

Respuestas de la Guía N° 1: ERRORES INSTRUMENTALES- 1º PARTE

$$1. a. \alpha_{med} = \frac{I_{med} * \alpha_{max}}{Alc} = \frac{12.6mA * 150div}{30mA} = 63div$$

$$1. b. E_{instrumental} = \pm \frac{c.Alc}{100} = \pm \frac{0.5 * 30mA}{100} = \pm 0.15mA$$

$$1. c. E_{lectura} = \pm \frac{\frac{1}{10}div * Alc}{\alpha_{max}} = \pm \frac{\frac{1}{10}div * 30mA}{150div} = \pm 0.02mA$$

$$1. d. E_{límite} = \pm (|E_{instrumental}| + |E_{lectura}|) = \pm (0.15 + 0.02)mA = \pm 0.17mA$$

$$1. e. I = (12.60 \pm 0.17)mA = (1260 \pm 17)mA$$

$$2. a. C_E = \frac{Alc}{\alpha_{max}} = \frac{6A}{60div} = 0.1A / div$$

$$2. b. I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{45div}{60div} * 6A = 4.5A$$

$$2. c. e_{\%instrumental} = \frac{\frac{c * Alc}{I_{med}}}{100} * 100 = \frac{\frac{0.5 * 6A}{4.5A}}{100} * 100 = 0.67\%$$

(sin considerar error de lectura)

$$2. d. E_{límite} = \pm (|E_{instrumental}| + |E_{lectura}|) = \pm (0.03 + 0.01) = \pm 0.04A$$

$$I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{10.1div}{60div} * 6A = 1.01A \Rightarrow I = (1.01 \pm 0.04)A$$

$$I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{35div}{60div} * 6A = 3.5A \Rightarrow I = (3.50 \pm 0.04)A$$

$$I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{45div}{60div} * 6A = 4.5A \Rightarrow I = (4.50 \pm 0.04)A$$

$$I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{58.3div}{60div} * 6A = 5.83A \Rightarrow I = (5.83 \pm 0.04)A$$

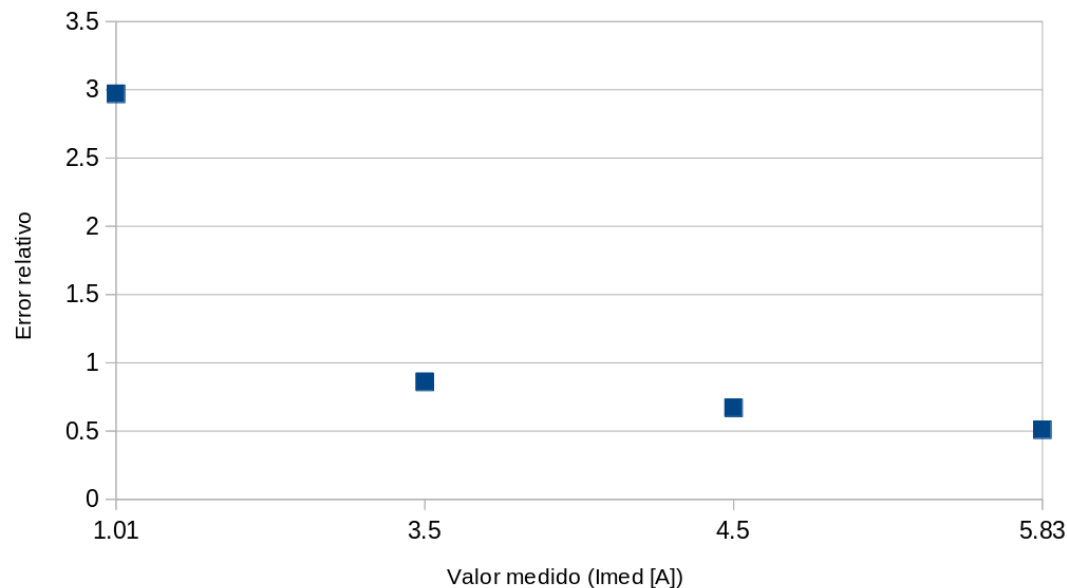
2. e.  $e_{\alpha_{med}=10.1divisiones} = \frac{0.03A}{1.01A} * 100 = 2.97\%$

$$e_{\alpha_{med}=35divisiones} = \frac{0.03A}{3.5A} * 100 = 0.86\%$$

$$e_{\alpha_{med}=45divisiones} = \frac{0.03A}{4.5A} * 100 = 0.67\%$$

$$e_{\alpha_{med}=58.3divisiones} = \frac{0.03A}{5.83A} * 100 = 0.51\%$$

2. f.



Se observa un decrecimiento hiperbólico cuya asíntota horizontal se corresponde con la clase del instrumento.

3.a.

$$e_{V1} = \frac{1.5 * 30 V / 100}{25V} * 100 = 1.8\%$$

$$e_{V2} = \frac{0.5 * 150 V / 100}{25V} * 100 = 3.0\%$$

El instrumento 1 comete menos error en la medición de 25V.

3.b.

$$e_{V2} = 1.8 \rightarrow \frac{0.5 * 150 V / 100}{V_x} * 100 = 1.8 \rightarrow V_x = \frac{0.5 * 150V}{1.8} = 41.67V$$

---

4.

$$e_{1/8} = \frac{c * Alc / 100}{1/8 * Alc} * 100 = 8 * c = 16\%$$

$$e_{1/4} = \frac{c * Alc / 100}{1/4 * Alc} * 100 = 4 * c = 8\%$$

$$e_{1/2} = \frac{c * Alc / 100}{1/2 * Alc} * 100 = 2 * c = 4\%$$

$$e_{3/4} = \frac{c * Alc / 100}{3/4 * Alc} * 100 = 4/3 * c = 2.67\%$$

---

5.

$$I_{med} = \frac{\alpha_{med}}{\alpha_{max}} * Alc = \frac{32 divisiones}{50 divisiones} * 10A = 6.4A$$

$$E_{instrumental} = \pm c * Alc / 100 = \pm 2 * 10 A / 100 = \pm 0.2A$$

$$E_{lectura} = 1/5 * C_E = \frac{\pm 1/5 * Alc}{\alpha_{max}} = \frac{\pm 1/5 * 10A}{50 divisiones} = \pm 0.04A$$

---

6. a. Magnitud medida: tensión

6. b. Alcance: 500V

6. c. Rango: 400V

6. d. Instrumento de hierro móvil

$$6. e. C_E = \frac{Rango}{\alpha_{total}} = \frac{400V}{40divisiones} = 10 V/division$$

6. f. Posición vertical

$$6. g. c \cdot Alc/100 = 1.5 \cdot 500V/100 = 7.5V$$

$$6. h. 1/5div \cdot C_E = 2V$$

---

$$7. a. E_{instrumental} = \pm 0.5/100 \cdot 15.686V + 0.001V = \pm 0.07943V$$

$$7. b. V = (15.686 \pm 0.079)V = (15.69 \pm 0.08)V$$

$$7. c. E_{ind} = 01.545V$$

7. d.

$$E_{instrumental} = \pm 0.5/100 \cdot 1.545 + 0.001V = \pm 0.008725V$$

$$V = (1.545 \pm 0.008725)V = (1.545 \pm 0.009)V$$

$$7. e. E_{ind} = 1.5450V$$

$$E_{instrumental} = \pm 0.5/100 \cdot 1.545 + 0.0001V = \pm 0.007825V$$

$$V = (1.545 \pm 0.007825)V = (1.545 \pm 0.008)V$$

---

$$8. a. E_{instrumental} = \pm 0.5/100 \cdot 8.02 + 0.03V = \pm 0.0701V$$

$$V = (8.02 \pm 0.0701)V = (8.02 \pm 0.07)V$$

$$8. b. E_{instrumental} = \pm 0.03/100 \cdot 20 + 0.03V = \pm 0.036V$$

$$V = (8.02 \pm 0.036)V = (8.02 \pm 0.04)V$$