



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**RADIO THEORY N2**

**5 AUGUST 2019**

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

**QUESTION 1**

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

(10 × 1) **[10]****QUESTION 2**

$$\begin{aligned}
 2.1 \quad \frac{1}{C_T} &= \frac{1}{C_1} + \frac{1}{C_2} \\
 \frac{C_T}{1} &= \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} \\
 &= \frac{1}{\frac{1}{200 \times 10^{-9}} + \frac{1}{75 \times 10^{-6}}} \checkmark \\
 &= \underline{199,468 \text{ nF}} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 Q &= C_T V_T \\
 &= 199,468 \times 10^{-9} \times 100 \\
 &= 1,99468 \times 10^{-9} \\
 &= \underline{1,99468 \text{ nF} \approx 2 \text{ nF}} \checkmark
 \end{aligned}$$

(2)

$$\begin{aligned}
 2.2 \quad V_{C1} &= \frac{Q}{C} \\
 &= \frac{1,99 \times 10^{-9}}{200 \times 10^{-9}} \\
 &= \underline{9,95 \text{ mV}} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 V_{C2} &= \frac{Q}{C} \\
 &= \frac{1,99 \times 10^{-9}}{75 \times 10^{-6}} \\
 &= \underline{26,5 \mu\text{V}} \checkmark
 \end{aligned}$$

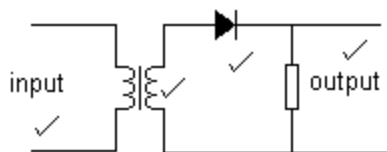
(2)  
**[5]**

**QUESTION 3**

- 3.1  $X_L = 2\pi fL$   
 $= 47,124 \Omega \checkmark \rightarrow$   
 $X_C = \frac{1}{2\pi fc} = 21,221 \Omega \checkmark \rightarrow$   
 $Z = \sqrt{15^2 + (47,124 - 21,221)^2} \checkmark \checkmark \checkmark$   
 $= 29,933 \Omega \checkmark \rightarrow$  (6)
- 3.2  $I = \frac{V}{Z} = \frac{100}{29,933} \checkmark$   
 $= 3,341 \text{ A} \checkmark \rightarrow$  (2)
- 3.3  $V_R = IR = 3,341 \times 15 = 50,115 \text{ V} \checkmark$   
 $V_L = IX_L = 3,341 \times 47,124 = 157,44 \text{ V} \checkmark$   
 $V_C = IX_C = 3,341 \times 21,221 = 70,899 \text{ V} \checkmark$  (3)
- 3.4 Power factor =  $\cos \theta = \frac{R}{Z} = \frac{15}{29,933} \checkmark$   
 $= 0,501 \checkmark \rightarrow$  (2)
- 3.5 Power =  $VI \cos \theta = 100 \times 3,341 \times 0,501 = 167,434 \text{ W} \checkmark \checkmark$   
or  
Power =  $I^2 R = (3,341)^2 \times 15 = 167,434 \text{ W} \rightarrow$  (2)
- [15]**

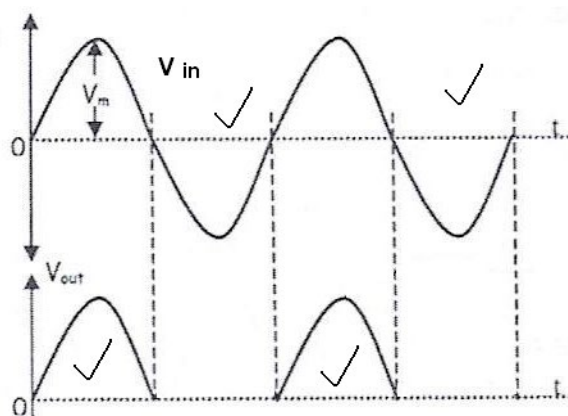
**QUESTION 4**

4.1



(4)

4.2



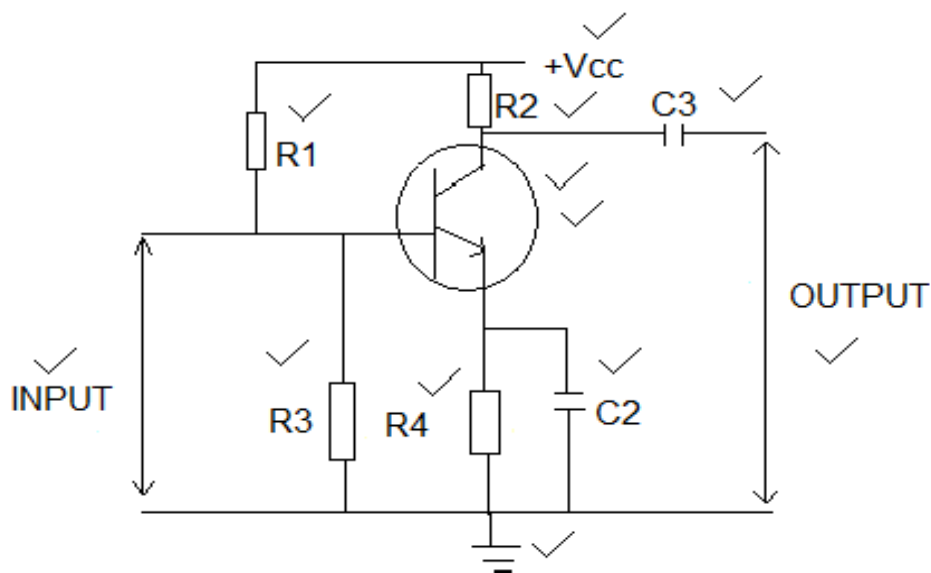
(4)

4.3

- Depletion MOSFET
- Enhancement MOSFET

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

5.1



(12)

5.2

- |       |                 |
|-------|-----------------|
| 5.2.1 | $R_1$ AND $R_3$ |
| 5.2.2 | $R_4$ AND $C_2$ |
| 5.2.3 | $R_2$           |
| 5.2.4 | $C_3$           |

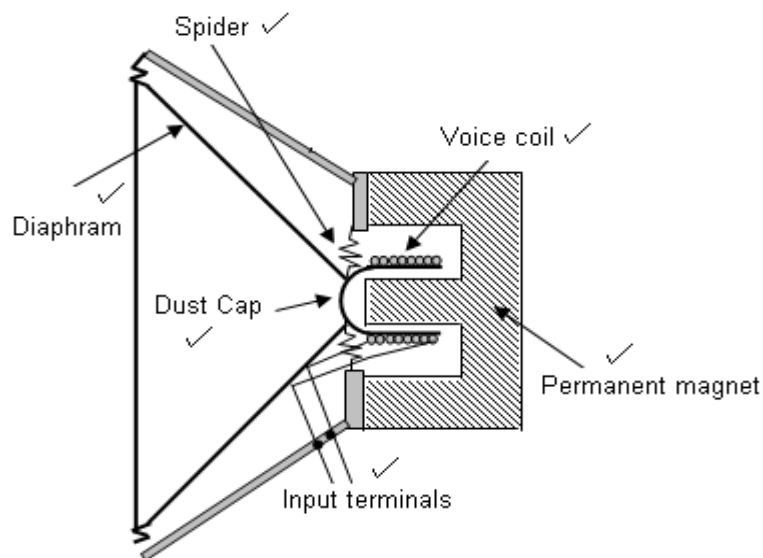
(4 × 2) (8)  
[20]

**QUESTION 6**

- 6.1
- Ribbon
  - Moving coil
  - Crystal
  - Carbon
  - Capacitor

(Any 4 × 1) (4)

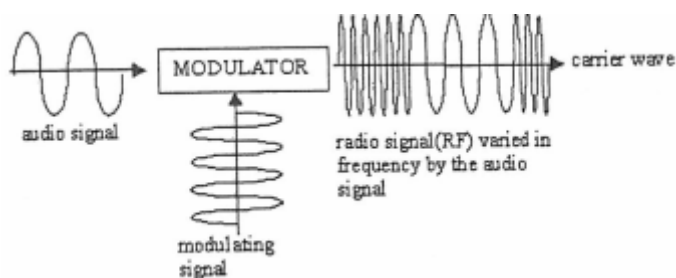
6.2

(6)  
[10]**QUESTION 7**

- 7.1 In AM modulation the audio signal ✓ is used to vary the amplitude ✓ of a higher-frequency carrier signal. ✓

(3)

7.2



(2 marks for each waveform) (6)

- 7.3 Sensitivity is the ability of a receiver to pick up weak signals and amplify it to a usable level. Selectivity is the ability of a receiver to receive one signal and reject all other signals.

(2 + 2) (4)

- 7.4 Converts electrical waves into sound waves

(2)  
[15]

**QUESTION 8**

|     |                                                                                                                                                                                                                                                                            |                   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 8.1 | <ul style="list-style-type: none"><li>• Collate the symptoms.</li><li>• Inspect equipment for obvious defects.</li><li>• Test and locate the suspected stage.</li><li>• Test components in faulty stage.</li><li>• Replace faulty components and test equipment.</li></ul> | (5)               |
| 8.2 | 8.2.1 Chooses the vertical scale                                                                                                                                                                                                                                           |                   |
|     | 8.2.2 Chooses the horizontal scale                                                                                                                                                                                                                                         |                   |
|     | 8.2.3 Makes the trace on the screen brighter or dimmer                                                                                                                                                                                                                     |                   |
|     | 8.2.4 Moves the trace up or down (vertical)                                                                                                                                                                                                                                |                   |
|     | 8.2.5 Moves the trace left or right (horizontal)                                                                                                                                                                                                                           |                   |
|     |                                                                                                                                                                                                                                                                            | (5 × 2) (10)      |
|     |                                                                                                                                                                                                                                                                            | <b>[15]</b>       |
|     |                                                                                                                                                                                                                                                                            | <b>TOTAL: 100</b> |