higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## RADIO THEORY N2

## 6 APRIL 2018

**This marking guideline consists of 6 pages.**

Copyright reserved

## QUESTION 1

1.1 1.1.1 $$X_c = \frac{1}{2\pi fC} = \frac{1}{2\pi\ 50x220x10^{-6}} \surd$$
$$X_c = 14{,}47\Omega \surd$$

1.1.2 $$X_L = 2\pi fL = 2\pi 50x20x10^{-3} \surd$$
$$X_L = 6{,}28\Omega \surd$$

1.1.3 $$Z_T = \sqrt{R^2 + (X_L - X_c)^2} = \sqrt{5^2 + (6{,}28 - 14{,}47)^2} \surd$$
$$Z_T = 9{,}6\,\Omega \surd$$

1.1.4 $$I = \frac{V}{Z} = \frac{100}{9{,}6} \surd$$
$$I = 10{,}42 \text{ Amps} \surd$$

1.1.5 $$V_R = I \times R = 10{,}42 \times 5 \surd$$
$$V_R = 52{,}1V \surd$$

1.1.6 $$V_C = I \times X_C = 10{,}42 \times 14{,}47 \surd$$
$$V_C = 293{,}612V \surd$$

1.1.7 $$V_L = I \times X_L = 10{,}42 \times 6{,}28 \surd$$
$$V_L = 65{,}44V \surd$$

1.1.8 $$\phi = \cos^{-1}\frac{R}{Z} = \cos^{-1}\frac{5}{9{,}6} \surd$$
$$\phi = 58{,}61^0 \surd$$

(8 × 2) (16)

1.2
- Direct current flows in only one direction.
- AC continuously changes direction.
- DC does not change polarity; it stays either positive or negative.
- AC changes continuously from positive to negative and back to positive. (4)

**[20]**

## QUESTION 2

2.1
- AC voltage measurement
- DC voltage measurement
- AC current measurement
- DC current measurement
- Resistance measurement
- Continuity testing
- Diode testing (Any 6 × 1) (6)

2.2 2.2.1 Peak-to-peak voltage = 2 × 4√ = 8 V√ (2)

2.2.2 Time period = 6 × 2mS√ = 12 milliseconds√

Frequency $= \frac{1}{\text{Period}} = \frac{1}{12\text{x}10^{-6}}$ √

= 83333,33 Hz√ (4)

2.3
- Overdamping
- Underdamping
- Critical damping (3)

**[15]**

## QUESTION 3

3.1 It changes AC to pulsating DC.√√ (2)

3.2 3.2.1 C
3.2.2 A
3.2.3 D
3.2.4 E
3.2.5 B

(5 × 1) (5)

3.3
- Barrier potential must be overcome.
- Diode must be correctly biased. (2)

3.4 0,2 V or 0,3 V√ (1)

**[10]**

## QUESTION 4

4.1 4.1.1 Common emitter amplifier (1)

4.1.2 It amplifies the input signal from the microphone. (1)

4.1.3 It limits the collector current. (1)

4.1.4 It blocks DC and passes AC. (1)

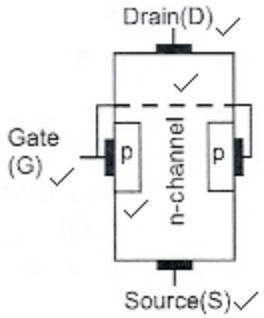
4.1.5 Is a voltage divider√ to bias the transistor.√ (2)

4.1.6 It prevents thermal runaway. (1)

4.1.7 It changes sound waves√ to electrical waves.√ (2)

4.1.8 It changes electrical waves√ to sound waves.√ (2)

4.2

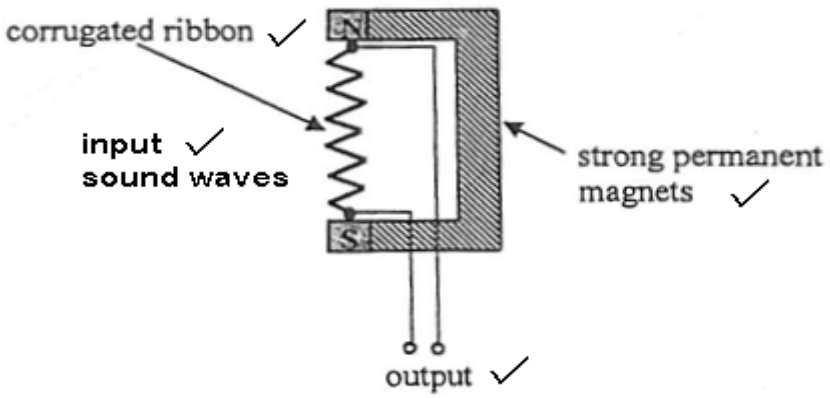



(4)
**[15]**

## QUESTION 5

5.1 Mains transformer: The primary and secondary windings are isolated from each other.√
Auto-transformer: Has a single winding that serves both as primary and secondary.√ (2)

5.2



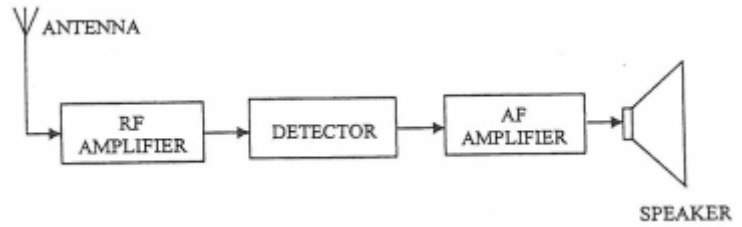

Is a rugged microphone OR Very good frequency response.√ (5)

5.3
- Relatively inexpensive.
- No external supply is required.
- Very good frequency response. (3)

**[10]**

## QUESTION 6

6.1




(1 mark for each block and 1 mark for correct drawing) (6)

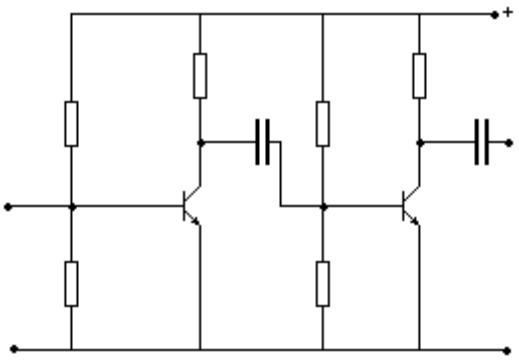
6.2 Radio transmitter: converts audio information into signals suitable for transmission.√√
Radio receiver: accepts the transmitted signals and converts it back into audio signals.√√ (4)

**[10]**

## QUESTION 7

7.1
- Collate the symptoms.
- Inspect equipment for obvious defects.
- Test to find the faulty stage.
- Test to find the component stage.
- Replace faulty component and test equipment. (5)

7.2




(Half mark for each component) (5)

**[10]**

## QUESTION 8

8.1
8.1.1 True
8.1.2 True
8.1.3 False
8.1.4 False
8.1.5 True
8.1.6 False
8.1.7 True
8.1.8 True
8.1.9 False
8.1.10 True

(10 × 1) **[10]**

**TOTAL: 100**

Copyright reserved