higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

7 April 2020 (X-paper)
09:00–12:00

A scientific calculator may be used.

This question paper consists of 7 pages and 1 formula sheet.

159Q1A2007

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
RADIO AND TELEVISION THEORY N1
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. Write neatly and legibly.

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QUESTION 1

Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 A … is used for voltage regulation in a circuit.

A resistor
B transistor
C Zener diode
D capacitor

1.2 The … offers high resistance to ac current.

A inductor
B capacitor
C resistor
D diode

1.3 An atom which loses an electron is called a …

A neutron.
B proton.
C positive ion.
D negative ion.

1.4 Used to detect the amplitude modulation:

A Detector
B Am detector
C FM detector
D Superimpose

1.5 An atom which gains an electron is: called a …

A negation ion
B positive ion
C neutral ion
D lost ion

(5 × 1) **[5]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 A diode can direct current in two directions.

2.2 A transistor can also be used to filter frequency.

2.3 Capacitors offer high resistance at low frequency.

2.4 Resistors are semiconductors in electronic circuits.

2.5 A shadow mask is found in a TV tube.

(5 × 1) **[5]**

QUESTION 3

Choose a term from COLUMN B that matches a term in COLUMN A. Write only the letter (A–L) next to the question number (3.1–3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	Super heterodyne	A	CRT
3.2	Ionosphere	B	semiconductor
3.3	Shadow mask	C	indicator
3.4	Diode	D	antenna
3.5	Transistor	E	mixing
3.6	Led	F	refraction of waves
3.7	Dipole	G	switch
3.8	15625 Hz	H	separation waveform
3.9	Detection	I	line oscillator
3.10	White	J	brightness
		K	hue
		L	vertical oscillator

(10 × 1) **[10]**

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QUESTION 4

Two resistors of 10 Ω and 15 Ω respectively are connected in parallel. This combination is connected in series to a 25 Ω resistor. The complete circuit is supplied by a 30 V DC power source.

Calculate each of the following:

4.1 Total resistance of the circuit (4)

4.2 Total current of the circuit (3)

4.3 Voltage across the 25 Ω resistor (3)
[10]

QUESTION 5

Draw a neat, labelled block diagram of an AM superheterodyne receiver and indicate all directions and interconnections. **[11]**

QUESTION 6

Define each of the following:

6.1 Conductor

6.2 Semiconductor

6.3 Power

6.4 Insulator

6.5 Molecule

(5 × 2) **[10]**

QUESTION 7

7.1 Sketch each of the following IEC symbols:

7.1.1 Diode

7.1.2 PNP transistor

7.1.3 NPN transistor

(3 × 2) (6)

7.2 Make a neat, labelled sketch of the internal structure of a forward-biased PN junction diode. (4)
[10]

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QUESTION 8

Define each of the following TV terms:

8.1 Sync separator

8.2 Line oscillator

8.3 FM detector

8.4 Flyback blanking

8.5 Peak white

(5 × 2) **[10]**

QUESTION 9

9.1 Name THREE factors that influence the capacity of a capacitor. (6)

9.2 Name THREE factors that influence the resistance of a conductor. (6)
[12]

QUESTION 10

10.1 Draw each of the following waveforms used in oscillators:

10.1.1 Sine wave

10.1.2 Square wave

10.1.3 Saw tooth

(3 × 2) (6)

10.2 Define each the following terms used in radio-wave propagation:

10.2.1 Polarisation

10.2.2 Ground-reflected wave

10.2.3 Direct-reflected wave

(3 × 2) (6)
[12]

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QUESTION 11

Write down each the following abbreviations in full:

11.1.1 Led

11.2 LCD

11.3 HDMI

11.4 HD

11.5 USB

(5 × 1) **[5]**

TOTAL: 100

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RADIO AND TELEVISION THEORY N1

FORMULA SHEET

$V = 3 \times 10^8 m/s$

$m\% = \frac{A-B}{A+B} \times \frac{100}{1}$

$R_T = R_1 + R_2 + \cdots R_N$

$e = E_M sin2\pi ft$

$P = V \times I$

$emf = {}^{b}/_{v}$

$V = \frac{P}{I}$

$I = \sqrt{\frac{P}{R}}$

$F = \frac{1}{T}$

$c = r \times t$

$I = \frac{E}{R+r}$

$\lambda = \frac{V}{f}$

$P = I^2R$

$I = I_M sin2\pi ft$

$R = \frac{P}{I^2}$

$V = I \times R$

$R = \frac{V^2}{P}$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots \frac{1}{R_N}$

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