higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1350(E)(M24)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N1

(11040821)

24 March 2013 (Y-Paper)
13:00–16:00

This question paper consists of 5 pages and 1 formula sheet.

ENGINEERING

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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

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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. Subsections of questions must NOT be separated.
5. Sketches must be large, clear and neat.
6. Write neatly and legibly.

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QUESTION 1

A circuit consists of three resistors connected in series. They are supplied by a 10-volts battery. Resistors values are 10 ohms (R1), 20 ohms (R2) and 60 ohms (R3).

1.1 Draw the circuit diagram mentioned above. (2)

1.2 Calculate the following:

1.2.1 Total resistance

1.2.2 The total current of the circuit

1.2.3 The voltage drop across R1

1.2.4 Voltage drop across R2

1.2.5 The power dissipated by the circuit

(5 × 2) (10)
[12]

QUESTION 2

2.1 Draw a circuit of a full-wave-bridge rectifier connected to a load resistor. (5)

2.2 Draw the output waveforms of the circuit in QUESTION 2.1 of TWO full AC cycle inputs. (4)

2.3 Draw a circuit which consists of TWO capacitors and ONE inductor that can be used as a filter for the circuit in QUESTION 2.1. (5)

2.4 Draw the output waveforms of the circuit in QUESTION 2.3. (2)

2.5 Fully explain the purpose of the filter circuit in QUESTION 2.3. (4)
[20]

QUESTION 3

Explain the following terms:

3.1 RF stage

3.2 Modulation

3.3 Mixer

3.4 AM

3.5 FM

(5 × 2) **[10]**

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QUESTION 4

Draw a neat labelled block diagram of a FM superheterodyne receiver. (ALL the directions and interconnections must be indicated.) **[10]**

QUESTION 5

Oscillators are used to produce various types or shapes of waveforms.

5.1 Draw THREE waveforms that can be produced by these oscillators. The names of the waveforms start with the letter 'S'. (6)

5.2 Explain the purpose of these waveforms as applied in electronics systems. (6)
[12]

QUESTION 6

Sky-wave transmission is subject to fading and erratic changes with seasons, night and day and atmospheric conditions. What makes sky-wave transmission possible is the exisistence of a series of ionised layers in the earth's upper atmosphere called the ionosphere.

Draw a diagram that shows how the ionosphere has an effect on various sky-wave transmission paths. **[10]**

QUESTION 7

Fully explain the following television receiver stages:

7.1 EHT

7.2 Power supply

7.3 Antenna

7.4 IF amplifier

7.5 Video amp

(5 × 2) **[10]**

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QUESTION 8

Draw the IEC symbols for the following electronic components in the ANSWER BOOK:

8.1 Fuse

8.2 Variable resistor

8.3 Transformer

8.4 NPN transistor

8.5 Zener diode

8.6 Lamp

8.7 Microphone

8.8 LED

8.9 Diode

8.10 Double-pole single-throw switch

8.11 Fixed capacitor

8.12 PNP transistor

(12 × 1) **[12]**

QUESTION 9

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (9.1–9.4) in the ANSWER BOOK.

9.1 *Digital multimeters* are not accurate as compared with *analog meters.*

9.2 The CRT of a monochrome TV has one electronic gun.

9.3 A loudspeaker is one form of a transducer.

9.4 DStv is part of satellite communication.

(4 × 1) **[4]**

TOTAL: 100

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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)

$P = I^2R$

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

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

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

$(c = r \times t)$

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