higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

14 April 2021 (X-paper)
09:00–12:00

Scientific calculators may be used.

This question paper consists of 6 pages and 1 formula sheet.

167Q1A2114

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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. Diagrams must be large and neat and may be done in pencil.
5. Use only a black or blue pen (with exception of the diagrams).
6. Write neatly and legibly.

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QUESTION 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 (1.1–1.5) in the ANSWER BOOK.

1.1 Capacitors in … increase the capacitance value.

A parallel
B series
C series and parallel
D None of the above



1.2 PN diodes also function … in power supplies.

A bidirectionally
B as amplifiers
C as regulators
D as rectifiers

1.3 Resistors in … increase the total circuit resistance.

A parallel
B series and parallel
C series
D None of the above



1.4 How many currents flow through a transistor in full operation?

A Two
B Three
C One
D None of the above

1.5 A/An … is used to act against high frequencies.

A inductor
B capacitor
C transistor
D None of the above

(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 Radio waves can be distorted by lightning.



2.2 EMF exists around charged battery voltage.

2.3 Radio and TV involves transmission of electromagnetic waves.

2.4 The outermost shell of an atom is called a covalent.

2.5 Detectors are mostly used to recover the original intelligence.

(5 × 1) **[5]**

QUESTION 3

Choose a term from COLUMN B that matches a description 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	Time constant	A	addition of impurity
3.2	Gives correct readings	B	three-valence electrons
3.3	Readings of estimated value	C	diode
3.4	Signal magnification	D	capacitor
3.5	TV antenna	E	pentavalent
3.6	Stores electrical charge	F	ampere meter
3.7	Used to measure current only	G	transmitter
3.8	Doping	H	receiver antenna
3.9	Trivalent	I	amplifier
3.10	Semiconductor	J	analog multimeter
		K	RC circuit
		L	digital multimeter

(10 × 1) **[10]**

QUESTION 4

10 Ω and 20 Ω resistors are connected in parallel. This combination is connected in series to a 5 Ω resistor. The complete circuit is supplied by a 20 V DC power source.

Calculate the following:

4.1 The total resistance of the circuit (4)

4.2 The total current of the circuit (3)

4.3 The voltage across the 5 Ω resistor (3)

[10]

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QUESTION 5

5.1 Draw a neat, labelled block diagram of an AM superheterodyne receiver. ALL the directions and interconnections must be indicated. (10)

5.2 Name a stage from the block diagram in QUESTION 5.1 which performs each of the following functions:

5.2.1 Circuit superheterodyning

5.2.2 Separation of signals

5.2.3 Mechanical sound

(3 × 2) (6)
[16]

QUESTION 6

Define the following terms:

6.1 Luminance

6.2 Monochrome TV

6.3 Line of sight

6.4 Intercarrier signal

6.5 Critical angle

(5 × 2) **[10]**

QUESTION 7

7.1 Name and describe TWO methods of deflecting the beam of a TV. (4)

7.2 Describe TWO functions of the oscilloscope probe. (2)
[6]

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QUESTION 8

Define the following terms:

8.1 Frequency

8.2 Period

8.3 Bandwidth

8.4 Cycle

8.5 Wavelength

(5 × 2) **[10]**

QUESTION 9

Name FIVE controls on the oscilloscope. **[5]**

QUESTION 10

Draw a labelled circuit diagram of a stabilised common emitter amplifier circuit. Show all the components and input and output waveforms. **[7]**

QUESTION 11

Draw a labelled graph of the characteristic curve of a *germanium diode* and a *silicon diode*. **[10]**

QUESTION 12

Make a sketch of each of the following IEC symbols:

12.1 Zener diode

12.2 Variable capacitor

12.3 PNP transistor

(3 × 2) **[6]**

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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