



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RADIO THEORY N3

5 APRIL 2018

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1 False
- 1.2 False
- 1.3 True
- 1.4 True
- 1.5 True
- 1.6 False
- 1.7 True
- 1.8 False
- 1.9 True
- 1.10 True

(10 × 1) **[10]****QUESTION 2**

$$\begin{aligned}
 V_i &= I_i \times R_i \\
 &= 10 \times 10^{-3} \times 6 \checkmark \\
 &= 0,06 \text{ V} \checkmark \\
 &\underline{\hspace{1cm} \rightarrow}
 \end{aligned}$$

$$\begin{aligned}
 I_o &= \frac{V_o}{R_o} = \frac{1}{10} \checkmark \\
 &= 0,1 \text{ A} \checkmark \\
 &\underline{\hspace{1cm} \rightarrow}
 \end{aligned}$$

$$\begin{aligned}
 P_i &= I_i^2 \times R \text{ OR } \frac{V^2}{R} \\
 &= (10 \times 10^{-3})^2 \times 6 \checkmark \\
 &= 600 \text{ } \mu\text{W} \checkmark \\
 &\underline{\hspace{1cm} \rightarrow}
 \end{aligned}$$

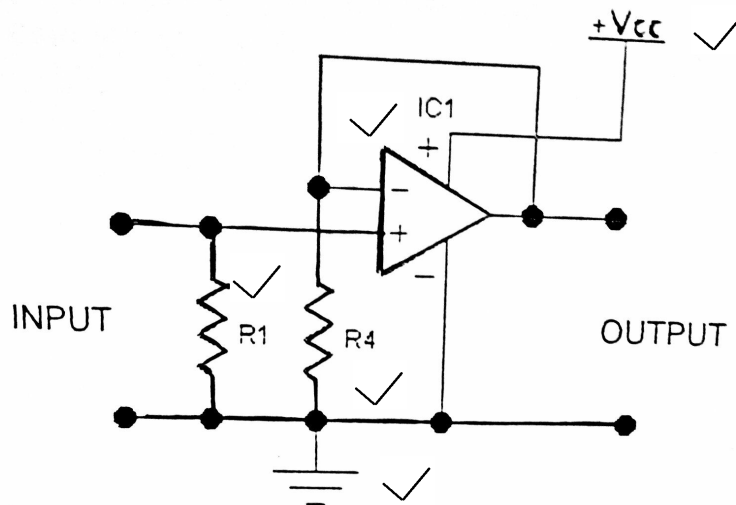
$$\begin{aligned}
 P_o &= \frac{V_o}{R_o} = \frac{1^2}{10} \checkmark \\
 &= 0,1 \text{ W} \checkmark \\
 &\underline{\hspace{1cm} \rightarrow}
 \end{aligned}$$

$$\begin{aligned}
 N &= 10 \log \frac{0,1}{600 \times 10^{-6}} \checkmark \\
 &= 22,218 \text{ dB} \checkmark \\
 &\underline{\hspace{1cm} \rightarrow}
 \end{aligned}$$

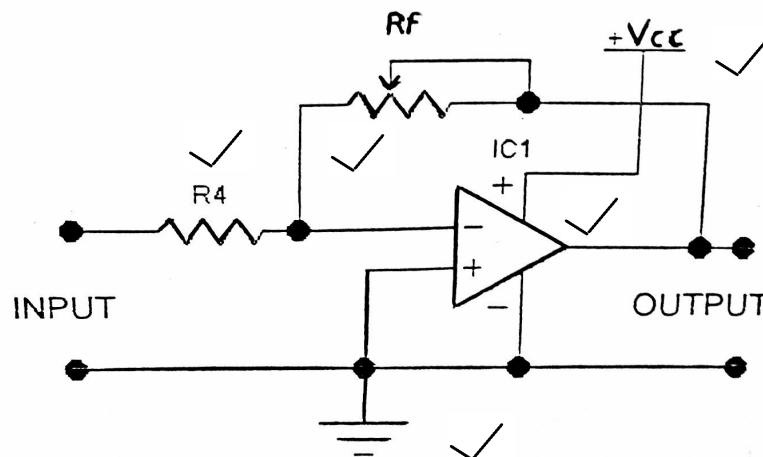
[10]

QUESTION 3

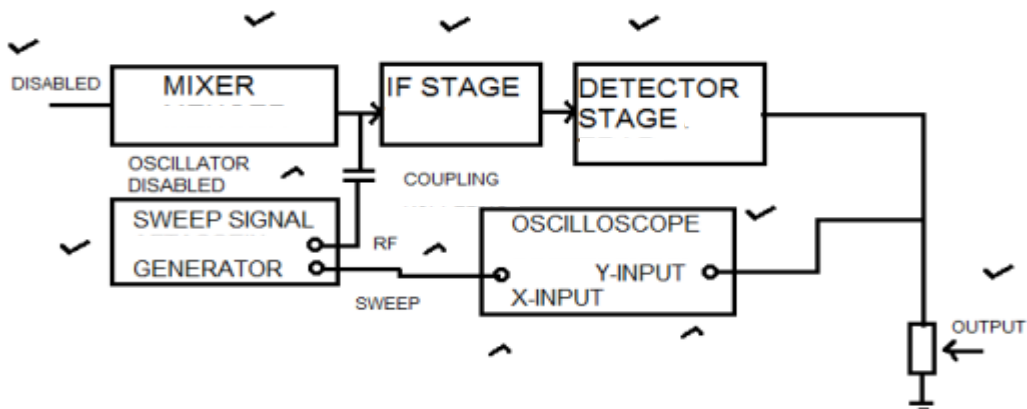
3.1



3.2



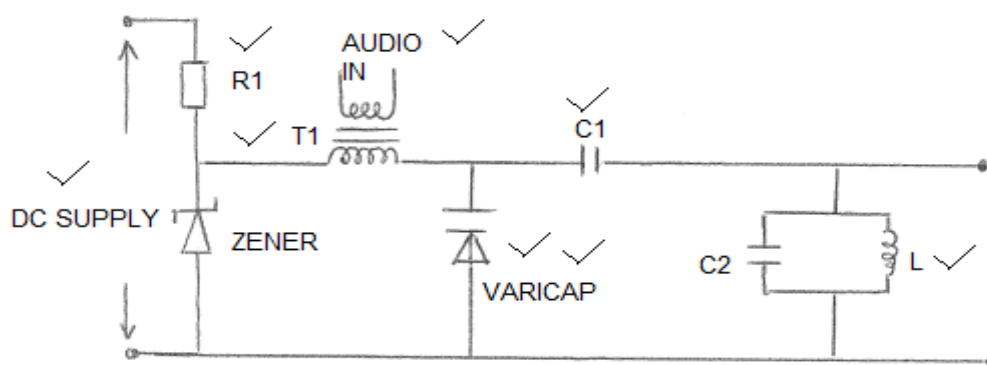
(2 x 5) [10]

QUESTION 4

[10]

QUESTION 5

5.1



(8)

The varicap is biased by the supply voltage applied via R1 and a Zener diode. The audio is coupled into the system via transformer T1.

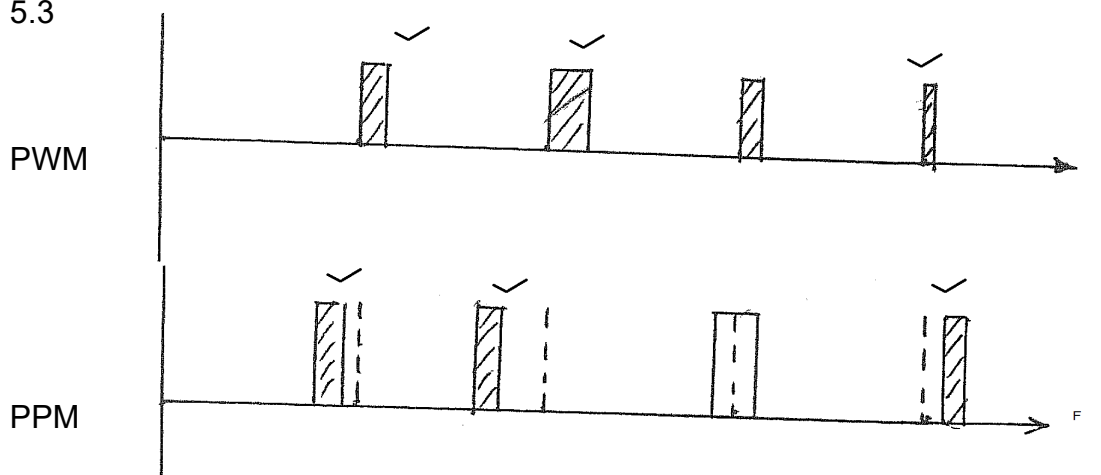
The reverse bias across the varicap now varies in accordance with AF variations and as such the capacitance varies. As the capacitance forms part of the oscillator-tuned circuit, the oscillator frequency will also vary and thus we have a modulated FM carrier wave.

(5)

5.2 Reactance transistor

(1)

5.3

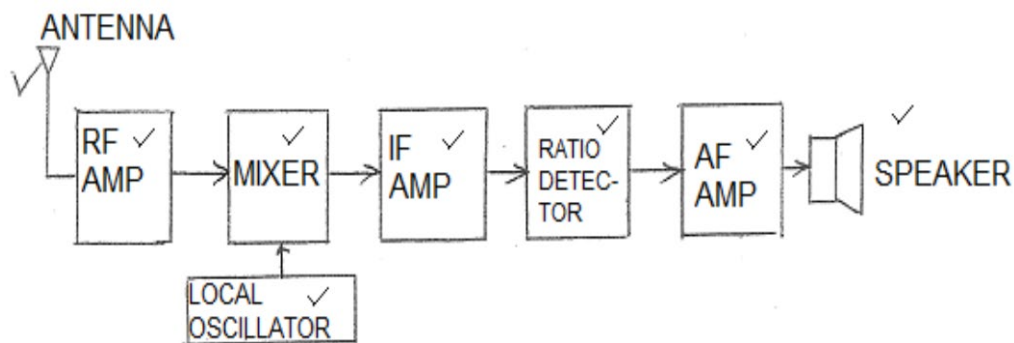


(3)

(3)
[20]

QUESTION 6

6.1



(8)

- 6.2
- Discriminator – It changes the frequency variations into amplitude variations to separate the AF and the RF carrier wave. ✓✓
 - The IF amplifier is tuned to pass only the IF signal and amplify it while rejecting all other frequencies. ✓✓ (2 × 2)

(4)

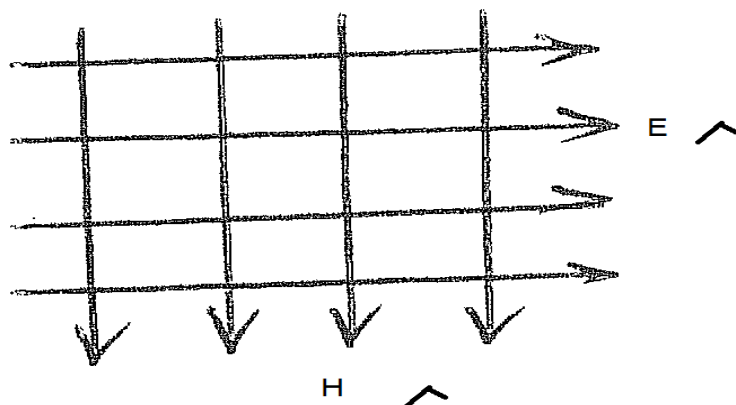
- 6.3 It employs a limiter that eliminates noise variations on the signal. ✓ (2)

- 6.4 10,7 MHz ✓ (1)

[15]**QUESTION 7**

- 7.1 It is a device that radiates or receives electromagnetic waves. (2)

7.2



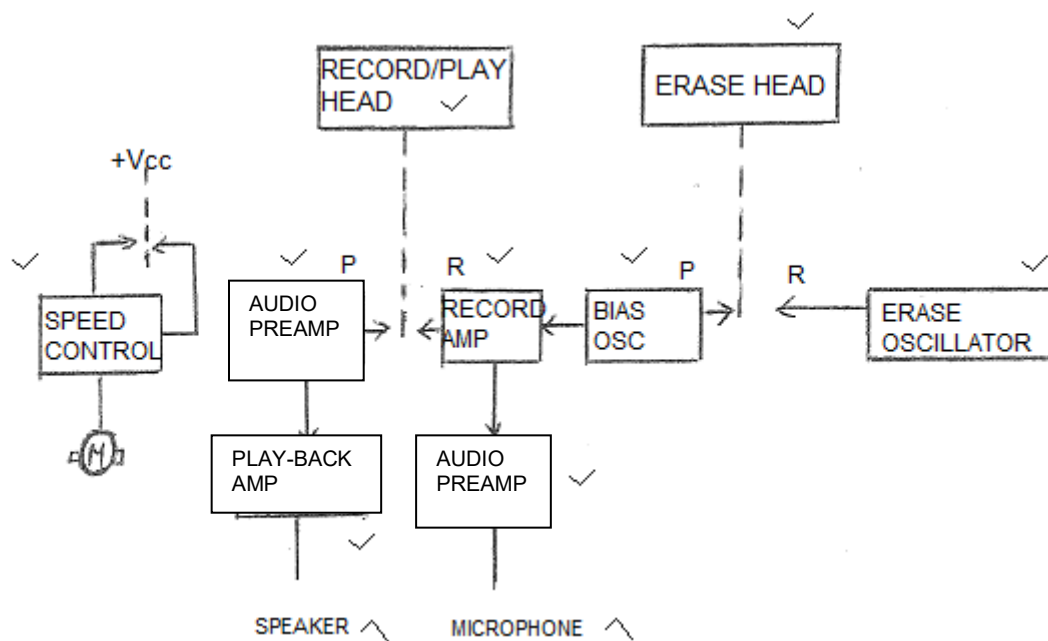
(1)

Electromagnetic waves possess an electric and magnetic field ✓ at right angles to each other and to the direction of propagation. When the electric field is horizontal, ✓ and the magnetic field vertical we say that the wave is horizontally polarised. Polarisation thus depends on whether the electric field is vertical ✓ or horizontal.

(3)

- 7.3 90° (2)

- 7.4 7.4.1 The signal travels round the surface of the earth ✓ by a process of diffraction. ✓ (2)
- 7.4.2 The wave travels directly from the transmitting to the receiving antenna ✓ without the need for reflection or refraction. ✓ (2)
- 7.4.3 This is the distance between the transmitter ✓ and the nearest point to which a sky-wave returns. ✓ (3)
- [15]**

QUESTION 8**[10]****TOTAL: 100**