higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1470**(E)**(J31)T

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

31 July 2018 (X-Paper)
09:00–12:00

Scientific calculators may be used.

This question paper consists of 5 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. Subsections of questions may NOT be separated.
5. Sketches must be neat.
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 series across an external load resistor of 5 ohms.

1.1 Draw a labelled sketch of the circuit. (2)

1.2 Calculate the following:

1.2.1 Total EMF of the circuit without load resistor

1.2.2 Internal resistance of the circuit

1.2.3 Circuit current

1.2.4 Voltage drop of the battery

(4 × 2) (8)
[10]

QUESTION 2

A 20 V 50 hz AC voltage is obtained from the secondary of a step-down transformer.

Calculate each of the following:

2.1 Peak voltage

2.2 RMS value

2.3 Wavelength

2.4 Time period

2.5 Propagation velocity per second

(5 × 2) **[10]**

QUESTION 3

Complete each of the following by writing only the answer next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 1µf = 1 × ... f

3.2 1 nf = 1 × ... f

3.3 1 pf = 1 × ... f

3.4 1 µf = … nf

3.5 1 nf = … pf

(5 × 1) **[5]**

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QUESTION 4

Write down each of the following abbreviations in full:

4.1 AGC

4.2 AFC

4.3 VHF

4.4 UHF

4.5 IF

(5 × 1) **[5]**

QUESTION 5

Draw a labelled sketch of the characteristic curve of germanium and silicon diodes. **[10]**

QUESTION 6

6.1 Draw a sketch to illustrate the basic elements in a radio communication chain. (6)

6.2 Explain the function of each element illustrated in QUESTION 6.1. (12)
[18]

QUESTION 7

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

ALL the directions and interconnections must be indicated. (10)

7.2 Give THREE advantages of amplitude modulation. (3)

7.3 Give TWO disadvantages of amplitude modulation. (2)
[15]

QUESTION 8

Name FIVE basic elements of a black-and-white television and the function of each. **[10]**

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QUESTION 9

Define each of the following television receiver stages:

9.1 Contrast

9.2 Video amp

9.3 Pincushion distortion

9.4 Shadow mask

9.5 Field oscillator

(5 × 2) **[10]**

QUESTION 10

Name SEVEN controls on an oscilloscope. **[7]**

TOTAL: 100

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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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