Name: **Id#**

ISE 307, Term 173
ENGINEERING ECONOMIC ANALYSIS

Quiz# 2 Solution

Date: Sunday, July 16, 2018

Q1. An engineer's salary was $50,000 in 2006. The same engineer's salary in 2018 is $100,000. If the company's salary policy dictates that a yearly raise in salaries reflect the cost of living increase due to inflation, what is the average inflation rate for the period 2006-2018?

(a) 3.95%
(b) 4.95%
(c) 5.95%
(d) 6.95%

$100,000 = \$50,000(F/P, f, 12) = \$50,000(1 + f)^{12}$
$f = 5.95\%$

Q2. A couple wants to save for their daughter's college expense. The daughter will enter college eight years from now, and she will need $50,000, $52,000, $54,000, and $56,000 in actual dollars over four school years. Assume that these college payments will be made at the beginning of each school year. The future general inflation rate is estimated to be 4% per year, and the annual inflation-free interest rate is 6%. What is the equal amount, in actual dollars, the couple must save each year until their daughter goes to college?

(a) $15,898.3
(b) $16,087.5
(c) $19,189.7
(d) $19,391.9

$i = i' + f' + i' f' = .06 + 0.04 + 0.0024 = 0.1024$
$P8 = 50,000 + 52,000 (1.1024)^{-1} + 54,000 (1.1024)^{-2} + 56,000 (1.1024)^{-3} = 183,403.24$
$A = 183,403.24 (A/F, 0.1024, 8) = 183,403.24*0.08744 = 16,087.5$

Q3. The annual fuel costs to operate a small solid-waste treatment plant are projected to be $1.8 million. The best estimates indicate that the annual inflation-free interest rate (i') will be 7% and the general inflation rate f = 4%. If the plant has a remaining useful life of five years, what is the present equivalent value of its fuel costs, using actual-dollar analysis?

(a) $ 6.606 million
(b) $ 8.317 million
(c) $ 9 million
(d) $10.095 million

$$i = i' + f + i'f$$
$$= 0.07 + 0.04 + 0.07 \times 0.04 = 0.1128 = 11.28\%$$

$$\text{PW of fuel cost} = A\,(P/A, 11.28\%, 5) = 1.8\left\{\frac{(1 + 0.1128)^5 - 1}{0.1128(1 + 0.1128)^5}\right\}$$

$$= \$6.606 \text{ million.}$$

Q4. A father wants to save in advance for his eight-year-old daughter's college expenses. The daughter will enter the college 10 years from now. An annual amount of $20,000 in today's dollars (constant dollars) will be required to support her college expenses for four years. Assume that these college payments will be made at the beginning of each school year. (The first payment occurs at the end of 10 years.) The future general inflation rate is estimated to be 5% per year, and the interest rate on the savings account will be 8% compounded quarterly (market interest rate) during this period. If the father has decided to save only $500 (actual dollars) each quarter, how much will the daughter have to borrow to cover her **freshman** expenses?

(a) $1,920
(b) $2,114
(c) $2,210
(d) $2,377

$$20,000\,(1 + 0.05)^{10} - 500\,(F/A, 2\%, 40)$$
$$= \$32,578 - \$30,201$$
$$= \$2,377$$