



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE**

**RADIO AND TELEVISION THEORY N3**

(11040873)

**30 November 2023 (X-paper)  
09:00–12:00**

**Drawing instruments and scientific calculators may be used.**

**This question paper consists of 7 pages.**

169Q1E2330

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
NATIONAL CERTIFICATE  
RADIO AND TELEVISION THEORY N3  
TIME: 3 HOURS  
MARKS: 100

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**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. Use only a black or blue pen.
  5. Write neatly and legibly.
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**SECTION A****QUESTION 1**

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 The ... wave is used in digital electronics.

- A sine
- B square
- C sawtooth
- D radio



1.2 A field oscillator must be able to produce a carefully shaped ... waveform for Class A output stage.

- A sawtooth
- B triangular
- C square
- D vertical

1.3 To drive a line output, the waveform is nearer in shape to a ... wave.

- A rectangular
- B sawtooth
- C triangular
- D vertical

1.4 The ... of the line oscillator is used to drive the line output stage.



- A output
- B input
- C EHT
- D voltage

1.5 The EHT is about ... in a colour TV.

- A 25 kV
- B 18 kV
- C 30 kV
- D 50 kV

(5 × 1)

[5]



**QUESTION 2**

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

- 2.1 The input signal to the sync separator can be secured from the output of the video detector.
- 2.2 The comparator circuit produces a DC voltage.
- 2.3 The line oscillator frequency is 15625 Hz.
- 2.4 The output of the field oscillator is a sawtooth waveform.
- 2.5 The output of the line oscillator is used to drive the line output stage.

(5 × 1)

**[5]****QUESTION 3**

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

| COLUMN A |                       | COLUMN B |                         |
|----------|-----------------------|----------|-------------------------|
| 3.1      | DC clamps             | A        | cuts-off electron beam  |
| 3.2      | Flyback blanking      | B        | deformation picture     |
| 3.3      | Brightness control    | C        | perforated steel plate  |
| 3.4      | Pincushion distortion | D        | RGB maximum drive       |
| 3.5      | Phosphor              | E        | removing magnetic field |
| 3.6      | Shadowmask            | F        | lock colour signal      |
| 3.7      | Peak white            | G        | DC level cathodes       |
| 3.8      | Degaussing            | H        | emits light             |
| 3.9      | Tripler circuit       | I        | EHT generation          |
| 3.10     | Delta gun             | J        | triangular form         |
|          |                       | K        | square form             |
|          |                       | L        | sync pulses             |

(10 × 1)

**[10]**

**QUESTION 4**

Complete the following sentences by writing only the missing word or words next to the question number (4.1–4.5) in the ANSWER BOOK.



- 4.1 A(An) ... is an electronic device that is used as the video detector.
- 4.2 The colour information consisting of saturation and hue signals is called ....
- 4.3 A(An) ... is designed to receive signals lying within different wavebands.
- 4.4 Changing the ... means changing the ratio between black and white in a TV receiver.
- 4.5 The ... supply unit supplies all sections with the necessary power.

(5 × 1)

**[5]****TOTAL SECTION A:****25****SECTION B****QUESTION 5**

- 5.1 Calculate each of the following additive and subtractive colour-mixing problems in terms of voltage:

5.1.1 Yellow + cyan

5.1.2 White – magenta

5.1.3 White – yellow

5.1.4 Green + blue

(4 × 2)

(8)

- 5.2 Discuss the THREE properties of colour.

(3 × 2)

(6)

**[14]****QUESTION 6**

Draw a fully labelled sketch of a unijunction transistor relaxation oscillator circuit. Show the input and output waveforms.

**[10]**

**QUESTION 7**

Describe the following faults in RF and luminance circuits:

- 7.1 Overall colour cast
- 7.2 Luminance delay line
- 7.3 Excessive sub-carrier dot pattern



(3 × 3) [9]

**QUESTION 8**

- 8.1 Define the term *pincushion distortion*. (3)
- 8.2 Show by means of THREE sketches the deformation (pincushion distortion) of a picture. (3)
- 8.3 Draw a labelled diagram of a circuit that is used to rectify pincushion distortion. (4)



[10]

**QUESTION 9**

Explain the process of manual degaussing of the picture. [6]

**QUESTION 10**

Explain the process of replacing the colour tube of a television receiver. [8]

**QUESTION 11**

- 11.1 Name the faulty section and the test instrument to use for the following television receiver faults:



- 11.1.1 Only colour and no picture information on the screen with the incoming correct signal.
- 11.1.2 A dot pattern on the screen of a colour television receiver.
- 11.1.3 Unstable EHT in a colour television receiver.

(3 × 2) (6)

- 11.2 Explain the difference between *line oscillator* and *field oscillator*. Also indicate their frequencies. (4)



[10]

**QUESTION 12**

12.1 Explain how, interlaced scanning, is done in the television tubes. Make use of sketches to support the answer. (6)

12.2 Explain the main purpose of the output stage of a television receiver. (2)

[8]



**TOTAL SECTION B: 75**  
**GRAND TOTAL: 100**

