



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE COMMUNICATION-ELECTRONICS N5

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This marking guideline consists of 8 pages.

QUESTION 1: AC NETWORKS

1.1 1.1.1 $V_R = I_T \times R$ but $I_T = \frac{V_T}{R}$ and $Z = R$ (at resonance)

$$= 40 \times 3 \checkmark \quad = \frac{120}{3}$$

$$= 120 \text{ V} \checkmark \quad = 40 \text{ A} \checkmark \quad (3)$$

1.1.2 $V_L = I_T \times X_L$ but $X_L = Q \times R$

$$= 40 \times 225 \checkmark \quad = 75 \times 3$$

$$= 9 \text{ kV} \checkmark \quad = 225 \Omega \checkmark$$

OR

$$V_L = Q \times V_s$$

$$= 75 \times 120 \checkmark$$

$$= 9 \text{ kV} \checkmark \checkmark \quad (3)$$

1.1.3 $V_L = V_C$ at resonance \checkmark
 $V_C = 9 \text{ kV} \checkmark \quad (2)$

1.1.4 $Q = \frac{1}{R} \sqrt{\frac{L}{C}}$

$$(75 \times 3)^2 = \left(\frac{100 \times 10^{-3}}{\sqrt{C}} \right)^2 \checkmark$$

$$C = \frac{100 \times 10^{-3}}{50\,625} \checkmark$$

$$= 1,975 \mu\text{F} \checkmark \quad (3)$$

1.1.5 $f_r = \frac{1}{2\pi\sqrt{LC}}$

$$f_r = \frac{1}{2\pi\sqrt{100 \times 10^{-3} \times 1,975 \times 10^{-6}}} \checkmark$$

$$= 358,127 \text{ Hz} \checkmark \checkmark \quad (3)$$

1.2 $Z_D = \frac{L}{CR}$

but

$$L = \frac{X_L}{2\pi f} \checkmark$$

and

$$C = \frac{1}{2\pi f X_C} \checkmark$$

Substitute:

$$= \frac{X_L}{2\pi f} \times \frac{2\pi f X_C}{R} \checkmark \checkmark$$

$$= \frac{X_L}{1} \times \frac{X_C}{R} \checkmark$$

But

$$Q = \frac{X_C}{R} \checkmark$$

Substitute:

$$Z_D = X_L \cdot Q \checkmark$$

(7)

- 1.3 Mutual inductance is when an alternating current of 1 ampere flows in the primary winding and induces a voltage of 1 volt in the secondary windings.

(2)

[23]

QUESTION 2: TRUE OR FALSE

- 2.1 False
- 2.2 False
- 2.3 False
- 2.4 True
- 2.5 True
- 2.6 False
- 2.7 True
- 2.8 True
- 2.9 False
- 2.10 False

(10 × 1)

[10]

QUESTION 3: FOUR-TERMINAL NETWORKS

- 3.1 3.1.1 Symmetrical network is a two-port network that has similar input and output ports that may be interchanged.
- 3.1.2 Insertion loss is the total loss or the mismatch losses combined with the attenuation losses when a network is inserted and is normally expressed in dB or neper.
- 3.1.3 Image impedances are the impedances that occur when one impedance is connected across one pair of terminals and the other impedance appears across the other terminals.

(3 × 2)

(6)