higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1470**(E)**(A5)T

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

5 April 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. Subsections of questions may NOT be separated.
4. Number the answers according to the numbering system used in this question paper.
5. Sketches must be neat.
6. Write neatly and legibly.

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QUESTION 1

Study FIGURE 1 below and answer the questions:

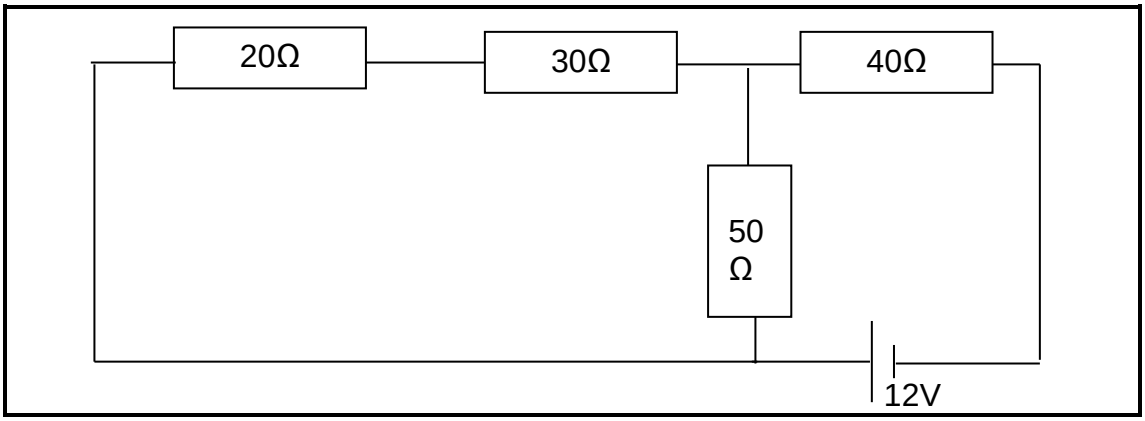


FIGURE 1

Determine the following values with the aid of Ohm's law:

1.1 Total resistance of the circuit (4)

1.2 Total current of the circuit (2)

1.3 Parallel resistance of the circuit. (2)

1.4 Voltage across the parallel resistance (2)

[10]

QUESTION 2

Write down each of the following abbreviations in full:

2.1 LO

2.2 PSU

2.3 VLF

2.4 AF

2.5 RF

(5 × 1) **[5]**

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QUESTION 3

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

COLUMN A		COLUMN B	
3.1	Mixer	A	refraction of waves
3.2	Degaussing	B	antenna
3.3	50 Hz scanning	C	shadow mask
3.4	Eht generator	D	zener diode
3.5	Dipole	E	demagnetising
3.6	Led	F	colour intensity
3.7	Voltage regulator	G	indicator
3.8	Crt	H	LOPT
3.9	Hue	I	alternating current
3.10	Ionosphere	J	vertical oscillator
		K	heterodyne

(10 × 1) **[10]**

QUESTION 4

4.1 Draw a neat, labelled block diagram of an FM superheterodyne receiver. Indicate ALL the directions and interconnections. (10)

4.2 Name the stages in the block diagram in QUESTION 4.1 in which each of the following functions takes place:

4.2.1 Heterodyning of signal

4.2.2 Detection

4.2.3 Frequency control

(3 × 2) (6)
[16]

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QUESTION 5

Define each of the following terms:

5.1 Power supply unit

5.2 Line oscillator

5.3 Sync separator

5.4 Modulation

5.5 Detection

(5 × 2) **[10]**

QUESTION 6

Sketch the IEC symbol of each of the following:

6.1 Microphone

6.2 Loudspeaker

6.3 Amplifier

6.4 Aerial

6.5 Light-dependent resistor

(5 × 1) **[5]**

QUESTION 7

Draw a labelled block diagram of an AM modulator and include the input and output waveforms. **[5]**

QUESTION 8

A PM 9 battery is used in a portable radio which has a voltage without load of 9,5 V. When connected to the radio a current of 0,3 A flows and the voltage drops to 9,2 V.

Calculate the internal resistance of the battery. **[5]**

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QUESTION 9

Draw a labelled block diagram of a black-and-white TV. Show ALL interconnections. **[20]**

QUESTION 10

Describe the differences between *amplitude* and *frequency modulation* of a radio frequency signal. **[6]**

QUESTION 11

11.1 Name THREE advantages of AM. (3)

11.2 Name TWO disadvantages of AM. (2)
[5]

QUESTION 12

Name the input and TWO outputs of the video detector circuit of a monochrome TV. **[3]**

TOTAL: 100

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RADIO AND TELEVISION THEORY N1

FORMULA SHEET

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

$V = I \times R$

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

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

$P = V \times I$

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

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

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

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

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

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

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

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

$P = I^2 R$

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

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

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

$(c = r \times t)$

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