higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MAINTENANCE MANAGEMENT: FARMING N4

(4090524)

14 November 2022 (X-paper)
09:00–12:00

Non-programmable calculators may be used.

This question paper consists of 11 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MAINTENANCE MANAGEMENT: FARMING N4
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each question on a new page.
5. Use only a blue or black pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 List FIVE basic equipment or hand tools needed in the workshop on the farm and ONE function of each. (5 × 2) (10)

1.2 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–J) next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	Flat head screwdriver	A	used to ensure bolts and nuts are tightened evenly
1.2.2	Torque wrench ☆	B	used for loosening and tightening of pipes
1.2.3	Phillips head screwdriver	C	used to tighten and loosen star headed screws
1.2.4	Pipe wrench	D	used for slotted-headed screws ☆
1.2.5	Allen keys	E	used to loosen and tight hexagonal slotted screws and bolts
1.2.6	Micrometer	F	used for measuring small gaps and spaces
1.2.7	Waterpump pliers	G	to remove quarter elliptical springs
1.2.8	Valve spring compressor ☆	H	it smooths out the thread effect inside caused by re-boring ☆
1.2.9	Feeler gauge	I	used to tighten packing gland nuts
1.2.10	Cylinder hone	J	used to measure outside diameters

(10 × 1) (10)
[20]

QUESTION 2

2.1 Complete the following sentence or sentences by using the words in the list below. Write only the missing word or words next to the question number (2.1.1–2.1.10) in the ANSWER BOOK.

compression; intake; piston rings; piston; four; two; torque; mechanical; cylinder; exhaust; internal; flywheel; power; gearbox; chemical

2.1.1 A car engine is an … combustion engine.

2.1.2 In a … stroke engine there is a power stroke for every two revolutions of the crankshaft.

2.1.3 In a … stroke engine is a power stroke every time the piston moves down.

2.1.4 The volume ratio between the … and combustion chamber is called the compression ratio.

2.1.5 The twisting force applied by the crankshaft is called ….

2.1.6 During … stroke the intake valve is open and exhaust valve closed with the piston moving down.

2.1.7 During … stroke the exhaust valve is open, intake valve closed, and the piston moves up.

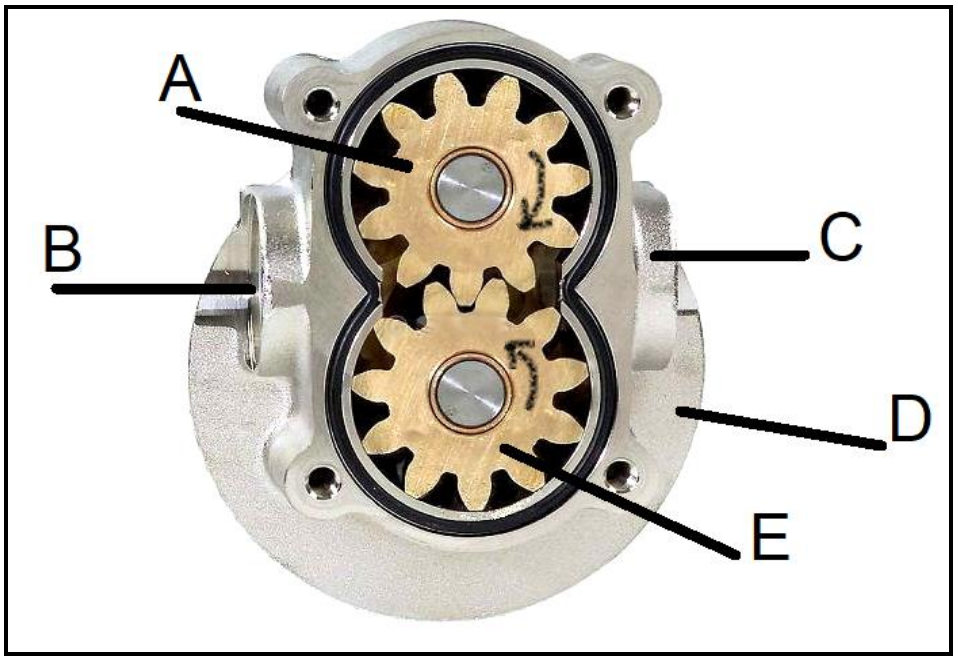
2.1.8 During the … stroke both valves are closed, and the piston moves up.

2.1.9 During the … stroke both valves are closed, and the piston moves down.

2.1.10 Fuel is used to produce mechanical energy from … energy.

(10 × 1) (10)

2.2 Look at the picture and then answer the questions. ☆



2.2.1 Label the different parts A–E in the ANSWER BOOK. (5)

2.2.2 Give the name of the part in the picture above and explain the function of the part. ☆ (3)

2.3 Identify the following components by writing the component's correct mechanical name next to the question number (2.3.1–2.3.7) in the ANSWER BOOK.

2.3.1 ☆



2.3.2 ☆



2.3.3



☆

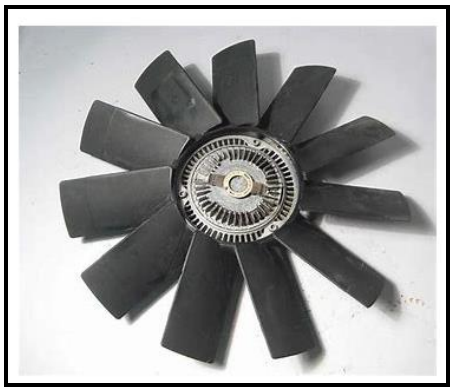
2.3.4



☆

2.3.5

☆



2.3.6



☆

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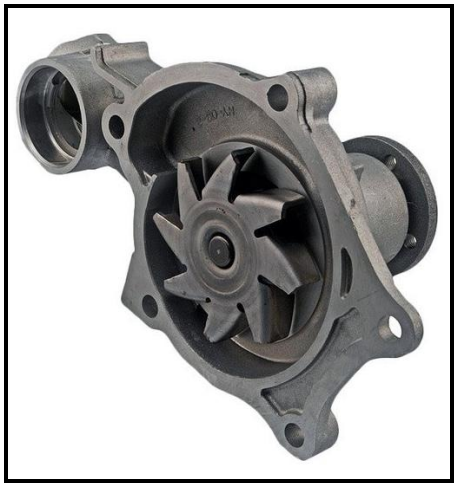
2.3.7



(7 × 1) (7)
[25]

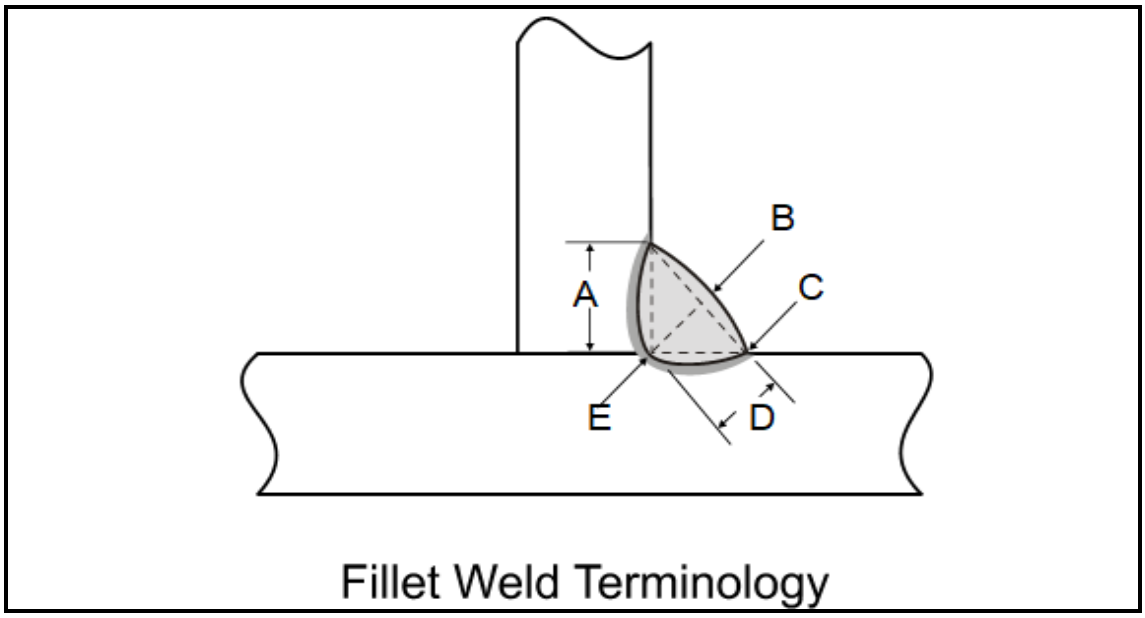
QUESTION 3

3.1 Choose a description from COLUMN B that matches a welding code in COLUMN A. Write only the letter (A–F) next to the question number (3.1.1–3.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1.1	3G	A	T-joint, flat weld
3.1.2	4G	B	flat, groove-weld
3.1.3	2G	C	overhead, groove weld
3.1.4	1G	D	vertical up, groove weld
3.1.5	1F	E	horizontal, groove weld
		F	vertical, fillet weld

(5 × 1) (5)

3.2 Look at the sketch and then answer the questions.



3.2.1 Label the different parts A–E in the ANSWER BOOK by choosing from the words below.

root; toe; face; leg; throat; nose; shield; penetration	(5)

3.2.2 Name the type of joint in the sketch above. (1)

3.3 Explain the *heating cycle* and how it causes internal stress in welded joints. (4)

[15]

QUESTION 4

4.1 Choose a description from COLUMN B that matches a type of agricultural waste in COLUMN A. Write only the letter (A–G) next to the question number (4.1.1–4.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
4.1.1	Biological waste	A	agricultural garbage, rubber, scrap
4.1.2	Solid waste	B	agricultural machinery servicing
4.1.3	Hazardous waste	C	corrosive, explosive and flammable
4.1.4	Used oil waste	D	human or animal manure/sewerage
4.1.5	Liquid waste	E	washing, flushing or food processing
		F	different types of food (maize, grains, beans)
		G	drinking types, wine, water, juice

(5 × 1) (5)

4.2 Indicate whether the following statements regarding personal protective clothing and equipment, are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (4.2.1–4.2.5) in the ANSWER BOOK.

4.2.1 Protective clothing needs to be kept separate from personal clothing.

4.2.2 Protective clothing needs to be washed after each application or spray operation before it is worn again.

4.2.3 You need to remove your protective clothing from the work area and wash your own protective clothing at home.

4.2.4 Workers need to buy their own special protective clothing that is splash proof, but employers need to supply general type of protective clothing.

4.2.5 Pesticides and chemical overalls should preferably be dark in colour so that contamination and spills can't be easily spotted.

(5 × 1) (5)
[10]

QUESTION 5

5.1 Do the following electrical calculations:

5.1.1 A single-phase electrical motor is connected to a 230 V supply. The resistance of the running windings is 100 Ohms.

Calculate the running current of the motor.

5.1.2 An electrical circuit draws 30 Amps with one internal winding. The equipment is connected to a 220 V supply.

Calculate the internal winding's resistance.

(2 × 3) (6)

5.2 List THREE basic parts a working electric circuit consists of. (3)

5.3 Explain what causes the magnetic field around a conductor. (1)
[10]

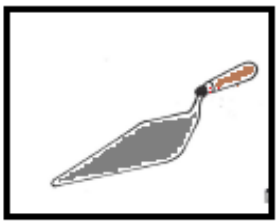
QUESTION 6

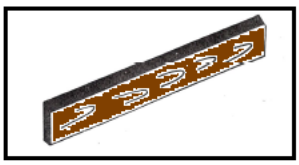
6.1 Ventilation is very important when designing buildings on the farm, either for animals or people's comfort. Wind is a natural form of ventilation in buildings.

☆ Make TWO labelled drawings to distinguish between *cross flow* and *pressure difference* mechanisms for ventilation. (2 × 5) (10)

6.2 Choose a picture from COLUMN B that matches a name in COLUMN A. Write only the letter (A–I) next to the question number (6.2.1–6.2.5) in the ANSWER BOOK.

☆

COLUMN A		COLUMN B
6.2.1	Hawk of wood or aluminium	A 
6.2.2	Whitewash brush	
6.2.3	Metal float	
6.2.4	Straight edge ☆	B 
6.2.5	Wooden float	C 
		D  ☆
		E 

	F  ☆ G  H  ☆ I 

(5 × 1) (5)

6.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (6.3.1–6.3.5) in the ANSWER BOOK.

6.3.1 Always check that the lintel is level when building in the lintel. ☆

6.3.2 The lintel should rest on brickwork between 150 mm–200 mm on each side.

6.3.3 The top side of the window frame doesn't have to be the same height as the door frame's top side.

6.3.4 If the lintel is longer than a meter, carefully support the centre of the lintel before building it in. ☆

6.3.5 Fill the lintels with mortar after it has been positioned and before you lay the bricks.

(5 × 1) (5)
[20]

TOTAL: 100

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