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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

22 November 2019 (X-Paper)
09:00–12:00

Scientific calculators may be used.

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

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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. Sketches must be large, neat and fully labelled.
5. Subsections of questions may NOT be separated.
6. Write neatly and legibly.

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QUESTION 1

THREE cells, each with an EMF of 1,5 V and an internal resistance of 0,2 ohms are connected in parallel across an external load resistor of 5 ohms.

1.1 Make a neat, labelled sketch of the circuit. (2)

1.2 Calculate the following:

1.2.1 Total EMF of the circuit without the load resistor

1.2.2 Total internal resistance of the circuit

1.2.3 Total current in the circuit

1.2.4 The voltage drop of the battery

(4 × 2) (8)
[10]

QUESTION 2

Make a neat, labelled sketch which indicates the following:

- The earth
- The ionosphere
- The path of a sky wave
- The path of a direct wave
- The path of a ground wave
- The transmitter and receiver

(6 × 1) **[6]**

QUESTION 3

Draw a neat, labelled block diagram of an FM superheterodyne receiver. Indicate ALL the directions and interconnections. **[10]**

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QUESTION 4

Explain the following terms used in cells and batteries:

4.1 Electrodes

4.2 Electrolyte

4.3 Wet cell

4.4 Dry cell

4.5 Secondary cell

(5 × 2) **[10]**

QUESTION 5

Choose an item from COLUMN B that matches an item in COLUMN A. Write only the letter (A–K) next to the question number (5.1–5.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
5.1	Heterodyne	A	ionosphere
5.2	Demagnetising	B	dipole
5.3	Vertical oscillator	C	CRT
5.4	LOPT	D	voltage regulator
5.5	Antenna	E	degaussing
5.6	Indicator	F	hue
5.7	Zener diode	G	seven segment
5.8	Shadow mask	H	EHT generator
5.9	Colour intensity	I	alternating current
5.10	Refraction of waves	J	50 Hz scanning
		K	mixer

(10 × 1) **[10]**

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QUESTION 6

6.1 Explain Faraday's law. (3)

6.2 Name FOUR factors that influence the amount of inductance in a coil. (8)
[11]

QUESTION 7

A 30 V 50 Hz AC voltage is obtained from the secondary of a step-down transformer.

Calculate the following:

7.1 Peak voltage

7.2 RMS value

7.3 Wavelength

7.4 Time period

7.5 Average value

(5 × 2) **[10]**

QUESTION 8

The following are stages in a TV receiver that are faulty.

Name TWO faults in each stage that can be diagnosed by a TV technician.

8.1 The cathode-ray tube

8.2 The line output stage

(2 × 2) **[4]**

QUESTION 9

State THREE precautions that should be followed when using a digital multimeter when measuring the following:

9.1 DC current

9.2 DC voltage

(2 × 3) **[6]**

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QUESTION 10

Define the following stages of a television receiver:

10.1 CRT

10.2 Field oscillator

10.3 PSU

10.4 Contrast

10.5 Line oscillator

(5 × 2) **[10]**

QUESTION 11

Oscillators are used to produce various types of waveforms.

11.1 Draw THREE waveforms that can be produced by oscillators. The name of each waveform starts with the letter 'S'. (6)

11.2 Explain the purpose of each of the waveforms you mentioned in QUESTION 11.1 as applied in electronic systems. (6)

[12]

QUESTION 12

Make a sketch of the IEC symbol of a microphone. **[1]**

TOTAL: 100

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FORMULA SHEET

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

$V = I \times R$

$R_t = R_1 + R_2 + \ldots R_n$

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

$P = V \times I$

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

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

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

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

$e = E_m \sin 2\pi ft$

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

$emf = b / v$

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

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

$P = I^2 R$

$(c = r \times t)$

$I = I_m \sin 2\pi ft$

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

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