Civil Engineering Licensure Exam – Mock Exam (Day 22: Present Worth, Future Worth, and Interest Calculations)

February 24, 2025

Instructions

- Time Limit: 60 Minutes
- Coverage: Present Worth, Future Worth, and Interest Calculations
- Total Questions: 10 (Multiple Choice & Problem-Solving)
- Show complete solutions for problem-solving questions.

Section A: Multiple Choice Questions (MCQs)

Choose the best answer.

1. The formula for calculating future worth (F) from present worth (P) using compound interest is:
   (a) $F = P(1+i)^n$
   (b) $F = P(1-i)^n$
   (c) $F = P(1+ni)$
   (d) $F = Pe^{in}$
2. The present worth of a future amount is calculated using:
   (a) $P = F(1+i)^n$
   (b) $P = F(1-i)^n$

(c) $P = \frac{F}{(1+i)^n}$

(d) $P = Fe^{-in}$

3. If an investment earns simple interest, the total accumulated amount after n years is:

   (a) $A = P(1 + ni)$

   (b) $A = P(1 + i)^n$

   (c) $A = Pe^{in}$

   (d) $A = \frac{P}{(1+i)^n}$

4. If an investment of \$1,000 grows to \$1,500 in 5 years at compound interest, the annual interest rate (i) can be found using:

   (a) $i = \left(\frac{F}{P}\right)^{1/n} - 1$

   (b) $i = \frac{F}{Pn}$

   (c) $i = \frac{F-P}{Pn}$

   (d) $i = \frac{P}{F} - 1$

5. The effective annual interest rate is given by:

   (a) $i_{\text{eff}} = (1 + i/m)^m - 1$

   (b) $i_{\text{eff}} = i \times m$

   (c) $i_{\text{eff}} = i/m$

   (d) $i_{\text{eff}} = 1 - e^{-im}$

Section B: Problem-Solving

1. A person invests \$5,000 in a savings account that earns 6% annual compound interest. Determine the future worth after 10 years.

2. What is the present worth of \$10,000 to be received in 8 years if the discount rate is 5% per year?

3. A loan of \$20,000 is repaid in full after 5 years at an interest rate of 7% per year, compounded annually. Determine the total amount to be paid.

4. An investor deposits \$2,500 in an account that earns 8% compounded quarterly. Find the effective annual interest rate.

5. A company plans to purchase equipment worth \$50,000 in 3 years. How much should they invest today in an account earning 4% annual interest to accumulate this amount?