higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

ENGINEERING

T1350(E)(J21)T
AUGUST EXAMINATION

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

21 July 2014 (Y-Paper)
13:00–16:00

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 emf of 1,5 V and 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.

1.2 Total EMF of the circuit without load resistor.

1.3 The internal resistance of the circuit.

1.4 What is the circuit current?

1.5 What is the voltage drop of the battery?

(5 × 2) **[10]**

QUESTION 2

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

Calculate the following:

2.1 Peak voltage

2.2 RMS value

2.3 Wavelength

2.4 Generation period

2.5 The propagation velocity per seconds

(5 × 2) **[10]**

QUESTION 3

Complete the following:

3.1 1 µf = 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 the following abbreviations in full.

4.1 AGC

4.2 AFC

4.3 VHF

4.4 UHF

4.5 I.F

(5 × 1) **[5]**

QUESTION 5

Draw a labelled sketch of the characteristic curve of Germanium and Silicon diodes. **[10]**

QUESTION 6

Radio communication was a first important use for electronics. The existence of electromagnetic waves was predicted in 1865 by James Clark Maxwell.

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

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

QUESTION 7

7.1 Draw a neat; labelled block diagram of FM SUPERHETERODYNE receiver. (ALL the directions and interconnections must be indicated.) (10)

7.2 Give THREE advantages of AM. (3)

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

QUESTION 8

Name FIVE basic elements of a black and white TV. **[10]**

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QUESTION 9

Fully define the following television receiver stages.

9.1 Contrast

9.2 Video amp

9.3 Pincushion distortion

9.4 Shadow mask

9.5 The field oscillator

(5 × 2) **[10]**

QUESTION 10

Name SEVEN controls on an oscilloscope.

[7]

TOTAL: 100

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RADIO AND TELEVISION THEORY N1

FORMULA SHEET

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

$V = I \times R$

$Rt = R_1 + R_2 + \ldots R_n$

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

$P = V \times I$

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

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

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

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

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

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

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

(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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