



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE COMMUNICATION-ELECTRONICS N5

26 JULY 2019

This marking guideline consists of 7 pages.

QUESTION 1: GENERAL

- 1.1 direct✓ oppose✓
 1.2 Insertion loss✓ mismatch✓
 1.3 prototype✓ networks✓
 1.4 microphone✓ electrical✓
 1.5 controllers✓ bandwidth✓

(5 × 2) [10]

QUESTION 2: AC NETWORKS

2.1 2.1.1 $Z_{\text{total}} = (2 + 2) + (j5 - j) = j4 + 4$

In polar form:

$$Z_T = 5,7 \angle 45^\circ \checkmark$$

$$\text{i.e. } \tan \theta = \frac{1}{1} = 45^\circ$$

$$\text{and } Z_T = \frac{4}{\sin 45^\circ} = 5,65 \text{ or } 5,7 \Omega \checkmark$$

$$I = \frac{V}{Z}$$

$$I = \frac{100 \angle 0^\circ}{5,7 \angle 45^\circ}$$

$$I = 17,5 \angle -45^\circ \checkmark$$

(3)

2.1.2 $i = I_m \sin(\omega t - \theta)$

$$\begin{aligned} \text{Where } I_m &= 17,5 - \sqrt{2} \text{ A} \\ &= 24,75 \text{ A} \checkmark \end{aligned}$$

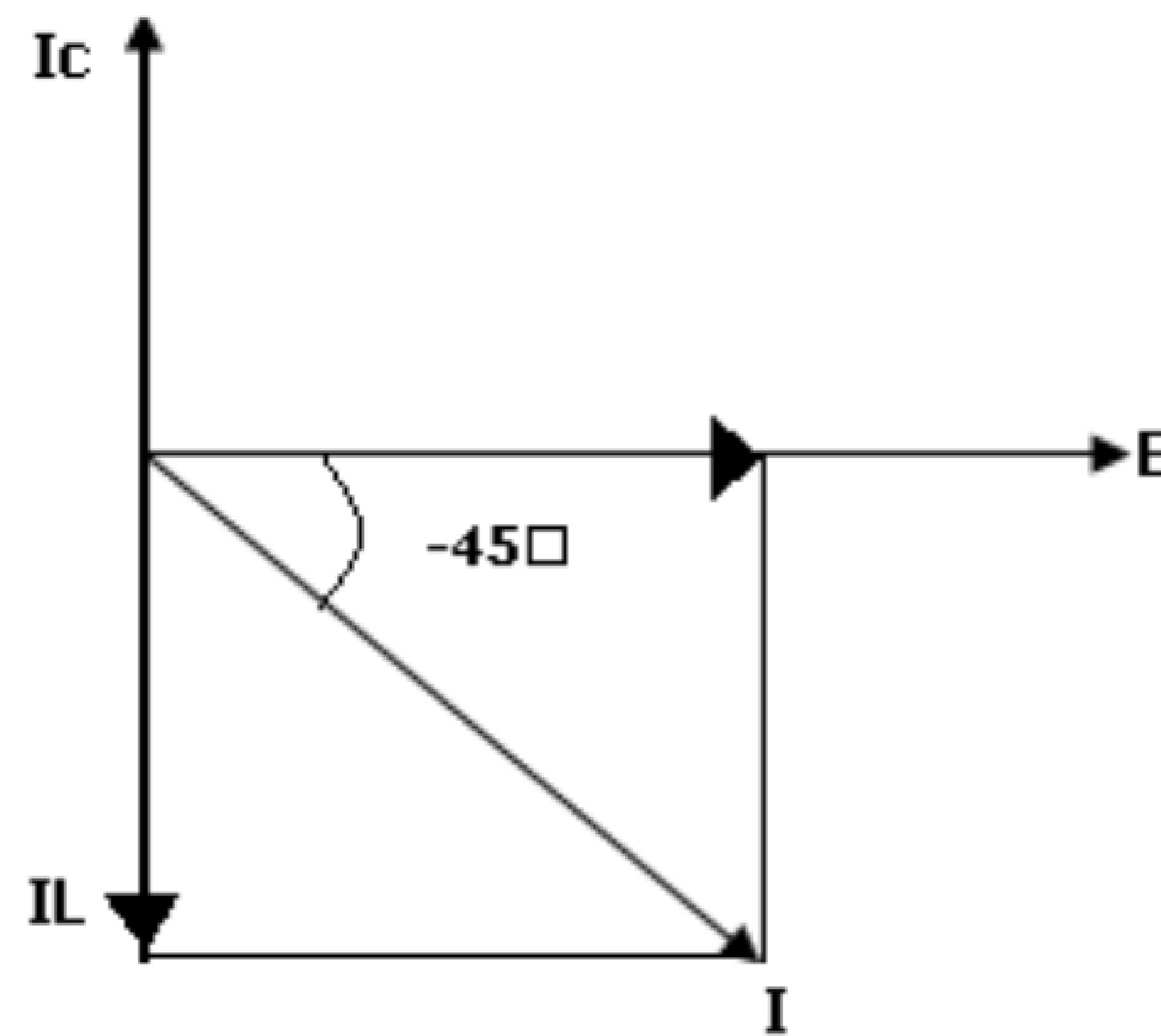
$$\text{Frequency } \omega = 377 \text{ rad/s}$$

$$\theta = 45^\circ$$

$$\begin{aligned} i &= I_m \sin(\omega t - \theta) \checkmark \\ &= 24(377t - 45^\circ) \checkmark \end{aligned}$$

(3)

2.1.3



(2)

2.2

$$Z_T = \frac{Z_C \times Z_L}{Z_C + Z_L}$$

Where $Z_C = -jX_C$

$$Z_L = R + jX_L \checkmark$$

$$\text{Therefore } \hat{Z} = \frac{-jX_C \times (R + jX_L)}{-jX_C + (R + jX_L)} \checkmark$$

At resonance $X_C = X_L$ i.e. $jX_C = jX_L = 0 \checkmark$

$$\text{Hence } \hat{Z} = \frac{-jRX_C + X_C X_L}{R} \checkmark$$

But $-jRX_C$ is negligible

$$\therefore Z = \frac{X_C \times X_L}{R} \checkmark$$

$$X_C = \frac{1}{\omega C} \text{ and } X_L = \omega L \checkmark$$

$$\text{i.e. } Z = \frac{\frac{1}{\omega C} \times \omega L}{R} \checkmark$$

$$= \frac{\omega L}{\omega C} = \frac{\omega L}{\omega C \times R} \checkmark \checkmark$$

$$\text{Hence } Z = \frac{L}{CR} \checkmark$$

(10)

- 2.3 2.3.1 Impedance versus frequency for a parallel-tuned circuit
- 2.3.2 Current versus frequency for a parallel-tuned circuit
- 2.3.3 Current versus frequency for a series-tuned circuit
- 2.3.4 Impedance versus frequency for a series-tuned circuit

(4 × 3)

(12)
[30]