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**Nomenclature**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A$</td>
<td>annual amount or annual value</td>
</tr>
<tr>
<td>$BV$</td>
<td>book value</td>
</tr>
<tr>
<td>$C$</td>
<td>initial cost, or present worth (present value) of all costs</td>
</tr>
<tr>
<td>$d$</td>
<td>inflation-adjusted interest rate</td>
</tr>
<tr>
<td>$D_j$</td>
<td>depreciation in year $j$</td>
</tr>
<tr>
<td>$E$</td>
<td>expected value</td>
</tr>
<tr>
<td>$EUAC$</td>
<td>equivalent uniform annual cost</td>
</tr>
<tr>
<td>$f$</td>
<td>constant inflation rate</td>
</tr>
<tr>
<td>$F$</td>
<td>future worth or future value</td>
</tr>
<tr>
<td>$i$</td>
<td>interest rate</td>
</tr>
<tr>
<td>$n$</td>
<td>service life</td>
</tr>
<tr>
<td>$p$</td>
<td>probability</td>
</tr>
<tr>
<td>$P$</td>
<td>present worth or present value</td>
</tr>
<tr>
<td>$S_n$</td>
<td>expected worth or present value in year $n$</td>
</tr>
<tr>
<td>$t$</td>
<td>time</td>
</tr>
</tbody>
</table>

**Subscripts**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$j$</td>
<td>at time $j$</td>
</tr>
<tr>
<td>$n$</td>
<td>at time $n$</td>
</tr>
</tbody>
</table>

**1. DEPRECIATION**

Depreciation is an artificial expense that spreads the purchase price of an asset or other property over a number of years. Generally, tax regulations do not allow the cost of an asset to be treated as a deductible expense in the year of purchase. Rather, portions of the expense must be allocated to each of the years of the asset's depreciation period. The amount that is allocated each year is called the depreciation.

The inclusion of depreciation in engineering economic analysis problems will increase the after-tax present worth (profitability) of an asset. The larger the depreciation, the greater the profitability will be. Therefore, individuals and companies that are eligible to utilize depreciation desire to maximize and accelerate the depreciation available to them.

The **depreciation basis** of an asset is the part of the asset's purchase price that is spread over the **depreciation period**, also known as the **service life**. The depreciation basis may or may not be equal to the purchase price.

A common depreciation basis is the difference between the purchase price and the expected salvage value at the end of the depreciation period.

$$
\text{depreciation basis} = C - S_n
$$

There are several methods of calculating the year-by-year depreciation of an asset. Equation 52.1 is not universally compatible with all depreciation methods. If a depreciation basis does not consider the salvage value, it is known as an **unadjusted basis**.

**Straight-Line Depreciation**

With the **straight-line method**, depreciation is the same each year. The depreciation basis $(C - S_n)$ is allocated uniformly to all of the $n$ years in the depreciation period. Each year, the depreciation will be

$$
D_j = \frac{C - S_n}{n}
$$

**Accelerated Cost Recovery System (ACRS)**

In the United States, property placed into service in 1981 and thereafter must use the **Accelerated Cost Recovery System (ACRS)** and property placed into service after 1986 must use **Modified Accelerated Cost Recovery System (MACRS)** or other statutory method. Other methods, such as the straight-line method, cannot be used except in special cases. Property placed into service in 1980 or before must continue to be depreciated according to the method originally chosen. ACRS cannot be used.

Under ACRS and MACRS, the cost recovery amount in the $j$th year of an asset’s cost recovery period is calculated by multiplying the initial cost by a factor. The initial cost used is not reduced by the asset’s salvage value.

$$
D_j = \text{factor} \times C
$$
The factor used depends on the asset's cost recovery period. Such factors are subject to continuing legislation changes. Representative depreciation factors are shown in Table 52.1.

### Table 52.1 Representative MACRS Depreciation Factors

<table>
<thead>
<tr>
<th>Recovery period (years)</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year j</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>33.3</td>
<td>20.0</td>
<td>14.3</td>
<td>10.0</td>
</tr>
<tr>
<td>2</td>
<td>44.5</td>
<td>32.0</td>
<td>24.5</td>
<td>18.0</td>
</tr>
<tr>
<td>3</td>
<td>14.8</td>
<td>19.2</td>
<td>17.5</td>
<td>14.4</td>
</tr>
<tr>
<td>4</td>
<td>7.4</td>
<td>11.5</td>
<td>12.5</td>
<td>11.5</td>
</tr>
<tr>
<td>5</td>
<td>11.5</td>
<td>8.9</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5.8</td>
<td>8.8</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8.9</td>
<td>6.6</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4.5</td>
<td>6.6</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>6.5</td>
<td>6.6</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>6.5</td>
<td>6.5</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3.3</td>
<td>6.6</td>
<td>6.6</td>
<td></td>
</tr>
</tbody>
</table>

#### 2. BOOK VALUE

The difference between the original purchase price and the accumulated depreciation is known as book value. At the end of each year, the book value (which is initially equal to the purchase price) is reduced by the depreciation in that year.

It is important to distinguish the difference between beginning-of-year book value and end-of-year book value. In Eq. 52.4, the book value \( BV_j \) means the book value at the end of the \( j \)th year after \( j \) years of depreciation have been subtracted from the original purchase price.

\[
BV_j = \text{initial cost} - \sum_{j=1}^{1} D_j
\]

The ratios of book value to initial costs for an asset depreciated using both the straight-line and the MACRS methods are illustrated in Fig. 52.1.

#### 3. EQUIVALENT UNIFORM ANNUAL COST

Alternatives with different lifetimes will generally be compared by way of equivalent uniform annual cost, or EUAC. An EUAC is the annual amount that is equivalent to all of the cash flows in the alternative. The EUAC differs in sign from all of the other cash flows. Costs and expenses expressed as EUACs, which would normally be considered negative, are considered positive. Conversely, benefits and returns are considered negative. The term cost in the designation EUAC serves to make clear the meaning of a positive number.

#### 4. CAPITALIZED COST

The present worth of a project with an infinite life is known as the capitalized cost. Capitalized cost is the amount of money at \( t=0 \) needed to perpetually support the project on the earned interest only. Capitalized cost is a positive number when expenses exceed income.

Normally, it would be difficult to work with an infinite stream of cash flows since most discount factor tables do not list factors for periods in excess of 100 years. However, the \( (A/P) \) discount factor approaches the interest rate as \( n \) becomes large. Since the \( (P/A) \) and \( (A/P) \) factors are reciprocals of each other, it is possible to divide an infinite series of annual cash flows by the interest rate in order to calculate the present worth of the infinite series.

\[
capitalized \text{ cost} = P = \frac{A}{i} \left[ \frac{\text{infinite}}{\text{series}} \right]
\]

Equation 52.5 can be used when the annual costs are equal in every year. If the operating and maintenance costs occur irregularly instead of annually, or if the costs vary from year to year, it will be necessary to somehow determine a cash flow of equal annual amounts that is equivalent to the stream of original costs (i.e., to determine the EUAC).

#### 5. BONDS

A bond is a method of obtaining long-term financing commonly used by governments, states, municipalities, and very large corporations. The bond represents a contract to pay the bondholder specified amounts of money at specific times. The holder purchases the bond in exchange for these payments of interest and principal. Typical municipal bonds call for quarterly or
semianual interest payments and a payment of the face value of the bond on the date of maturity (end of the bond period). Because of the practice of discounting in the bond market, a bond's face value and its purchase price will generally not coincide.

The bond value is the present worth of the bond, considering all interest payments that are paid out, plus the face value of the bond when it matures.

The bond yield is the bondholder's actual rate of return from the bond, considering the purchase price, interest payments, and face value payment (or value realized if the bond is sold before it matures). By convention, bond yield is specified as a nominal rate (rate per annum), not as an effective rate per year. The bond yield should be determined by finding the effective rate of return per payment period (e.g., per semiannual interest payment) as a conventional rate of return problem. Then the nominal annual rate can be found by multiplying the effective rate per period by the number of payments per year.

6. INFLATION

Economic studies must be performed in terms of constant-value dollars. There are several methods used to accomplish this when inflation is present. One alternative is to replace the effective annual interest rate, i, with a value adjusted for inflation. This adjusted value, \( d \), is

\[
d = i + f + if\]

In Eq. 52.6, \( f \) is a constant inflation rate per year. The inflation-adjusted interest rate should be used to compute present worth values.

7. PROBABILISTIC PROBLEMS

If an alternative's cash flows are specified by an implicit or explicit probability distribution rather than being known exactly, the problem is probabilistic. Probabilistic problems typically possess the following characteristics.

- There is a chance of loss that must be minimized (or, more rarely, a chance of gain that must be maximized) by selection of one of the alternatives.
- There are multiple alternatives. Each alternative offers a different degree of protection from the loss. Usually, the alternatives with the greatest protection will be the most expensive.
- The outcome is independent of the alternative selected.

Probabilistic problems are typically solved using annual costs and expected values. An expected value is similar to an average value, since it is calculated as the mean of the discrete values. If cost 1 has a probability of occurrence of \( p_1 \), cost 2 has a probability of occurrence of \( p_2 \), and so on, the expected value is

\[
E = p_1(\text{cost 1}) + p_2(\text{cost 2}) + \cdots
\]

SAMPLE PROBLEMS

Problem 1

A machine has an initial cost of $50,000 and a salvage value of $10,000 after 10 years. What is the straight-line depreciation rate as a percentage of the initial cost?

(A) 4%
(B) 8%
(C) 10%
(D) 12%

Solution

Using Eq. 52.2, the straight-line depreciation per year is

\[
D = \frac{C - S_n}{n} = \frac{50,000 - 10,000}{10 \text{ years}} = 4000 \text{ per year}
\]

The depreciation rate is

\[
\frac{4000}{50,000} = 0.08 \quad (8%)
\]

Answer is B.

Problem 2

Referring to the machine described in Prob. 1, what is the book value after five years using straight-line depreciation?

(A) $12,500
(B) $16,400
(C) $22,300
(D) $30,000

Solution

Using straight-line depreciation, the depreciation every year is the same. From Eq. 52.4,

\[
BV_5 = C - \sum_{i=1}^{5} D_i = 50,000 - 4000 \times 5 = 30,000
\]

Answer is D.
Problem 3
Referring to the machine described in Prob. 1, what is the book value after five years using the MACRS method of depreciation?

(A) $12,500
(B) $16,400
(C) $18,500
(D) $21,900

Solution
Using Eq. 52.4,

\[ BV = C - \sum_{j=1}^{5} D_j \]

To compute the depreciation in the first five years, use the MACRS factors for a 10-year recovery period.

\[ \begin{array}{c|c|c}
\text{year} & \text{factor} (%) & D_j = \text{(factor) } C \\
1 & 10.0 & (0.10)(50,000) = 5000 \\
2 & 18.0 & (0.18)(50,000) = 9000 \\
3 & 14.4 & (0.144)(50,000) = 7200 \\
4 & 11.5 & (0.115)(50,000) = 5750 \\
5 & 9.2 & (0.092)(50,000) = 4600 \\
\end{array} \]

\[ BV = 50,000 - 31,550 = 18,450 \quad (18,500) \]

Answer is C.

Problem 4
A machine that costs $20,000 has a 10-year life and a $2000 salvage value. If straight-line depreciation is used, what is the book value of the machine at the end of the second year?

(A) $14,000
(B) $14,400
(C) $15,600
(D) $16,400

Solution
Use straight-line depreciation.

\[ D_j = \frac{C - S_n}{n} \]

\[ = \frac{20,000 - 2000}{10} \]

\[ = 1800 \text{ per year} \]

\[ BV_2 = C - \sum_{j=1}^{2} D_j \]

\[ = 20,000 - 2(1800)(1800 \text{ per year}) \]

\[ = 16,400 \]

Answer is D.

Problem 5
A $1000 face-value bond pays dividends of $110 at the end of each year. If the bond matures in 20 years, what is the approximate bond value at an interest rate of 12% per year, compounded annually?

(A) $890
(B) $930
(C) $1000
(D) $1820

Solution
The bond value is the present value of the sum of annual interest payments and the present worth of the future face value of the bond.

\[ P = (110)(P/A, 12\%, 20) + (1000)(P/F, 12\%, 20) \]

\[ = (110)\left(\frac{1.12^{-20} - 1}{0.12}\right) + (1000)(1 + 0.12)^{-20} \]

\[ = (110)(7.4694) + (1000)(0.1037) \]

\[ = 925 \quad (930) \]

Answer is B.

FE-STYLE EXAM PROBLEMS
Problem 1 through Prob. 7 refer to the following situation.
A company is considering buying one of the following two computers.

<table>
<thead>
<tr>
<th></th>
<th>computer A</th>
<th>computer B</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial cost</td>
<td>$3900</td>
<td>$5500</td>
</tr>
<tr>
<td>salvage value</td>
<td>$1800</td>
<td>$3100</td>
</tr>
<tr>
<td>useful life</td>
<td>10 years</td>
<td>13 years</td>
</tr>
<tr>
<td>annual</td>
<td>$275 (year 1 to 8)</td>
<td>$425 (year 9 to 13)</td>
</tr>
<tr>
<td>maintenance</td>
<td>$390</td>
<td>$425</td>
</tr>
<tr>
<td>interest rate</td>
<td>6%</td>
<td>6%</td>
</tr>
</tbody>
</table>

1. What is the equivalent uniform annual cost of computer A?

(A) $740
(B) $780
(C) $820
(D) $850
2. What is the equivalent uniform annual cost of computer B?
   (A) $770
   (B) $780
   (C) $850
   (D) $940

3. If computer A was to be purchased and kept forever without any change in the annual maintenance costs, what would be the present worth of all expenditures?
   (A) $3970
   (B) $7840
   (C) $10,000
   (D) $10,400

4. What is the annual straight-line depreciation for computer A?
   (A) $210/year
   (B) $225/year
   (C) $262/year
   (D) $420/year

5. What is the total straight-line depreciation value of computer A after the fifth year?
   (A) $1000
   (B) $1050
   (C) $1125
   (D) $1250

6. What is the book value of computer B after the second year, using the MACRS method of depreciation and a 10-year recovery period?
   (A) $3360
   (B) $3780
   (C) $3960
   (D) $4120

7. What is the present worth of the costs for computer A?
   (A) $5330
   (B) $5770
   (C) $6670
   (D) $6770

For the following problems, use the NCEES Handbook as your only reference.

8. An investment proposal calls for a $100,000 payment now and a second $100,000 payment 10 years from now. The investment is for a project with a perpetual life. The effective annual interest rate is 6%. What is the approximate capitalized cost?
   (A) $156,000
   (B) $160,000
   (C) $200,000
   (D) $267,000

9. Depreciation allowance is best defined as
   (A) the value that a buyer will give a machine’s owner at the end of the machine’s useful life
   (B) the amount awarded to industries involved in removing natural limited resources from the earth
   (C) the amount used to recover the cost of an asset so that a replacement can be purchased
   (D) a factor whose use is regulated by federal law

10. Twenty thousand dollars is invested today. If the annual inflation rate is 6% and the effective annual return on investment is 10%, what will be the approximate future value of the investment, adjusted for inflation, in five years?
    (A) $26,800
    (B) $32,200
    (C) $42,000
    (D) $43,100

11. An investment currently costs $28,000. If the current inflation rate is 6% and the effective annual return on investment is 10%, approximately how long will it take for the investment’s future value to reach $40,000?
    (A) 1.8 years
    (B) 2.3 years
    (C) 2.6 years
    (D) 3.4 years
Problem 12 through Prob. 16 refer to the following information.

An oil company is planning to install a new pipeline to connect storage tanks to a processing plant 1500 m away. The connection will be needed for the foreseeable future. Both 80 mm and 120 mm pipes are being considered.

<table>
<thead>
<tr>
<th></th>
<th>80 mm pipe</th>
<th>120 mm pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial cost</td>
<td>$1500</td>
<td>$2500</td>
</tr>
<tr>
<td>service life</td>
<td>12 years</td>
<td>12 years</td>
</tr>
<tr>
<td>salvage value</td>
<td>$200</td>
<td>$300</td>
</tr>
<tr>
<td>annual maintenance</td>
<td>$400</td>
<td>$300</td>
</tr>
<tr>
<td>pump cost/hour</td>
<td>$2.50</td>
<td>$1.40</td>
</tr>
<tr>
<td>pump operation</td>
<td>600 hours/year</td>
<td>600 hours/year</td>
</tr>
</tbody>
</table>

For this analysis, the company will use an annual interest rate of 8%. Annual maintenance and pumping costs may be considered to be paid in their entireties at the end of the years in which their costs are incurred.

12. Disregarding the initial and replacement pipe costs, what is the approximate capitalized cost of the maintenance and pumping costs for the 80 mm pipe?
   (A) $15,100
   (B) $20,100
   (C) $23,800
   (D) $27,300

13. What is the approximate equivalent uniform annual cost of the 80 mm pipe, considering all costs and expenses?
   (A) $1710
   (B) $1800
   (C) $1900
   (D) $2100

14. What is the approximate equivalent uniform annual cost of the 120 mm pipe, considering all costs and expenses?
   (A) $1250
   (B) $1290
   (C) $1380
   (D) $1460

15. What is the approximate depreciation allowance for the 120 mm pipe in the first year? Use MACRS depreciation assuming a 10-year life.
   (A) $193
   (B) $210
   (C) $230
   (D) $250

16. If the annual effective rates for inflation and interest have been 5% and 9%, respectively, what was the uninflated present worth of the 120 mm pipe three years ago?
   (A) $1590
   (B) $1670
   (C) $1710
   (D) $1780

17. Permanent mineral rights on a parcel of land are purchased for an initial lump-sum payment of $100,000. Profits from mining activities are $12,000 each year, and these profits are expected to continue indefinitely. What approximate interest rate is being earned on the initial investment?
   (A) 8.33%
   (B) 9.00%
   (C) 10.0%
   (D) 12.0%

18. Flood damage in a typical year is given according to the following table.

<table>
<thead>
<tr>
<th>value of flood damage</th>
<th>probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>0.75</td>
</tr>
<tr>
<td>$10,000</td>
<td>0.20</td>
</tr>
<tr>
<td>$20,000</td>
<td>0.04</td>
</tr>
<tr>
<td>$30,000</td>
<td>0.01</td>
</tr>
</tbody>
</table>

If the effective annual interest rate is 6%, what is the most likely present worth of flood damage over the next 10-year period?
   (A) $3100
   (B) $9600
   (C) $16,000
   (D) $23,000
**SOLUTIONS**

1. The equivalent uniform annual cost is the annual amount that is equivalent to all of the cash flows in the alternative. For computer A,

\[(EUAC)_A = ($3900)(A/P, 6\%, 10) +$390 - ($1800)(A/F, 6\%, 10) \]

\[= ($3900)(0.1359) +$390 - ($1800)(0.0759) \]

\[= $783 \text{ ($780)}\]

Answer is B.

2. For computer B,

\[(EUAC)_B = ($5500)(A/P, 6\%, 13) +$275 + ($425 - $275)(P/A, 6\%, 5) \times (P/F, 6\%, 8)(A/P, 6\%, 13) - ($3100)(A/F, 6\%, 13) \]

\[= ($5500)(0.1130) +$275 + ($150)(4.2124)(0.6274)(0.1130) - ($3100)(0.0530) \]

\[= $777 \text{ ($780)}\]

Alternate Solution

\[(EUAC)_B = ($5500)(A/P, 6\%, 13) +$425 - ($425 - $275)(P/A, 6\%, 8) \times (P/F, 6\%, 8)(A/P, 6\%, 13) - ($3100)(A/F, 6\%, 13) \]

\[= ($5500)(0.1130) +$425 - ($150)(6.2098)(0.1130) - ($3100)(0.0530) \]

\[= $777 \text{ ($780)}\]

Answer is B.

3. The present worth is

\[\text{capitalized cost} = \text{initial cost} + \frac{\text{annual cost}}{i} \]

\[= $3900 + \frac{($390}{0.06} \]

\[= $10,400 \]

Answer is D.

4. For straight-line depreciation

\[D_j = \frac{C - S_n}{n} = \frac{$3900 - $1800}{10 \text{ years}} \]

\[= $210/\text{year} \]

Answer is A.

5. The total depreciation after five years is

\[\sum D = (5 \text{ years})/($210 \text{ per year}) \]

\[= $1050 \]

Answer is B.

6. Subtract the depreciation of the first two years from the original cost.

\[BV = C - \sum_{j=1}^{2} D_j \]

\[\begin{array}{ccc}
\text{year} & \text{factor (\%)} & D_j \\
1 & 10.0 & (0.10)(\$5500) = \$550 \\
2 & 18.0 & (0.18)(\$5500) = \$990 \\
\end{array} \]

\[\sum D_j = \$1540 \]

\[BV = \$5500 - \$1540 = \$3960 \]

Answer is C.

7. Bring all costs and benefits into the present.

\[P = \$3900 + (\$390)(P/A, 6\%, 10) - (\$1800)(P/F, 6\%, 10) \]

\[= \$3900 + (\$390)(7.3601) - (\$1800)(0.5584) \]

\[= \$5765 \text{ ($5770)} \]

Answer is B.

8. Capitalized cost is the present worth of a project with an infinite life.

\[\text{capitalized cost} = \text{initial cost} + F(P/F, 6\%, 10) \]

\[= \$100,000 + (\$100,000)(0.5584) \]

\[= \$155,840 \text{ ($156,000)} \]

Answer is A.
9. Depreciation rates are closely regulated by federal law. Although depreciation does in fact result in a reduction in income taxes, it never is able to fully recover the original cost of the asset.

Answer is D.

10. The interest rate adjusted for inflation is

\[ d = i + f + if \]
\[ = 0.10 + 0.06 + (0.10)(0.06) \]
\[ = 0.166 \]

Use the single payment factor to determine the future worth of the investment.

\[ F = P(1 + d)^n \]
\[ = ($20,000)(1 + 0.166)^5 \]
\[ = $43,105 \quad ($43,100) \]

Answer is D.

11. The interest rate adjusted for inflation is

\[ d = i + f + if \]
\[ = 0.10 + 0.06 + (0.10)(0.06) \]
\[ = 0.166 \]

Use the present worth factor to determine the number of years.

\[ P = F(1 + i)^{-n} \]
\[ $28,000 = ($40,000)(1 + 0.166)^{-n} \]
\[ 0.7 = (1 + 0.166)^{-n} \]

Solve by taking the log of both sides.

\[ \log 0.7 = -n \log 1.166 \]
\[ -0.1549 = -n(0.0667) \]
\[ n = 2.32 \text{ years} \quad (2.3 \text{ years}) \]

Answer is B.

12. The capitalized cost is the present worth of an infinite investment. The \((P/A)\) factor for an infinite number of years is the reciprocal of the interest rate.

\[
\text{capitalized cost} = \frac{\text{annual cost}}{d} = \frac{\text{annual cost}}{0.166}
\]

\[
400 \quad \text{year} \quad + \quad \left( \frac{2.50}{\text{year}} \right) \quad \left( \frac{600}{\text{hours}} \right)
\]

\[
= \frac{0.08}{0.08}
\]

\[ = $23,750 \quad ($23,800) \]

Answer is C.

13. The approximate equivalent uniform annual cost is

\[
(EUAC)_{80} = \frac{($1500)(A/P, 8\%, 12) + $400}{(1 + 0.166)^5} \quad + \quad \left( \frac{2.50}{\text{hour}} \right) \quad (600 \text{ hours})
\]
\[ - \quad ($200)(A/F, 8\%, 12) \]
\[ = ($1500)(0.1327) + $400 + $1500 \]
\[ - \quad ($200)(0.0527) \]
\[ = $2089 \quad ($2100) \]

Answer is D.

14. The approximate equivalent uniform annual cost is

\[
(EUAC)_{120} = \frac{($2500)(A/P, 8\%, 12) + $300}{(1 + 0.166)^5} \quad + \quad \left( \frac{1.40}{\text{hour}} \right) \quad (600 \text{ hours})
\]
\[ - \quad ($300)(A/F, 8\%, 12) \]
\[ = ($2500)(0.1327) + $300 + $840 \]
\[ - \quad ($300)(0.0527) \]
\[ = $1456 \quad ($1460) \]

Answer is D.

15. Use the MACRS factor for 10-year depreciation.

\[
D_{10} = \text{(cost)}(\text{MACRS factor})
\]
\[ = ($2500)(0.10)
\]
\[ = $250 \]

Answer is D.