higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

3 August 2021 (X-paper)
09:00–12:00

Drawing instruments and scientific calculators may be used.

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

167Q1G2103

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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 question on a new page.
5. Only use a black or blue pen.
6. 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 It is the outer shell which determines the … of an atom.

A resistor
B impurity
C semiconductor
D chemical valence

1.2 Component that offers low resistance to AC current:

A Inductor
B Capacitor
C Resistor
D Diode

1.3 Force that holds the electron in orbit around the nucleus:

A Neutron
B Proton
C Electron force
D Centrifugal force

1.4 Variation of signal amplitude for modulation:

A Detector
B AM modulation
C FM modulation
D Superimpose

1.5 Atoms consist of a centre part called the …

A negation ion.
B positive ion.
C neutral ion.
D nucleus.

(5 × 1) **[5]**

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QUESTION 2

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

2.1 When magnetic forces of magnets are the same, they will attract each other.

2.2 The combination of the same type of atoms is referred to as molecules.

2.3 Capacitors offer high resistance to direct current.

2.4 LCD is part of new screens.

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

(5 × 1) **[5]**

QUESTION 3

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

COLUMN A		COLUMN B	
3.1	Doping	A	cannot be recharged
3.2	PN junction	B	liquid type of electrolyte
3.3	Electrodes	C	measures the specific gravity of an electrolyte
3.4	Electrolyte	D	it is a dry cell
3.5	Primary cells	E	has long shelf life
3.6	Wet cells	F	chemical solution
3.7	Mercury cell	G	metals inside a cell
3.8	Alkaline cell	H	addition of impurities
3.9	Hydrometer	I	diode
3.10	Secondary cells	J	energy through chemical reaction

(10 × 1) **[10]**

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QUESTION 4

A 5 ohm- and a 15 ohm-resistor are connected in parallel. This combination is connected in series to a 25 ohm-resistor. The complete circuit is supplied by a DC power source of 12 V.

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 25 ohm-resistor (3)

[10]

QUESTION 5

Draw a neat, labelled block diagram of an FM superheterodyne receiver.

NOTE: ALL the directions and interconnections must be indicated. **[11]**

QUESTION 6

Define the following terms:

6.1 Electromagnetic induction

6.2 Self-induction

6.3 Faraday's law

6.4 Lenz's law

6.5 Cycle

(5 × 2) **[10]**

QUESTION 7

7.1 Sketch the IEC symbols of the following:

7.1.1 A diode

7.1.2 A PNP transistor

7.1.3 An NPN transistor

(3 × 2) (6)

7.2 Make a neat, labelled sketch that shows a reverse-biased PN junction of a diode. (4)

[10]

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QUESTION 8

Define the following TV terms:

8.1 IF amplifier

8.2 Video detector

8.3 Video amp

8.4 Sync separator

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 the following waveforms used in oscillators:

10.1.1 Sine wave

10.1.2 Square wave

10.1.3 Saw tooth wave

(3 × 2) (6)

10.2 Define the following terms used in radio wave propagation:

10.2.1 Polarisation

10.2.2 Ground wave

10.2.3 Direct wave

(3 × 2) (6)

[12]

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QUESTION 11

Write the following abbreviations in full:

11.1 IF

11.2 AF

11.3 HD

11.4 FM

11.5 AM

(5 × 1) **[5]**

TOTAL 100

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(11040821)

RADIO AND TELEVISION THEORY N1

FORMULA SHEET

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

$V = I \times R$

$R_t = R_1 + R_2 + ... R_n$

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

$P = V \times I$

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

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

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

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

$e = E_m \sin 2\pi ft$

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

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

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

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

$P = I^2 R$

$(c = r \times t)$

$I = I_m \sin 2\pi ft$

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

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