201304T288

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1470(E)(A2)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

2 April 2013 (X-Paper)
09:00–12:00

This question paper consists of 5 pages and a 1-page 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

Given: Three resistors connected in series. R1 is 20 ohms, R2 is 100 ohms and R3 is 150 ohms, supplied with a DC voltage of 12 volts.

1.1 Draw the circuit diagram of the resistors mentioned above. (2)

1.2 Calculate the following, using the information given above:

1.2.1 Total resistance

1.2.2 The total current of the circuit

1.2.3 The voltage drop across 20 ohms

1.2.4 The power dissipation of the circuit

(4 × 2) (8)
[10]

QUESTION 2

2.1 Sketch the IEC symbols of the following:

2.1.1 A diode

2.1.2 A PNP transistor

2.1.3 An NPN transistor

(3 × 2) (6)

2.2 Make a neat, labelled sketch which indicates a forward-biased condition of a PN junction of a diode. (4)
[10]

QUESTION 3

3.1 Draw a neat, labelled block diagram of an FM superheterodyne receiver. ALL the directions and interconnections must be indicated. (10)

3.2 Name the stage in the block diagram in QUESTION 3.1 above which performs the following function:

3.2.1 Selection

3.2.2 Output IF

3.2.3 Sound magnification

(3 × 2) (6)
[16]

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QUESTION 4

Explain the functions of the following in a television receiver:

4.1 AF amplifier

4.2 Video/Luminance amplifier

4.3 Loudspeaker

4.4 EHT

(4 × 2) **[8]**

QUESTION 5

Draw a neat, labelled block diagram of a 625-line television receiver. ALL the directions and interconnections must be indicated. **[12]**

QUESTION 6

6.1 Draw the following waveforms used in oscillators:

6.1.1 Sine wave

6.1.2 Square wave

6.1.3 Sawtooth wave

(3 × 2) (6)

6.2 Define the following terms used in radio wave propagation:

6.2.1 Polarisation

6.2.2 Ground-reflected wave

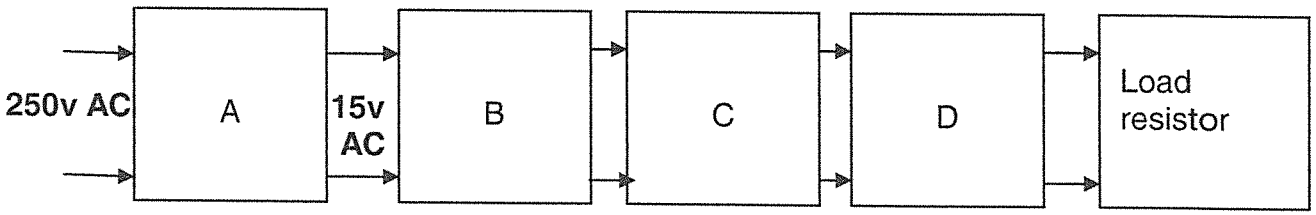
6.2.3 Direct-reflected wave

(3 × 2) (6)
[12]

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QUESTION 7

Refer to the figure below and answer the questions.



7.1 Name the stages of the block diagram above. (4)

7.2 Explain the functions of the following stages in the sketch above:

7.2.1 A

7.2.2 B

7.2.3 D

(3 × 2) (6)
[10]

QUESTION 8

The oscilloscope is widely used in electrical and electronic laboratories.

8.1 Give FIVE tests that can be performed by the oscilloscope. (5)

8.2 Name FIVE basic components of an oscilloscope CRT and explain the function of each component. (10)
[15]

QUESTION 9

Draw a labelled circuit diagram of a stabilised common emitter amplifier circuit using a NPN transistor. Show all components with input and out waveforms. **[7]**

TOTAL: 100

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RADIO AND TELEVISION THEORY N1

FORMULA SHEET

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

$V = I \times R$

$Rt = R_1 + R_2 + \ldots R_n$

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

$P = \mathrm{V} \times \mathrm{I}$

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

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

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

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

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

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

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

(EMK = BLS/EMF = BV)

$P = I^2R$

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

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

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

$(c = r \times t)$

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