11-5

Cost of furniture = $50,000

Salvage = $0

Time (*t*) = 10 years

(a) Straight-line method = (Cost – Salvage)/Time

= ($50,000 – 0)/10

= $5,000 depreciation each year

(b) DDB *dt* = 2/*N* (Book value*t*–1)

Where

*d* = Depreciation

*t* = Any particular year

*N* = Total life in years

|  |  |  |  |
| --- | --- | --- | --- |
| **Year, *t*** | **Depreciation** | **Sum of Depreciations (∑*dj*)** | **Book Value (B** – **∑*dj*)** |
| 1 | 2/10 × $50,000 = $10,000 | $10,000 | $50,000 – $10,000 = $40,000 |
| 2 | 2/10 × $40,000 = $8,000 | $18,000 | $50,000 – $18,000 = $32,000 |
| 3 | 2/10 × $32,000 = $6,400 | $24,400 | $50,000 – $24,400 = $25,600 |
| 4 | 2/10 × $25,600 = $5,120 | $29,520 | $50,000 – $29,520 = $20,480 |
| 5 | 2/10 × $20,480 = $4,096 | $33,616 | $50,000 – $33,616 = $16,384 |
| 6 | 2/10 × $16,384 = $3,276 | $36,892 | $50,000 – $36,892 = $13,107 |
| 7 | 2/10 × $13,107.2 = $2,621 | $39,514 | $50,000 – $39,514 = $10,485 |
| 8 | 2/10 × $10,485.76 = $2,097 | $41,611 | $50,000 – $41,611 = $8,388 |
| 9 | 2/10 × $8,388.60 = $1,677 | $43,289 | $50,000 – $43,289= $6,710 |
| 10 | 2/10 × $6,710.00 = $1,342 | $44,631 | $50,000 – $44,631 = $5,368 |

(c) SOYD = *N* (*N* + 1)/2 = 10 × 11/2 = 55

*dt* = (*N* – *t* + 1) (*B* – *S*)/SOYD

*d*1 = (10 – 1 + 1) ($50,000)/55 = $9,091

*d*2 = (10 – 2 + 1) ($50,000)/55 = $8,181

*d*3 = (10 – 3 + 1) ($50,000)/55 = $7,272

*d*4 = (10 – 4 + 1) ($50,000)/55 = $6,363

*d*5 = (10 – 5 + 1) ($50,000)/55 = $5,454

*d*6 = (10 – 6 + 1) ($50,000)/55 = $4,545

*d*7 = (10 – 7 + 1) ($50,000)/55 = $3,636

*d*8 = (10 – 8 + 1) ($50,000)/55 = $2,727

*d*9 = (10 – 9 + 1) ($50,000)/55 = $1,818

*d*10 = (10 – 10 + 1) ($50,000)/55 = $909

(d) As per Table 11-1, Class 8, the depreciation percentage for furniture is 20% per year.

Cost of furniture (*C*0) = $50,000

Time = 10 years

Depreciation rate = 20%

*dt* = Cost*t*–1 × 20%

*d*1 = $50,000 × 20%

= $10,000

*C*1 = *C*0 – *d*1

= $50,000 – $10,000

= $40,000

*d*2 = $40,000 × 20%

= $8,000

*C*2 = *C*1 – *d*2

= $40,000 – $8,000

= $32,000

*d*3 = $32,000 × 20%

= $6,400

*C*3 = *C*2 – *d*3

= $32,000 – $6,400

= $25,600

*d*4 = $25,600 × 20%

= $5,120

*C*4 = *C*3 – *d*4

= $25,600 – $51,200

= $20,480

*d*5 = $20,480 × 20%

= $4,096

*C*5 = *C*4 – *d*5

= $20,480 – $4,096

= $16,384

*d*6 = $16,384 × 20%

= $3,276

*C*6 = *C*5 – *d*6

= $16,384 – $3,276

= $13,107

*d*7 = $13,107.2 × 20%

= $2,621

*C*7 = C6 – *d*7

= $13,107– $2,621

= $10,485

*d*8 = $10,485.76 × 20%

= $2,097

*C*8 = *C*7 – *d*8

= $10,485 – $2,097

= $8,388

*d*9 = $8,388.608 × 20%

= $1,677

*C*9 = *C*8 – *d*9

= $8,388 – $1,677

= $6,710

*d*10 = $6,710× 20%

= $1,342

*C*10 = *C*9 – *d*10

= $6,710 – $1,342

= $5,368

Salvage value = $5,368

11-10

Cost of handling equipment BV0) = $75,000

Time = 10 years

Handling equipment qualifies as a Class-43 asset in Table 11-1, and its CCA depreciation rate is 30%.

Book value*t* = BV*t*–1 – *dt*

The depreciation schedule is shown in the following table, which takes the first-year rule into account:

|  |  |  |
| --- | --- | --- |
| **Year** | **UCC** | **CCA** |
| 1 | $75,000 | $11,250 |
| 2 | $63,750 | $19,125 |
| 3 | $44,625 | $13,388 |
| 4 | $31,238 | $9,371 |
| 5 | $21,866 | $6,560 |
| 6 | $15,306 | $4,592 |
| 7 | $10,714 | $3,214 |
| 8 | $7,500 | $2,250 |
| 9 | $5,250 | $1,575 |
| 10 | $3,675 | $1,103 |

11-13

Schedule A is depreciated with the SOYD method.

Schedule B is depreciated with declining-balance depreciation of 25% per year.

Schedule C is depreciated with the unit-of-production method.

Schedule D is depreciated with the straight-line method.

11-19

Cost of Equipment = $100,000

Salvage = $10,000

Time = 6 years

Straight-line method = (Cost – Salvage)/Time

## SOYD Method

SOYD = *N* (*N* + 1)/2 = 10 × 11/2 = 55

*dt* = (*N* – *t* + 1) (*B* – *S*)/SOYD

## CCA Method

Book value*t* = BV*t*–1 – *dt*

*dt* = *dt*–1 × CCA rate

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Straight Line** | | **Sum of Years’ Digits** | | **CCA** | |
| **Period (in years)** | **Depreciation** | **Book Value** | **Depreciation** | **Book Value** | **Depreciation** | **Book Value** |
| 1 | $15,000.00 | $85,000.00 | $25,714.00 | $74,286.00 | $10,000.00 | $90,000.00 |
| 2 | $15,000.00 | $70,000.00 | $21,429.00 | $52,857.00 | $18,000.00 | $72,000.00 |
| 3 | $15,000.00 | $55,000.00 | $17,143.00 | $35,714.00 | $14,400.00 | $57,600.00 |
| 4 | $15,000.00 | $40,000.00 | $12,857.00 | $22,857.00 | $11,520.00 | $46,080.00 |
| 5 | $15,000.00 | $25,000.00 | $8,571.00 | $14,286.00 | $9,216.00 | $36,864.00 |
| 6 | $15,000.00 | $10,000.00 | $4,286.00 | $10,000.00 | $7,373.60 | $29,491.40 |

11-29

**Part 1**

1. The asset class for a general-purpose truck is **Class 10**, with a CCA rate of 30%.
2. Cost of truck = $17,000

*d*1 = 17,000 × 30% x 0.5 = $2,550

*d*2 = 14,450 × 30% = $4,335

*d*3 = 10,115 × 30% = **$3,035**

1. UCC6 = 17,500 (1 – 30%/2) (1 – 30 %)5

= 17,500 (1 – 0.15) (1 – 0.3)5

= 17,500 × 0.85 × 0.16807

= **$2,500.04**

**Part 2**

1. The asset class for production equipment bought after 1992 is **Class 43**, with a CCA rate of 30%.
2. Cost of Equipment = $30,000

*d*1 = 30,000 × 30% x 0.5 = $4,500

*d*2 = 25,500× 30% = $7,650

*d*3 = 17,850 × 30% = **$5,355**

1. UCC6 = 17,500 (1 – 30%/2) (1 – 30 %)5

= 17,500 (1 – 0.15) (1 – 0.3)5

= 17,500 × 0.85 × 0.16807

= **$4,285.79**

**Part 3**

1. The asset class for cement buildings built after 1988 is **Class 3**, with a CCA rate of 5%.
2. Cost of Building = $130,000

*d*1 = 130,000 × 5% x 0.5 = $3,250

*d*2 = 126,750 × 5% = $6,338

*d*3 = 120,413 × 5% = **$6,021**

1. UCC6 = 130,000 (1 – 5%/2) (1 – 5 %)5

= 130,000 (1 – 0.025) (1 – 0.05)5

= 130,000 × 0.975 × 0.773781

= **$9,8077**

11-32

(a) EUACI = (P − S) (*A/P*, *i*%, n) + *Si* + Annual operating cost

= ($80,000 − $20,000) (*A/P*, 10%, 20) + $20,000 (0.10) + $18,000

= $60,000 (0.1175) + $2,000 + $18,000

= $27,050

EUACII = ($100,000 − $25,000) (*A/P*, 10%, 25) + $25,000 (0.10) + $20,000 − $5,000 (*P/A*, 10%, 10) (*A/P*, 10%, 25)

= $75,000 (0.1102) + $2,500 + $20,000 − $5,000 (6.145) (0.1102)

= $27,380

To minimize EUAC, select Machine II.

(b) Capitalized Cost of Machine I = PW of an infinite life = EUAC/*i*

In part (a), EUAC = $27,050, so:

Capitalized Cost = $27,050/0.10 = $270,500

(c) Fund to replace Machine I

Required future sum F = $80,000 − $20,000 = $60,000

Annual Deposit A = $60,000 (*A/P*, 10%, 20)

= $60,000 (0.0175) = $1,050

(d)

|  |  |
| --- | --- |
| **Year** | **Cash Flow** |
| 0 | −$80,000 |
| 1− | +$28,000 |
| 20 | −$18,000 |
| 20 | +$20,000 |

$80,000 = ($28,000 − $18,000) (P/A, i%, 20) + $20,000 (P/F, i%, 20)

Solve by trial and error:

**Try *i* = 10%**

($10,000) (8.514) + $20,000 (0.1486) = $88,112 > $80,000

**Try *i* = 12%**

($10,000) (7.469) + $20,000 (0.1037) = $76,764 < $80,000

Rate of Return = 10% + (2%) [($88,112 − $80,000)/($88,112 − $76,764) = 11.4%

(e) SOYD depreciation

Book value of Machine I after two periods

Dep. Charge in any year = (Remaining useful life at beginning of yr/SOYD for total useful life)(P − S)

Sum of years digits = (*n*/2) (*n* + 1) = 20/2 (20 + 1) = 210

1st Year depreciation = (20/210) ($80,000 − $20,000) = $5,714

2nd Year depreciation = (19/210) ($80,000 − $20,000) = $5,429

Sum = $11,143

Book value = Cost – depreciation to date

= $80,000 − $11,143

= $68,857

(f) DDB Depreciation

Book value of Machine II after three years

Depreciation charge in any year = (2/*n*) (P – Depreciation charge to date)

1st Year Depreciation = (2/25) ($100,000 − $0) = $8,000

2nd Year Depreciation = (2/25) ($100,000 − $8,000) = $7,360

3rd Year Depreciation = (2/25) ($100,000 − $15,360) = $6,771

Sum = $22,131

Book Value = Cost – Depreciation to date

= $100,000 − $22,131

= $77,869

(g) CCA Depreciation, 30% depreciation rate, first-year rule applies:

1st Year Depreciation = $100,000 (0.15) = $15,000

2nd Year Depreciation = $85,000 (0.3) = $25,500

3rd Year Depreciation = $59,500 (0.3) = **$17,850**

11-42

We tabulate the depreciation schedules for each case:

|  |  |  |  |
| --- | --- | --- | --- |
| **Straight-Line Depreciation** | | | |
| **Year** | **BV (SLD)** | **Dep (SLD)** | **PV** |
| 1 | 15,000 | 1,667 | 1,587 |
| 2 | 13,333 | 1,667 | 1,512 |
| 3 | 11,667 | 1,667 | 1,440 |
| 4 | 10,000 | 1,667 | 1,371 |
| 5 | 8,333 | 1,667 | 1,306 |
| 6 | 6,667 | 1,667 | 1,244 |
| 7 | 5,000 | 1,667 | 1,184 |
| 8 | 3,333 | 1,667 | 1,128 |
| **9** | **1,667** | **1,667** | **1,074** |
| Sum |  |  | **11,846** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Sum-of-Years’-Digits Depreciation** | | | |
| **Year** | **BV (SOYD)** | **Dep (SOYD)** | **PV** |
| 1 | 15,000 | 3,000 | 2,857 |
| 2 | 12,000 | 2,667 | 2,419 |
| 3 | 9,333 | 2,333 | 2,016 |
| 4 | 7,000 | 2,000 | 1,645 |
| 5 | 5,000 | 1,667 | 1,306 |
| 6 | 3,333 | 1,333 | 995 |
| 7 | 2,000 | 1,000 | 711 |
| 8 | 1,000 | 667 | 451 |
| **9** | **333** | **333** | **215** |
| Sum |  |  | **12,615** |

|  |  |  |  |
| --- | --- | --- | --- |
| **CCA43 Depreciation** | | | |
| **Year** | **BV (CCA43)** | **Dep (CCA43)** | **PV** |
| 1 | 15,000 | 2,250 | 2,143 |
| 2 | 12,750 | 3,825 | 3,469 |
| 3 | 8,925 | 2,678 | 2,313 |
| 4 | 6,248 | 1,874 | 1,542 |
| 5 | 4,373 | 1,312 | 1,028 |
| 6 | 3,061 | 918 | 685 |
| 7 | 2,143 | 643 | 457 |
| 8 | 1,500 | 450 | 305 |
| **9** | **1,050** | **315** | **203** |
| Sum |  |  | **12,145** |

11-44

At disposal we are interested in capital gains, depreciation recapture, or ordinary losses. We need to know the market value and book value at the time of disposal.

Market Value at year 5 = $90,000

Book Value at year 5 = $150,000 – [(150,000 – 30,000)/8] (5) = $75,000

Depreciation Recapture (Ordinary Gain) = Market Value – Book Value

= $90,000 - $75,000 = $15,000

**From a tax perspective, the asset is sold at a market value that is higher than its book value.**

11-48

We include the shipping and installation costs in the cost base.

1. **CCA Class 43**

After four years of depreciation, the book value is

$160,000 (0.85) (0.73) = $46,648

It is being disposed of at zero cost, so there will be a loss of $46,648

1. **Straight-line depreciation**

We subtract the cost of dismantling the belt from the anticipated salvage income.

After four years of depreciation, the book value is

$160,000 – (160,000 – 20,000) × 4/6 = $66,667

It is being disposed of at zero cost, so there will be a loss of $66,667

1. **SOYD depreciation**

After four years of depreciation, the book value is

$160,000 – (160,000-20,000) (6+5+4+3)/(1+2+3+4+5+6)

= $160,000 – 140,000 × 18/21 = $40,000

It is being disposed of at zero cost, so there will be a loss of $40,000

1. **150%-Declining-Balance depreciation**

The machine depreciates at 33%, so after four years of depreciation, its book value is

$160,000 (0.674) = $32,242

It is being disposed of at zero cost, so there will be a loss of $32,242

11-63

|  |  |
| --- | --- |
| **Year** | **Utilization (hr/yr)** |
| 1 | 6,000 |
| 2 | 4,000 |
| 3 | 4,000 |
| 4 | 1,600 |
| 5 | 800 |
| 6 | 800 |
| 7 | 2,200 |
| 8 | 2,200 |

1. SOYD = *N* (*N* + 1)/2

= 8 (8 + 1)/2

= 8 × 9/2

= 36

Cost = $600,000

Salvage = $60,000

Cost – Salvage = $600,000 – $60,000 = $540,000

*dt* = (*N* – *t* + 1) (*B* – *S*)/SOYD

*d*1 = (8 – 1 + 1) ($540,000)/36= $120,000

*d*2 = (8 – 2 + 1) ($540,000)/36 = $105,000

*d*3 = (8 – 3 + 1) ($540,000)/36 = $90,000

*d*4 = (8 – 4 + 1) ($540,000)/36 = $75,000

*d*5 = (8 – 5 + 1) ($540,000)/36 = $60,000

*d*6 = (8 – 6 + 1) ($540,000)/36 = $45,000

*d*7 = (8 – 7 + 1) ($540,000)/36 = $30,000

*d*8 = (8 – 8 + 1) ($540,000)/36 = $15,000

1. Total utilization = 21,600 hours in 8 years

*d*1= 6,000/21,600 × ($600,000 – $60,000) = 6,000/21,600 × $540,000 = $50,000

*d*2= 4,000/21,600 × ($600,000 – $60,000) = 4,000/21,600 × $540,000 = $100,000

*d*3= 4,000/21,600 × ($600,000 – $60,000) = 4,000/21,600 × $540,000 = $100,000

*d*4= 1,600/21,600 × ($600,000 – $60,000) = 1,600/21,600 × $540,000 = $40,000

*d*5= 800/21,600 × ($600,000 – $60,000) = 800/21,600 × $540,000 = $20,000

*d*6= 800/21,600 × ($600,000 – $60,000) = 800/21,600 × $540,000 = $20,000

*d*7= 2,200/21,600 × ($600,000 – $60,000) = 2,200/21,600 × $540,000 = $55,000

*d*8= 2,200/21,600 × ($600,000 – $60,000) = 2,200/21,600 × $540,000 = $55,000

11-67

Cost of equipment = $20,000

Market value in 2nd year = $14,000

CCA rate = 30%

*d*1 = $20,000 × 30% x 0.5 = $3,000

BV2 = Cost – *d*1

= $20,000 – $3,000

=$ 17,000

**Since the book value exceeds the market value for the equipment in the second year, there is a terminal loss.**