higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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NATIONAL CERTIFICATE

MOTOR ELECTRICAL THEORY N2

(11040612)

1 August 2018 (X-Paper)
09:00–12:00

This question paper consists of 5 pages and 1 formula sheet.

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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. Draw ALL sketches neatly and in good proportion.
5. Do ALL answers, including sketches, in the ANSWER BOOK.
6. Write neatly and legibly.

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QUESTION 1

1.1 Three resistances of 3 Ω, 4 Ω and 5 Ω respectively are connected in series.

1.1.1 Make a neat labelled sketch of the circuit using SI symbols. Indicate the given values on the sketch. (4)

1.1.2 Calculate the total resistance. (2)

1.1.3 Calculate the current flowing when a potential difference of 144 volts is supplied to the current. (2)

1.1.4 Calculate the voltage across each resistance. (6)

1.2 Define each of the following SI units:

1.2.1 Coulomb (2)

1.2.2 Weber (3)

1.2.3 Tesla (3)
[22]

QUESTION 2

2.1 Name TWO types of magnetos that replaced rotating-armature magnetos. (2)

2.2 Give THREE main advantages of a flywheel magneto. (3)

2.3 Draw a labelled circuit diagram of a series-wound generator with a field rheostat connected in the circuit. (5)

2.4 Give FIVE reasons why AC generators gradually replaced DC generators. (5)
[15]

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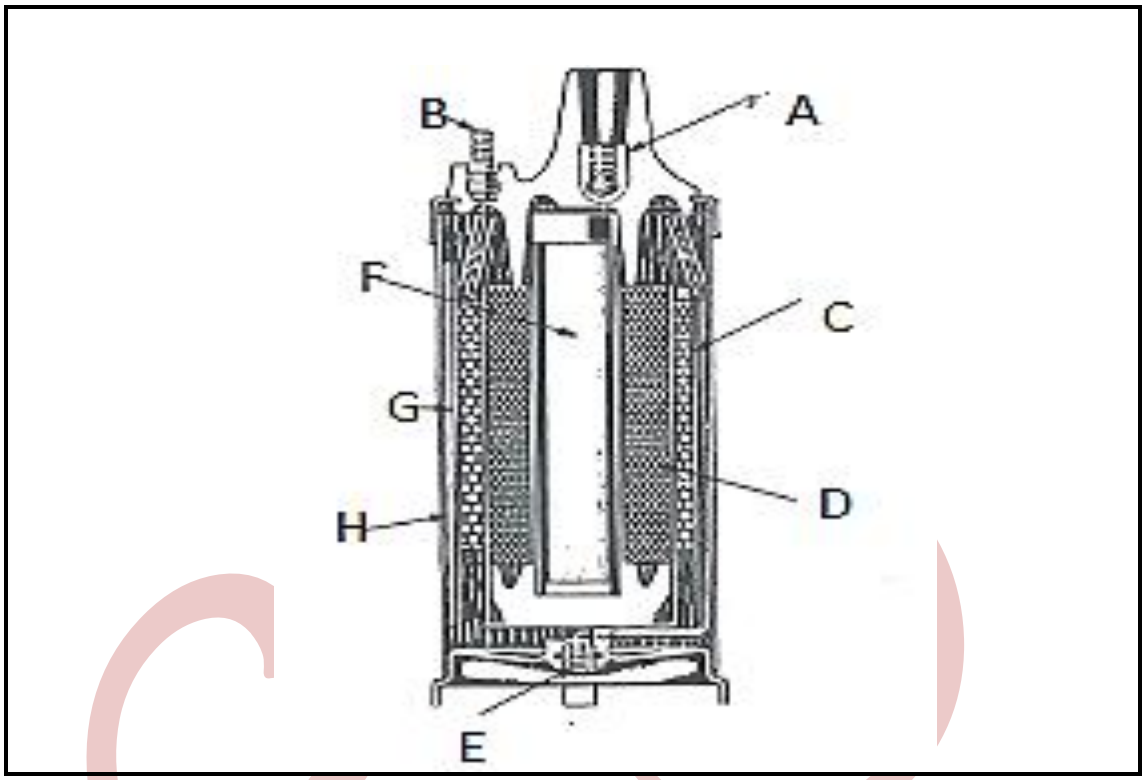
QUESTION 3

3.1 Label each component of the unit below by writing only the name of the component next to the letter (A-H) in the ANSWER BOOK.



(8 × 1) (8)

3.2 Give TWO functions of a capacitor in an ignition system. (2 × 2) (4)

3.3 Explain how a field-coil balancing test is done. (6)

[18]

QUESTION 4

4.1 Fully explain the procedure to carry out current-regulator settings. (5 × 2) (10)

4.2 What is the essential element of a semiconductor-type regulator? (2)

4.3 Give THREE factors that determine the amount of induced voltage. (3)

4.4 Compare the variode regulator with other regulators in terms of temperature effect. (4)

[19]

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QUESTION 5

5.1 Electric starting systems consist of a battery, cranking motor with a solenoid switch, a starting switch and complementary wires and cables.

Give FOUR additional components of an electric starting system. (4)

5.2 Define the term *solenoid.* (3)

5.3 Explain how a field coil is tested for grounded circuits. (4)

5.4 Give TWO factors that will affect the output voltage of a generator. (2)
[13]

QUESTION 6

6.1. A sulphated lead-acid battery will cause starting problems in a vehicle.

Explain the procedure to test a lead-acid battery for sulphated conditions. (5)

6.2 List THREE factors that may lead to a sulphated lead-acid battery. (3)

6.3 Give any TWO characteristics of a common emitter amplifier. (2)

6.4 A transistor may be used as an amplifier.

Give THREE types of transistor amplifiers. (3)
[13]

TOTAL: 100

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FORMULA SHEET

1. $I = \frac{V}{R}(A)$

2. $P = I.V\ (W)$

3. $Rt = R_1 + R_2 + R_3 + \ldots R_n\ (\Omega)$

4. $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots \frac{1}{R_n}\ (\Omega^{-1})$

5. $V = E - I.r\ (v)$

6. $E = B.\ell.v\ (V)$

7. $F = B.\ell.I\ (N)$

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