Chapter 11, Solution 37.

Design a problem to help other students to better understand how to determine the rms value of the sum of multiple currents.

Although there are many ways to work this problem, this is an example based on the same kind of problem asked in the third edition.

Problem

Calculate the rms value of the sum of these three currents:

$i_1 = 8, \quad i_2 = 4\sin(t + 10°), \quad i_3 = 6\cos(2t + 30°)$ A

Solution

$$i = i_1 + i_2 + i_3 = 8 + 4\sin(t + 10^o) + 6\cos(2t + 30^o)$$

$$I_{rms} = \sqrt{I^2_{1rms} + I^2_{2rms} + I^2_{3rms}} = \sqrt{64 + \frac{16}{2} + \frac{36}{2}} = \sqrt{90} = \underline{9.487\,\text{A}}$$