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.

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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

$V_i = I_i \times R_i$
$= 10 \times 10^{-3} \times 6$ ✓
$= 0{,}06\ V$ ✓

$I_O = \frac{V_O}{R_O} = \frac{1}{10}$ ✓
$= 0{,}1\ A$ ✓

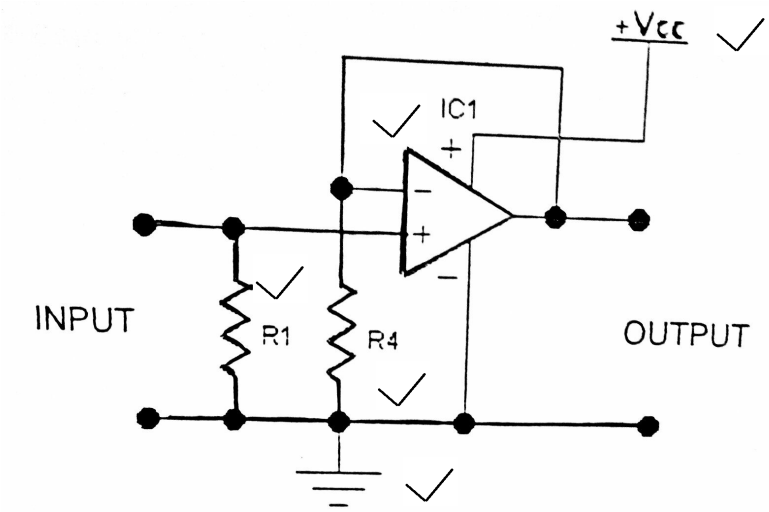
$P_i = I_i^2 \times R$ OR $\frac{V^2}{R}$
$= (10 \times 10^{-3})^2 \times 6$ ✓
$= 600\ \mu W$ ✓

$P_O = \frac{V_O}{R_O} = \frac{1^2}{10}$ ✓
$= 0{,}1\ W$ ✓
$N = 10 \log \frac{0{,}1}{600 \times 10^{-6}}$ ✓
$= 22{,}218\ dB$ ✓

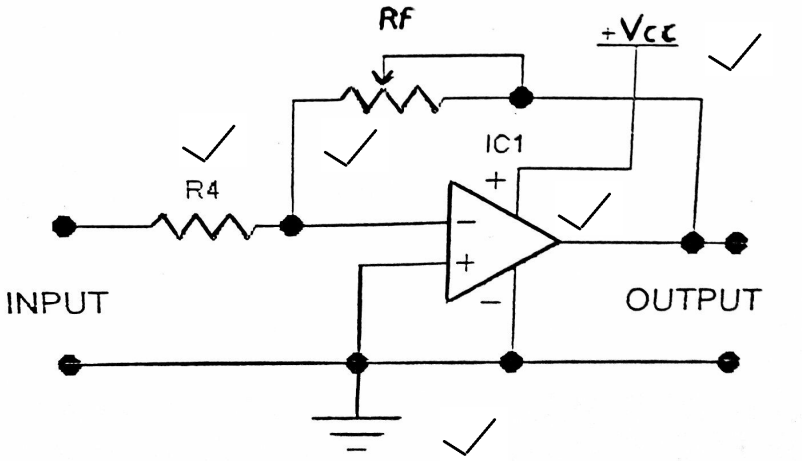
[10]

QUESTION 3

3.1

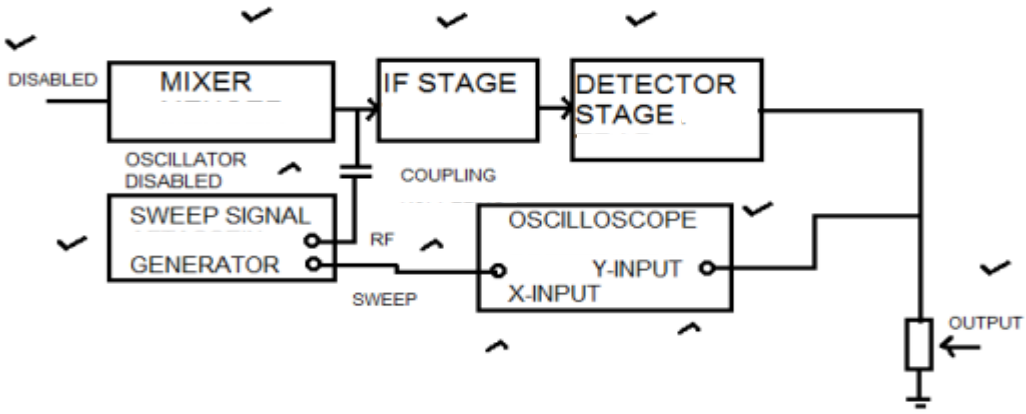


3.2



(2 x 5) **[10]**

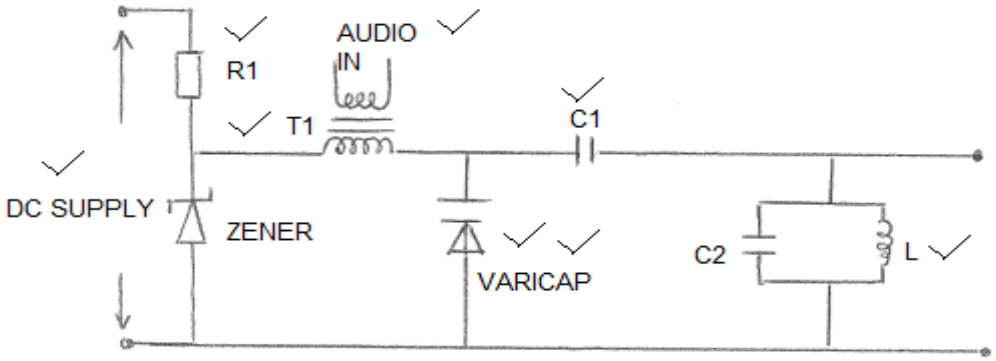
QUESTION 4



[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.

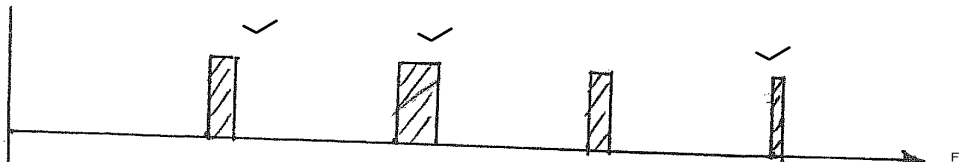
The reverse bias across the varicap now varies in accordance with AF variations and as such the capacitance varies.✓ As the capacitance forms part of the oscillator-tuned circuit, the oscillator frequency will also vary and thus we have a modulated FM carrier wave.✓

(5)

5.2 Reactance transistor (1)

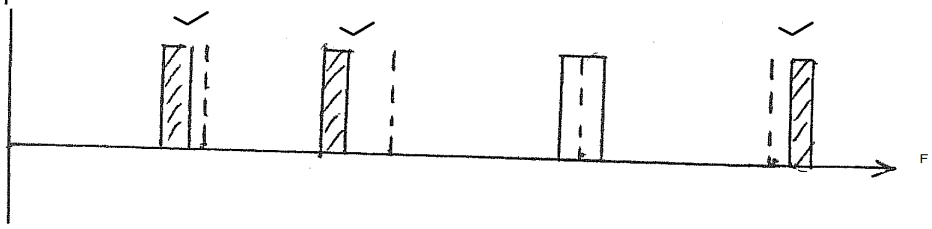
5.3

PWM



(3)

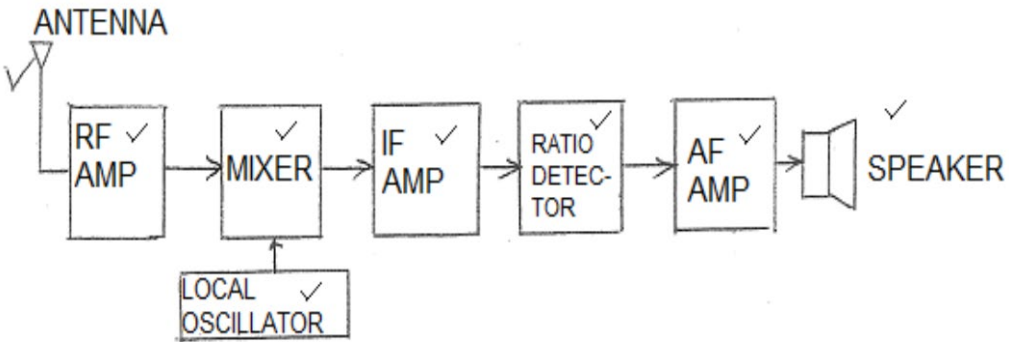
PPM



(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)

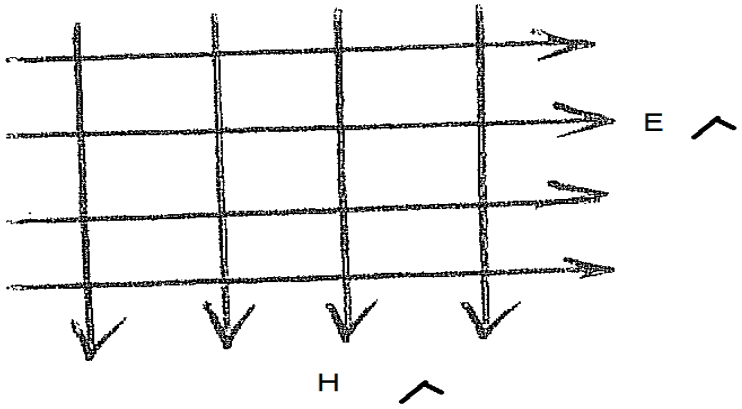
6.4 10,7 MHz ✓ (1)

[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)

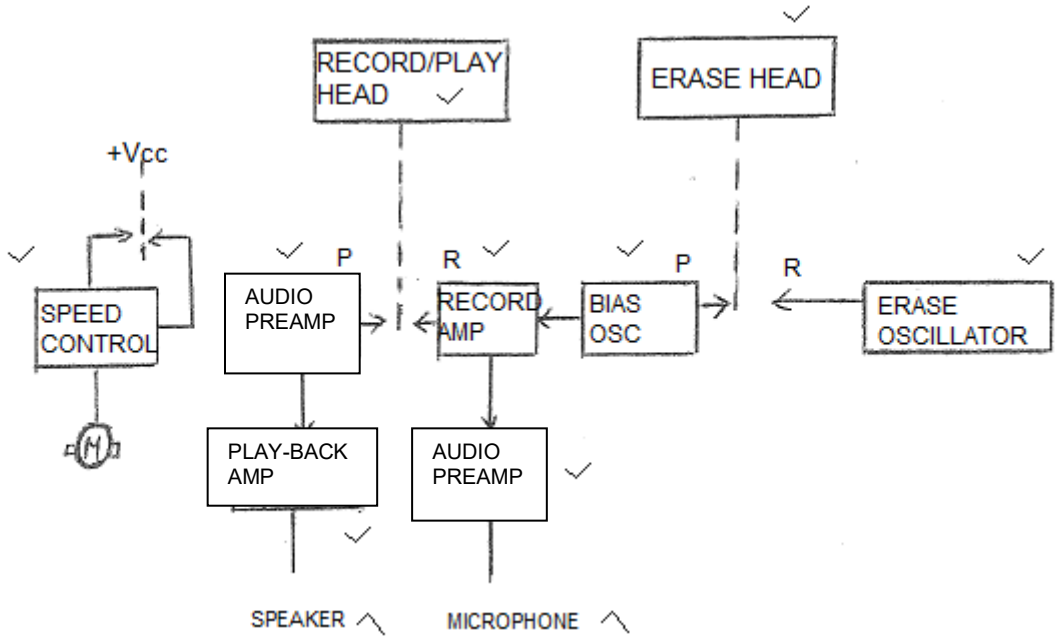
7.4 7.4.1 The signal travels round the surface of the earth ✓ by a process of diffraction. ✓ (2)

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

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