higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

23 November 2022 (X-paper)
09:00–12:00

Drawing instruments and scientific calculators may be used.

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

167Q1E2223

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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. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

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 The smallest part of an element that can enter into a chemical reaction or change:

A Atom
B Ion
C Electron
D Proton

1.2 Electrical current strength symbolised by the letter A:

A Ammeter
B Ampere
C Current
D Conductor

1.3 The product formed when two or more elements combine:

A Conductor
B Compound
C Semiconductor
D Atom

1.4 An element that enables the easy flow of current:

A Semiconductor
B Conductor
C Insulator
D Ion

1.5 The force that causes electrons to move and produce a current:

A Electromotive force
B Electromotive pressure
C Electromagnetic force
D Electrolytic pressure

(5 × 1) **[5]**

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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 Bohr's theory states that electrons rotate in orbits around the nucleus.

2.2 The number of protons in an atom determines the atomic number.

2.3 When an electric current flows there exists a movement of charge or electrons.

2.4 Free electrons move from the negative potential to the positive potential.

2.5 The amount of electrons flowing in a conductor determines the strength of the current.

(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	Electrodes	A	secondary cell
3.2	Electrolyte	B	spongy cathode
3.3	Primary cells	C	voltage of 1,25 V
3.4	Wet cells	D	inside a cell
3.5	Dry cells	E	chemical solution in a cell
3.6	Mercury cells	F	cannot be recharged
3.7	Alkaline cells	G	liquid-type electrolyte
3.8	Accumulator	H	paste-type electrolyte
3.9	Lead acid cell	I	expensive and long shelf life
3.10	Nickel cadmium cell	J	dry cell with high current
		K	voltage of 1,35 V
		L	carbonised

(10 × 1) **[10]**

TOTAL SECTION A: 20

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SECTION B

QUESTION 4

A circuit consists of three resistors connected in series. The resistors are supplied by a 10 V battery. The resistor values are 10 Ω (R1), 20 Ω (R2) and 60 Ω (R3).

4.1 Draw the circuit diagram. (2)

4.2 Calculate the:

4.2.1 Total resistance

4.2.2 Total current of the circuit

4.2.3 Voltage drop across R1

4.2.4 Voltage drop across R2

(4 × 2) (8)
[10]

QUESTION 5

5.1 Draw a circuit of a full-wave bridge rectifier connected to a load resistor. (5)

5.2 Draw the output waveforms of the circuit in QUESTION 5.1 with two full AC cycle inputs. (4)

5.3 Draw a circuit that consists of two capacitors and one inductor that can be used as a filter for the circuit in QUESTION 5.1. (5)

5.4 Draw the output waveforms of the circuit in QUESTION 5.3. (2)

5.5 Explain the purpose of the filter circuit in QUESTION 5.3. (2 × 2) (4)
[20]

QUESTION 6

Explain each of the following terms:

6.1 RF stage

6.2 Modulation

6.3 Mixer

6.4 AM

6.5 FM

(5 × 2) **[10]**

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QUESTION 7

Draw a neat, labelled block diagram of a FM super heterodyne receiver. Indicate all directions and interconnections. **[10]**

QUESTION 8

8.1 Draw THREE waveforms that can be produced by oscillators. (3 × 2) (6)

8.2 Explain the purpose of *sine waves* and *square waves* as applied in electronic systems. (2 + 2) (4)

[10]

QUESTION 9

Draw a diagram that shows how the ionosphere has an effect on various sky-wave transmission paths. **[10]**

QUESTION 10

Explain each of the following television-receiver stages:

10.1 EHT

10.2 Power supply

10.3 Antenna

10.4 IF amplifier

10.5 Video amp

(5 × 2) **[10]**

TOTAL SECTION B: 80
GRAND TOTAL: 100

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FORMULA SHEET

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

$e = E_m \ Sin \ 2\pi \ ft$

$V = I \times R$

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

$Rt = R_1 + R_2 + ... R_n$

(emk = BLS : (emf = b/v)

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

$P = I^2R$

$P = \text{V} \times \text{I}$

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

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

$I = I_m \ Sin \ 2\pi \ ft$

$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + ... \frac{1}{R_n}$

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

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

$(c = r \times t)$

$m\% = \frac{A - B}{A + B_1} \times \frac{100}{1}$

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

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