Depreciation*

Is an artifice that reflects the decrease in the asset's value over time or with usage .

*not cash flow

1-Straight Line Depreciation (SLN):

Annual depreciation charges from a uniform annual series

$dt = \frac{(P-F)}{n}$

$\beta t = P - (t\ dt)$

dt : depreciation allowed at end of each year t : no. of year P:present value

βt :Unrecovered investment book value at end of each year F : salvage value

2-Declining balance Depreciation (DB)

Larger depreciation chargers in the early years and smaller depreciation years in the later years . (negative geometric series)

$dt = \rho\ P(1-\rho)^{t-1}$, $\beta t = (1-\rho)^{t}$

at Declining (DB) $\rho = 1 - \frac{F}{P}^{\frac{1}{n}}$

at **Double** Declining (DDB) $\rho = \frac{200\%}{n} = \frac{2}{n}$ ($\rho = \frac{150\%}{n} = \frac{1.5}{n}$)

* Declining balance with switch to (SLN)

(for SLN)

$dt = \frac{\beta(t-1)-F}{n-(t-1)}$

$\beta t = \frac{P\ (1-\rho)^{t-1}-F}{n-(t-1)}$

Used SLN & DB(or DDB) , then choice the larges between them and contract from βt even end of year .

3- Sum of years Digits Depreciation

$dt = \frac{n-(t-1)}{n(n+1)/2}(P - F)$

$\beta t = (P - F)\frac{(n-t)(n-t+1)}{n(n+1)} + F$

Ex.1

P = 1600 000 , F = 100 000 , n=5

a) By Straight Line

$dt = \frac{1\,500\,000}{5} = 300\,000$

Eoy	dt	Bt
0	-	1600 000
1	300 000	1 300 000
2	300 000	1 000 000
3	300 000	700 000
4	300 000	400 000
5	300 000	100 000 ≥ s.v o.k

b) Declining balance depreciation

$\rho = 1 - (\frac{100\,000}{1\,600\,000}^{\frac{1}{5}}) = 0.426$

$dt = 1\,600\,000\,(0.426)\,(1 - 0.426)^{t-1}$

$dt = 681\,600\,(0.574)^{t-1}$

EOY	dt	βt
0	-	1 600 000
1	681 600	918 400
2	391 238.4	527 161.6
3	224570.8	302590.76
4	128903.66	173687.1
5	73 990.7	99 696.39 ≤ s.v Not o.k
	73 687.1	100 000 o.k

c- Sum of years digits Depreciation

$dt = \frac{5-(t-1)}{15}$ (1 500 000)

Eoy	dt	βt
0	-	1 600 000
1	500 000	1 100 000
2	400 000	700 000
3	300 000	400 000
4	200 000	200 000
5	100 000	100 000 ≥ s.v

C- Double Declining depreciation (200%)

$\rho = \frac{2}{n} = \frac{2}{5} = 0.4$

$dt = 1\ 600\ 000\ (\ 0.4\ )\ (\ 1 - 0.4\ )^{t-1}$

$dt = 640\ 000(0.6)^{t-1}$

EOY	dt	βt
0	-	1 600 000
1	640 000	960 000
2	384 000	576 000
3	230 400	345 600
4	138 240	207 360
5	62 944	124 416 ≥ s.v

d) Double declining Switching to (SLN) [200%]

$$Dt\ (\ SLN\ )\ = \frac{1\ 600\ 000\ (0.6)^{t-1} - 100\ 000}{5-(\ t-1\ )}$$

EOY	Dt (DB)		Dt (SLN)	βt
0	-	>	-	1 600 000
1	640 000	>	300 000	960 000
2	384 000	>	215 000	576 000
3	230 400	>	158 666.67	345 000
4	138 240	>	122 800	207 360
5	82 944	<	107 360	100 000

- **Other method to find Dt**

a – Units of production metho

$$Dt = (P - F)\frac{Ut}{\sum U}$$

Ut = Unit during year

U = Total unit in life

b- Operation day (hr) method

$$Dt = (P - F)\frac{Qt}{\sum Q}$$

Qt = Unit during year

Q = Total Unit

C-Income for cost method

$$Dt = (P - F)\frac{Rt}{\sum R}$$

Rt= Rental income during year

R = Total useful life income

Ex.2

A) A small truck is production for SR 270,000 . The truck is expected to be of use to the company for 5 years , after which it will be sold for SR 40,000 . Calculate the depreciation deduction and the resulting un recovered investment during each year of the asset's life .
   i) Use straight –Line depreciation
   ii) Use sum of the year's digits depreciation .

B) If for the same truck , depreciation is calculated based on mileage driven and expected mileage per year is :

Year	1	2	3	4	5
Mileage(km)	85,000	72,000	60,000	45,000	38,000

Calculate the depreciation deduction and the resulting unrecovered investment during each year the truck's life according to units of production method .

Solution

a-i

P = 270 000 , n = 5 , sv = 40 000

N	Dt = $\frac{P-F}{n}$	βt
0	-	270 000
1	4 600	265 400
2	4 600	260 800
3	4 600	256 200
4	4 600	251 600
5	4 600	247 000 > s.v

a-ii

N	dt = $\frac{n-(t-1)}{n(n+1)/2}$ (P – F)	βt
0	-	270 000
1	76 666	193 334
2	61 333	132 001
3	46 000	86 001
4	30 666	55 335
5	15 333	40 002

B- mileage per year

N	Mileage	Dt	βt
0	-	-	270 000
1	85 000	65 166.8	244 833
2	72 000	55 200	189 633
3	60 000	46 000	143 633
4	45 000	34 500	109 133
5	38 000	29133.5	80 000
Total = 300 000			

Ex.3

A small factory has purchased a vehicle for SR 10 000 with an anticipated salvage of SR 500 after 8 years of service . Compute the depreciation deduction and the resulting uncovered investment during each year of that period using 200% declining balance switching to straight-line depreciation .

Solution

P = 10 000 , F = 500 , n = 8 , R = 200%

Year	D (DB)	D (SLN)	βt
0	-	-	10 000
1	2 500	1 187	7 500
2	1 875	1 000	5 625
3	1 406	854.1	4 218
4	1 054	743.8	3 164
5	791	666	2 373
6	593	624	1 748
7	437	624	1 124
8	281	624	500

... END...