higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RADIO AND TELEVISION THEORY N3

31 JULY 2018

This marking guideline consists of 7 pages.

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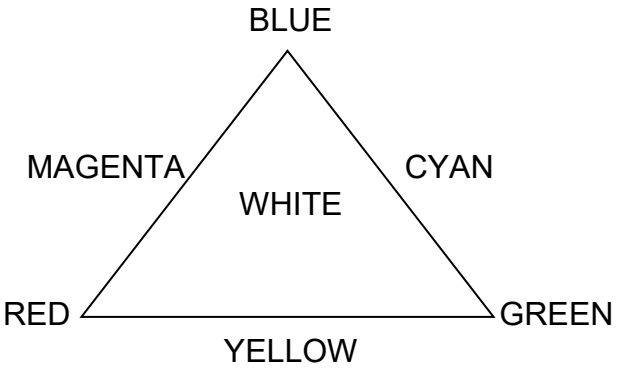
QUESTION 1

1.1



1 mark for each colour inserted (6)

1.2 1.2.1 Blue + red + green
= 0,11 V✓ + 0,3 V ✓ + 0,59 V ✓
= 1 V ✓ (4)

1.2.2 Blue + green
= 0,11 V ✓ + 0,59 V ✓
= 0,7 V ✓ (2)
[12]

QUESTION 2

2.1 A colour killer is used to switch the chrominance decoder off ✓ during black and white picture reception. ✓ (2)

2.2 AGC is used to maintain a constant video output ✓ from the detector as the RF signal varies. ✓ (2)

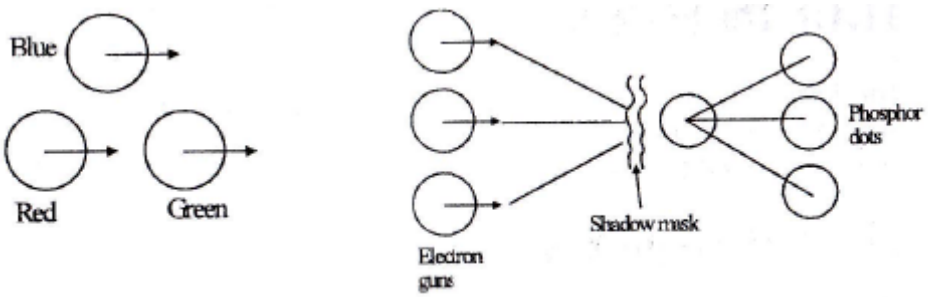
2.3 A Y-delay line is used to delay the luminance signal (usually 0,7 µsec) ✓ so that the Y-signal and the chrominance signal reach the tube at the same time. ✓ (2)

2.4 A colour burst is 10 cycles of 4,43 MHz ✓ on the back porch of the synchronising pulse of every line carrying colour information. ✓ Its duration is 2,2 µsec. ✓ The purpose of the burst is to keep the reference oscillator of 4,43 MHz in the chrominance decoder phase locked. ✓ It is also used to identify the presence or absence of a PAL colour signal. ✓ (5)
[11]

QUESTION 3

Delta gun:

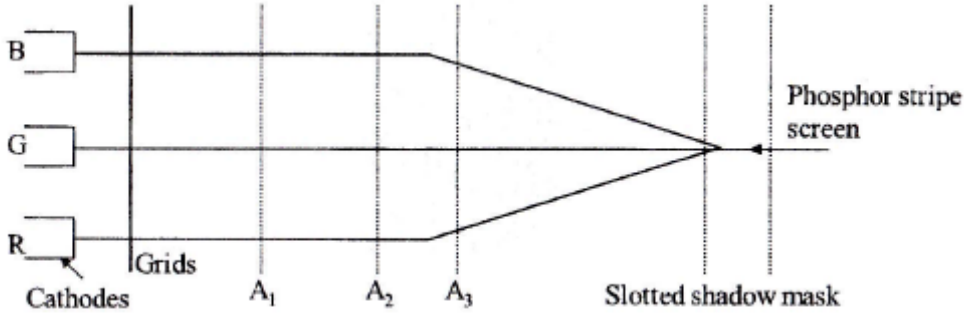
- Guns are arranged in triangular format. ✓
- The screen phosphors are laid down in phosphor dots. ✓
- The tube has a shadow mask placed before the screen to prevent the electron beam from falling onto the wrong colour phosphor. ✓



(3 marks for explanation + 3 marks for drawing)

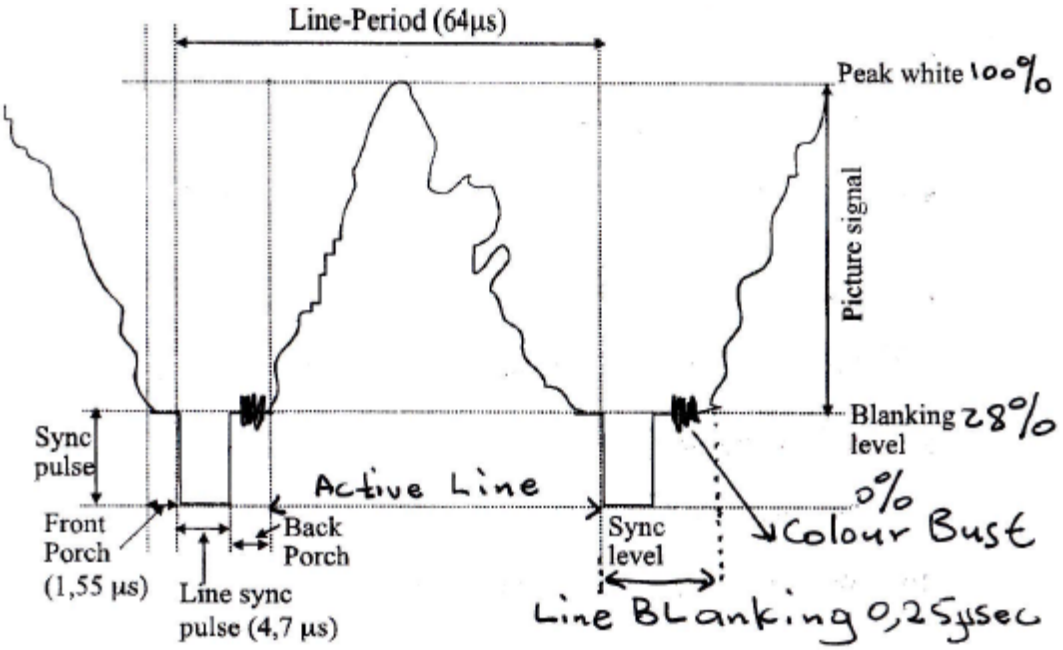
In-line gun:

- The guns are arranged in a horizontal line. ✓
- The screen phosphors are laid down in the form of vertical stripes or slots. ✓
- The beams are bent slightly by offsetting the aperture in the final anode. ✓



(3 marks for explanation + 3 marks for drawing) **[12]**

QUESTION 4



1 mark per label with a minimum of 8 labels **[8]**

QUESTION 5

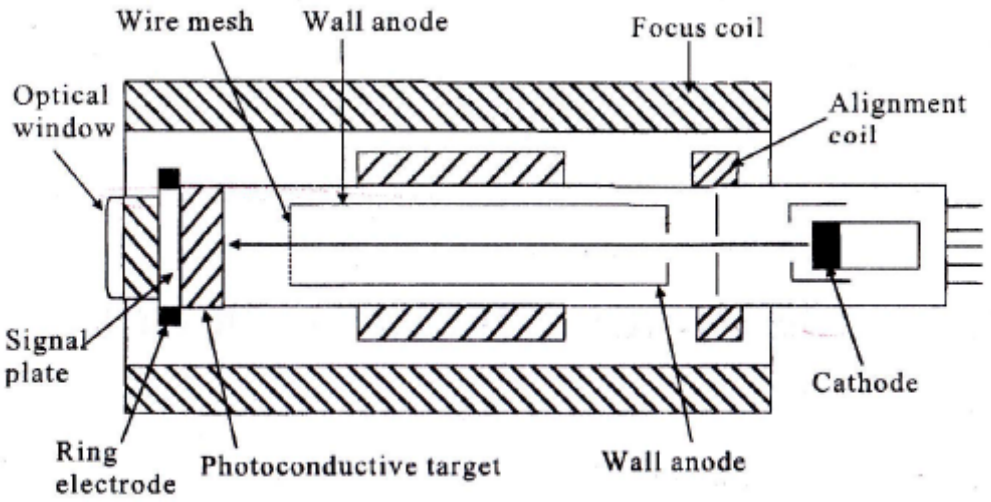
5.1 The three electron beams must converge on the phosphors of the same triad. ✓ Red on red phosphor, ✓ blue on blue phosphor ✓ and green on green phosphor of the same triad. ✓ (4)

5.2
- Static convergence ✓
- Dynamic convergence ✓ (2)

5.3
- If necessary, a magnifying glass or convergence microscope can be used to make sure that the beams are striking the phosphor dots of a single triad. ✓
- Use a cross-hatch pattern or dot display. ✓
- Switch off the blue gun. ✓
- Adjust the red and green radial magnets until the red and green rasters coincide at the centre of the screen to produce a yellow dot or cross-hatch. ✓
- Switch on the blue gun and adjust the blue radial and blue lateral magnets until blue coincide with yellow at the centre of the screen to produce a white dot or white cross-hatch. ✓ (5)

[11]

QUESTION 6



THE VIDICON TUBE

(1 mark for each label + 2 marks for drawing) **[12]**

QUESTION 7

7.1 The electron gun produces a beam of electrons ✓ accelerated to a fluorescent screen that emits light. ✓

7.2 The control grid allows electrons to pass through to the anodes. ✓ The negative-bias voltage at the control grid with respect to the cathode enables it to control the brightness of the video signal. ✓

7.3 The accelerating grid has three anodes at successive higher positive potential ✓ to accelerate the electron beam towards the screen. ✓

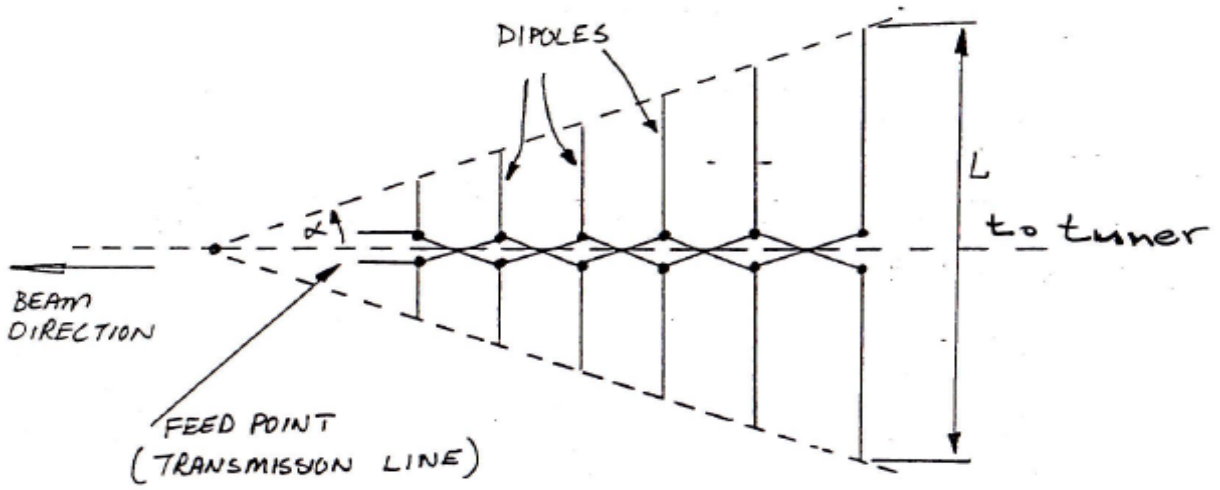
7.4 The phosphor screen has red, blue and green phosphors, one for each primary colour. ✓ When an electron beam hits the phosphor dot it glows for a certain period. ✓

7.5 The magnetic deflection has scanning coils around the neck of the tube that deflects the electron beam across the screen. ✓ The deflection angle obtained by this deflection is much greater than with electrostatic deflection. ✓

7.6 The shadow mask is a perforated metal sheet placed behind the phosphor inside the tube ✓ where the electron beam has to go through to bombard one triad on the screen. ✓

(6 × 2) **[12]**

QUESTION 8



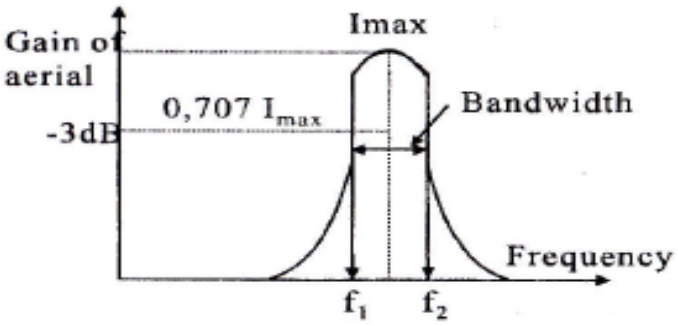
(1 mark for each label)

Advantages:

- Wide bandwidth ✓
- Medium gain ✓
- Strong construction ✓
- Directional ✓
- Eliminates ghosting ✓ **[9]**

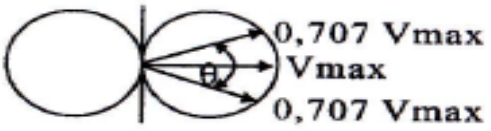
QUESTION 9

9.1



½ mark for each label (3)

9.2



Dipole θ = 90°

(3)

9.3 Gain is the ratio of the power induced ✓ in the given antenna as compared to the power induced in a simple dipole ✓ by an electromagnetic wave. ✓ (3)
[9]

QUESTION 10

10.1 True
10.2 False
10.3 True
10.4 False

(4 × 1) **[4]**

TOTAL: 100

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