higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING PRACTICE AND MAINTENANCE
NQF LEVEL 3

(6021003)

20 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 8 pages.

NCV

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Read ALL the questions carefully.
2. Answer ALL the questions.
3. Number the answers according to the numbering system used in this question paper.
4. Start each question on a NEW page.
5. Write neatly and legibly.

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QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 … uses design models again and again.

A CAD
B Polarity
C Resistance
D Technical database

1.1.2 Visual refers to using one's … to diagnose a problem area in a system.

A hands
B eyes
C ears
D nose

1.1.3 … is NOT used to identify symptoms of a fault.

A Questing the customer
B Direct observation
C Trial and error replacement of parts
D Taking measurements

1.1.4 … greases have different types of mixtures.

A Calcium
B Lithium
C Solid
D Complex

1.1.5 Products must be … regularly due to changing technology.

A maintained
B destroyed
C repaired
D modified

(5 × 1) (5)

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1.2 Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–G) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	Lubricant	A	follow professionalism acts
1.2.2	Consumables	B	done on computer
1.2.3	Sodium grease	C	diagnosing and repairing
1.2.4	Ethical	D	get used up and must be replaced
1.2.5	Troubleshooting	E	used on high-speed antifriction bearings
		F	be alert
		G	provides a film between moving parts

(5 × 1) (5)

1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 Taking measurements is one of the techniques used by technicians to locate a fault.

1.3.2 Synthetic oil does NOT improve engine performance.

1.3.3 A short-circuit test is carried out to make sure there are NO leakages of electricity in a system.

1.3.4 Viscosity is NOT one of the principles of lubrication.

1.3.5 Irrelevant symptoms are those that give a clue about the symptoms.

(5 × 1) (5)

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1.4 Give ONE term for each of the following descriptions by choosing a term from the list below. Write only the term next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

dirty; cut; part; slip; made; produces; additives

1.4.1 Synthetic lubricant … from artificial ingredients.

1.4.2 A guillotine is a machine used to …plates.

1.4.3 … give lubricants specific performance characteristics.

1.4.4 Blunt tools force one to use more pressure and can also …

1.4.5 A steel plant is a production facility that … steel.

(5 × 1) (5)
[20]

QUESTION 2

2.1 Differentiate between each of the following:

2.1.1 Patent and technical journals

2.1.2 Computer software and internet

(2 × 2) (4)

2.2 A motor car engine is an example of existing mechanical power transmission solutions.

Name FIVE types of problems existing solutions might create. (5)

2.3 Explain the term *technological solution*. (3)

2.4 Designers need feedback on different aspects of a system or product after it has been used for some time by customers and users.

State FOUR aspects of customer feedback. (4)

2.5 Engineers developed different fundamental approaches in every engineering company.

What are the FOUR fundamental approaches you will apply to solve specific types of design problems? (4)
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QUESTION 3

3.1 Explain each of the following engineering terms:

3.1.1 Job card

3.1.2 Processing plant

3.1.3 Defect

3.1.4 Apprentice

3.1.5 Shutdown

(5 × 1) (5)

3.2 In engineering, fault-finding diagnostic involves a step-by-step systematic and logical approach to find out which part(s) of a system is problematic.

State FOUR principles of fault-finding diagnostics. (4)

3.3 Draw a labelled diagram showing FIVE parts of an engineering system. (5)

3.4 Name TWO important items that must be included in a fault-finding diagnostic-procedure report. (2)

3.5 Potentially hazardous equipment includes ALL hand tools, electrical pneumatics and hydraulic machinery, power tools and heavy machinery.

List FOUR safety precautions to adhere to when operating hazardous equipment. (4)

[20]

QUESTION 4

4.1 A faulty power tool has stopped the production in an engineering and related design workshop.

Name FIVE methods to follow when locating a fault and determining its cause. (5)

4.2 An artisan can get more information about the symptoms of a fault by asking the customer the right questions.

Give FOUR questions an artisan could ask the customer to identify the symptoms of a fault. (4)

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4.3 Copy the table below to the ANSWER BOOK.

Tabulate ONE positive aspect and ONE negative aspect of each of the following techniques in the corresponding columns.

TECHNIQUES		POSITIVE ASPECTS	NEGATIVE ASPECTS
4.3.1	Operational test		
4.3.2	Measurement-based testing		

(2 × 2) (4)

4.4 Differentiate between *relevant symptoms* and *irrelevant symptoms*. (2)

4.5 State FIVE details that must be recorded in the maintenance record of a machine. (5)

[20]

QUESTION 5

Read the extract below and answer the questions.

REPORT ON LUBRICATION FAILURES

There is some benign rubbing wear together with a number of large sliding wear steel particles and some dark metallo-oxides present. This is indicative of a transition from normal to severe sliding wear and likely due to insufficient lubrication. There are a few cutting wear particles due to the presence of nonmetallic crystalline particles in the form of silica. There are a number of severe copper alloy fatigue chunks and a few overheated tin/lead alloy fatigue chinks indicating severe bearing wear.

There are moderate amounts of red oxides present indicating water ingress at some stage. The presence of a large amount of submicroscopic particles at the exit end is indicative of corrosive wear. There is a moderate amount of insect and plant matter indicating seals and filters may be compromised or the sampling technique may not be adequate. Advice: Check bearings for signs of wear. Change oil and check filters and seals. Resample after 10 hours.

[Adapted from: *www.engineersireland.ie*]

5.1 What causes the presence of dark metallo-oxides? (2)

5.2 Explain the causes of severe bearing wear. (3)

5.3 What causes the severe copper-alloy fatigue chunks? (2)

5.4 State the importance of seals and filters. (2)

5.5 Define the term *corrosive wear.* (2)

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5.6 Name THREE groups into which lubricants can be categorised. (3 × 2) (6)

5.7 Give THREE disadvantages of using a manual-feed lubrication system. (3)
[20]

TOTAL: 100

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