higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MOTOR ELECTRICAL THEORY N2

(11040612)

20 November 2020 (X-paper)
09:00–12:00

Calculators may be used.

This question paper consists of 4 pages.

191Q1E2020

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MOTOR ELECTRICAL THEORY N2
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. Use only a blue or black pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 A circuit has a series resistor of unknown value connected to two parallel resistors of 12 Ω each. A potential difference of 12 volts produces a total current of 1 ampere.
Calculate the value of the unknown resistor. (4)

1.2 Explain the purpose of a resistor in a circuit. (2)

1.3 Name TWO sources of direct current. (2)

1.4 What is *electric power*? (2)

1.5 Briefly explain each of the following:

1.5.1 The EMF of a circuit

1.5.2 A short circuit

1.5.3 Direct current

(3 × 3) (9)
[19]

QUESTION 2

2.1 Name FOUR components of a starter motor armature. (4)

2.2 Explain the purpose of the bushes in a starter motor. (2)

2.3 State TWO characteristics of the brush lead of a starter motor. (2)

2.4 Describe in detail the construction of the field coils of a starter motor. (5)

2.5 Describe the construction of a solenoid of a pre-engaged-type starter motor. (5)
[18]

QUESTION 3

3.1 Explain the following:

3.1.1 Lenz's law (3)

3.1.2 Self-induction (2)

3.1.3 Mutual induction (2)

3.1.4 Faraday's law (3)

3.1.5 Electromagnetic induction (2)

3.2 Name SIX components of a workshop battery charger. (12)
[24]

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QUESTION 4

4.1 State TWO advantages of a magneto system when compared to a coil-ignition system. (2)

4.2 Explain step-by-step, the procedure to set the dynamic timing of a petrol engine. (5)

4.3 A point gap that is set to the correct specifications will produce the specified dwell angle.

Give THREE reasons for a fluctuating dwell angle that cannot be set to specifications. (3)

[10]

QUESTION 5

Explain the procedure to test an armature for each of the following:

5.1 Earth fault

5.2 Open circuit in windings

5.3 Short circuit in windings

(3 × 3) **[9]**

QUESTION 6

6.1 Make TWO neat, labelled sketches to show the *forward bias* and *reverse bias* of a diode. (2 × 3) (6)

6.2 Write out the following abbreviations in full of the systems or components used in motor vehicles:

6.2.1 ABS

6.2.2 EMS

6.2.3 GPS

6.2.4 EFI

(4 × 2) (8)

6.3 Make a neat, labelled sketch of any type of a transistor amplifier. (6)

[20]

TOTAL: 100

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