CHE374 - Quiz #7 (Saturday 26th October 2024)

Question 1) A machine purchased for $200,000 has a depreciable life of 4 years. It will have an expected salvage value of $35,000 at the end of the depreciable life. What would be the book value of the asset in each of the 4 years if the following depreciation methods were used.

Variables: Purchase Price (PP) = $200,000
Depreciation Life = 4 years
Salvage Value (SV) = $35,000
Total Depreciation = PP - SV = $200,000 - $35,000 = $165,000

(A) Straight Line Depreciation

$$\text{Annual Depreciation (AD)} = \frac{\text{Total Depreciation}}{\text{Life}} = \frac{\$165,000}{4} = 41\,250\ \$/\text{year}$$

At the end of
Year 0: BV = PP = $92,000
Year 1: BV = PP - AD(t) = $200,000 - (41250 x 1) = $158,750
Year 2: BV = PP - AD(t) = $200,000 - (41250 x 2) = $117500
Year 3: BV = PP - AD(t) = $200,000 - (41250 x 3) = $76250
Year 4: BV = PP - AD(t) = $200,000 - (41250 x 4) = $35,000 = Salvage Value ✓

(B) Declining Balance Depreciation → $\text{rate (d)} = 1 - \sqrt[\text{Life}]{\frac{SV}{PP}} = 1 - \sqrt[4]{\frac{\$35,000}{\$200,000}} = 0.353216 \approx 35.32\%$

At the end of
Year 0: BV = PP = $200,000
Year 1: $BV = PP(1-d)^t = \$200,000\,(1-0.353216)^1 = \$129356.80$
Year 2: $BV = PP(1-d)^t = \$200,000\,(1-0.353216)^2 = \$83665.91$
Year 3: $BV = PP(1-d)^t = \$200,000\,(1-0.353216)^3 = \$54113.77$
Year 4: $BV = PP(1-d)^t = \$200,000\,(1-0.353216)^4 = \$35000.13$

(C) Sum of the Years' Digits (SOYD = 1+2+3+4 = 10)

$$\text{Depreciation Rate (DR)} = \frac{\text{Life} - t + 1}{\text{SOYD}} \qquad D_t = \frac{N - t + 1}{\text{SOYD}}(PP - SV)$$ } Depreciation for year t

PP - SV = $165,000

Year 0: BV = $200,000
Year 1: $DR = \frac{4-1+1}{10} = 0.4$ $BV = \$200,000 - (0.4 \cdot 165,000) = \$134,000$
Year 2: $DR = \frac{4-2+1}{10} = 0.3$ $BV = \$200000 - [(0.4+0.3)165,000] = \$84500$
Year 3: $DR = \frac{4-3+1}{10} = 0.2$ $BV = \$200,000 - [(0.4+0.3+0.2)165,000] = \$51500$
Year 4: $DR = \frac{4-4+1}{10} = 0.1$ $BV = \$200,000 - [(0.4+0.3+0.2+0.1)165,000] = \$35,000$

(D) Units of production assuming the following units production rates.

Year	Units
0	–
1	85,000
2	55,000
3	35,000
4	25,000

$$D_t = \frac{\text{Production in year } t}{\text{Lifetime Production}} (PP - SV)$$

Life time production $= 85{,}000 + 55000 + 35{,}000 + 25{,}000$
$= 200{,}000$

$$\text{Depreciation Rate} = \frac{(PP - SV)}{\text{Lifetime Production}} = \frac{165{,}000}{200{,}000} = 0.825 \text{ \$ per unit}$$

BV = PP − (Total production at the end of year t) × DR

At the end of year :

Year 0 : BV = \$200,000

Year 1 : BV = \$200,000 − (85,000)(0.825) = \$129875

Year 2 : BV = \$200,000 − (85,000 + 55000)(0.825) = \$84500

Year 3 : BV = \$200,000 − (85,000 + 55000 + 35,000)(0.825) = \$55625

Year 4 : BV = \$200,000 − (85,000 + 55000 + 35,000 + 25,000)(0.825) = \$35000