higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N2

6 APRIL 2018

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 area
1.2 sin
1.3 minimum
1.4 high
1.5 3
1.6 diode
1.7 horizontal
1.8 faster
1.9 360°
1.10 1 kHz

(10 × 1) **[10]**

QUESTION 2

2.1 100 V given (1)

2.2 $E_{rms} = 0,707 \times E_{\max}$
$= 0,707 \times 100$ ✓
$= 70,7$ Volts ✓

$E_{ave} = 0,637 \times E_{\max}$
$= 0,637 \times 100$ ✓
$= 63,7$ Volts ✓ (4)

2.3 $2\pi f = 314,2$
$f = \frac{314,2}{2\pi}$ ✓✓
$= 50$ Hz ✓ (3)

2.4 $T = \frac{1}{f} = \frac{1}{50}$ ✓
$= 0,02$ seconds ✓ (2)

2.5 $e = 100\sin(314,2 \times 12 \times 10^{-3} \times 57,3°)$ ✓✓✓
$= -58,9$ Volts ✓ (4)

2.6 $55 = 100\sin(314,2t \times 57,3)$ ✓
$\frac{55}{100} = \sin(314,2t \times 57,3)$ ✓

$\sin^{-1} 0,55 = (314,2t \times 57,3)$ ✓
$33,367 = 314,2t \times 57,3$ ✓
$t = \frac{33,367}{314,2 \times 57,3}$ ✓
$= 0,00185$ seconds ✓
$= 1,85$ ms (6)

[20]

QUESTION 3

3.1 $X_L = X_C$ ✓
$Z = R$ ✓
$I_{\max imum}$ ✓
$\theta = 0°$ ✓
$Pf = 1$ ✓ (Any 4 × 1) (4)

3.2 3.2.1

$$fr = \frac{1}{2\pi\sqrt{LC}}$$
$$= \frac{1}{2\pi\sqrt{128\times10^{-3}\times58\times10^{-6}}}$$ ✓✓✓
$$\underline{= 58{,}412 \text{ Hz}}$$ ✓ (4)

3.2.2

$$Q = \frac{1}{R}\sqrt{\frac{L}{C}}$$ OR $Q = X_L/R$
$$= \frac{1}{15}\sqrt{\frac{128\times10^{-3}}{58\times10^{-6}}}$$ ✓ $= 2 \times 3{,}142 \times 58{,}412 \times 128 \times 10^{-3}/15$
$= 3{,}13$
$$= \frac{1}{15}\sqrt{2206{,}896}$$
$$\underline{= 3{,}13}$$ ✓ (2)

[10]

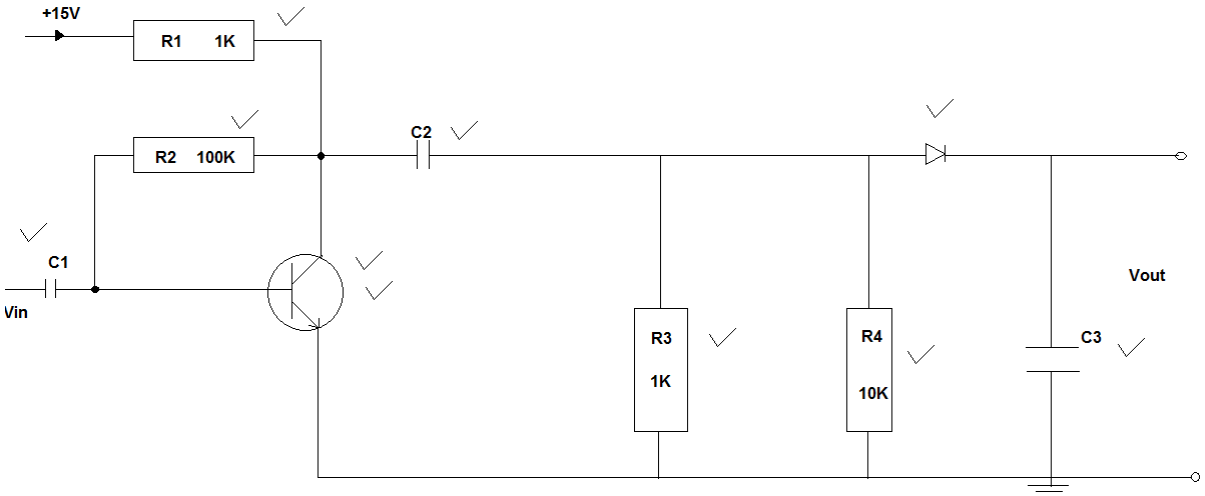
QUESTION 4

4.1
- Cathode-ray tube
- Vertical amplifier
- Horizontal amplifier
- Time-base generator
- Delay line
- Trigger circuit
- Power supply unit (7)

4.2
- These probes contain active devices such as diodes and transistors.
- They are designed to provide an effective coupling method of high-frequency, fast rise-time signals to the CRO.
- They allow for high-input impedances. (3)

[10]

QUESTION 5



[10]

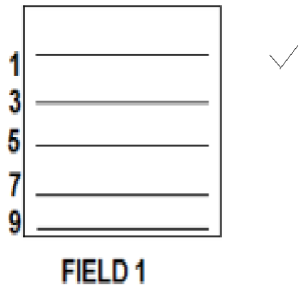
QUESTION 6

Because of bandwidth limitations✓ of the transmission channel a special scanning method called interlaced scanning is used.

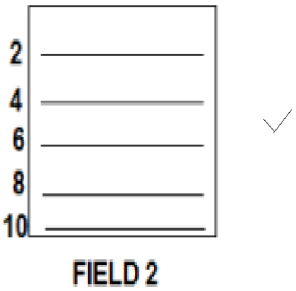
Instead of the target in the camera tube and the TV tube being scanned in consecutive✓ lines, the beam is made to scan all the odd-numbered✓ lines in the order 1, 3, 5, 7, etc. down to the bottom line. It then scans all even lines 2, 4, 6, 8, etc.✓ down to the end line of the raster. From there it goes back to the beginning of line 1 and the process is repeated.✓

It does two vertical sweeps✓ of a raster producing one complete picture✓ on the screen. The first half is produced by odd-scanning✓ and the second is produced by even-line✓ scanning. The first half picture is superimposed✓ on the first.

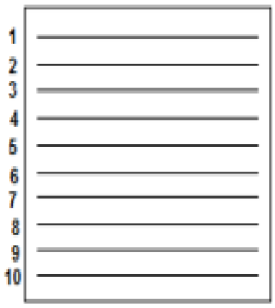
The number of half pictures presented is called the field frequency and the number of pictures presented in every second is called the picture frequency.✓ Note the field frequency is always double the picture frequency.



FIELD 1



FIELD 2



FIELD 3

[15]

QUESTION 7

7.1 The circle allows for adjusting the correct aspect ratio (4 : 3). The centre of the circle is also the centre of the picture. (2)

7.2 The black and white castellations around the edge of the pattern allows for centring and adjusting the size of the picture. (2)

7.3 Scanning linearity can be monitored by the cross-hatch at the background of the circle. This allows for vertical and horizontal scanning. (2)

7.4 Convergence is allowed by the black bars in the very central area of the circle (static convergence). The cross-hatch bars outside the circle allow for dynamic convergence adjustments. (3)

7.5 Contrast settings can be checked by the six rectangular bars below the grayscale settings. There should be a constant difference in brightness. (2)

7.6 Ghost images can be checked by the white or black vertical lines. Particularly with the black needle in the top area of the circle. (2)

7.7 Colour settings can be done with the colour display provided by the test pattern. Various areas are coloured to provide colour adjustments, either at the front end of the receiver or at the colour circuitry inside the receiver. (2)

[15]

QUESTION 8

- Familiarise yourself with the normal state of the equipment.
- Do not speculate about the problem.
- Work step by step to find the fault.
- Remove dust from the equipment – in television receivers, dust can make fault-finding procedures difficult.
- Inspect the equipment before attempting to find the fault.
- There are normally three quick checks that can be carried out, namely smell, look, and listen.
- Be patient – the equipment is not going to tell you what is wrong or where the fault is, you must locate and repair it yourself.
- If in doubt, ask – you cannot know everything.
- Record the located fault.
- Develop a system of bookkeeping where all faults located in various pieces of equipment are recorded. **[10]**

TOTAL: 100

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