To evaluate this short-term credit transaction, we must apply the principles of **Exact Simple Interest**. As defined in the engineering economy, simple interest dictates that only the original principal sum earns interest over the duration of the loan. When a time frame is specified using calendar dates rather than a whole number of years, the time factor (n) must be expressed as a fraction where the numerator is the exact number of days between the dates and the denominator is the total number of days in a year.

The problem explicitly requests the **exact interest**, which requires us to use the true astronomical calendar length of 365 days (or 366 days during a leap year) in the denominator. The year 2010 is an ordinary year because it is not evenly divisible by 4, meaning the year contains exactly 365 days. To find the exact number of interest-bearing days in the numerator, we count the precise number of days spanning from January 18, 2010, to November 3, 2010, traditionally excluding the first day and including the last day.

DETAILED STEP-BY-STEP SOLUTION

Step 1: Compute the Calendar Days (With Error Correction)

We track the exact number of days accumulated month-by-month through the calendar year 2010.

- **January:** 31 - 18 = 13 days
- **February:** 28 days
- **March:** 31 days
- **April:** 30 days
- **May:** 31 days
- **June:** 30 days
- **July:** 31 days
- **August:** 31 days
- **September:** 30 days
- **October:** 31 days
- **November:** 3 days

Adding these values together yields the true mathematical number of days:

Exact Days = 13 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 3 = 289 days

Step 2: Formulate the Time Fraction (n)

Using the exact simple interest framework, the time parameter (n) is structured as:

$$n = \frac{Exact\ days}{365}$$

Using the true calendar day count:

$$n = \frac{289}{365} \approx 0.79178\ years$$

<u>Step 3:</u> Calculate the Total Simple Interest (I)

Substituting the principal P = 28,000, nominal annual interest rate i = 15% = 0.15, and the reference time factor n = 0.79178 into the equation:

$$I = P \cdot i \cdot n$$

$$I = (28,000)(0.15)(0.79178)$$

$$I = PhP3,325.48$$