Depreciation

Depreciation is the measure of wearing out of a fixed asset. All fixed assets are expected to be less efficient as time goes on and as they are continuously used in a business, for example. Depreciation is calculated as the estimate of this measure of wear and is recorded in the Profit & Loss report either on a monthly or an annual basis. The cost of the asset less the total depreciation will give you the Net Book Value of the asset.

The idea of depreciation is to spread the cost of that capital asset over the period of its "useful life to the entity" that currently owns it.
If the full cost of the asset were to be borne in the year that it was purchased, then that year's expenditure would be unfairly penalised whilst expenditure during the remaining years, which were still receiving the benefit from the asset, would not be affected.

Depreciable Asset
Depreciable assets are assets which

i. are expected to be used during more than one accounting period; and
ii. have a limited useful life; and
iii. are held by an enterprise for use in the production or supply of goods and services, for rental to others, or for administrative purposes and not for the purpose of sale in the ordinary course of business.

What is depletion?
The term 'Depletion' refers to the physical deterioration by the exhaustion of natural resources, like, quarries, mines, oil-wells, etc. Due to mining or extraction, the stock of minerals/oil, etc. is depleted/reduced. In case of such assets, usually depreciation is charged on the basis of quantity produced.

What is amortisation?
Amortisation refers to the economic deterioration of intangible assets like, goodwill, patents, trademark, copyright etc. It is the practice to write off the intangible assets over a reasonable period. When a part of an intangible asset is written off, it is called amortisation.

What is obsolescence?
The term 'Obsolescence' refers to the economic deterioration of assets, due to change in technology, invention of improved equipment, market decline due to change in taste and fashion, etc., or inadequacy of existing plant to meet the increased business.
Depreciation is affected by obsolescence as it decreases the value of asset.

Causes of Depreciation

I. **Wear and tear**. Fixed assets are purchased for use in business. Due to constant use of fixed assets in business for generating income, the value of such assets is decreased. It is called 'wear' and 'tear'. It is main cause of depreciation.
II. **Passage of time**. Every asset has a certain economic useful life. With the passage of time effective life of the assets goes on decreasing. Certain assets like a lease, have a certain legal life. With the passage of time, value of such assets goes down, even may not be actually used in the business.

III. **Depletion.** Depletion is reduction of natural resources. In case of wasting assets, depletion is also a cause of fall in the value of assets like, mines, oils wells, quarries, etc.

IV. **Obsolescence.** Due to invention of new technology, the assets based on old technology may become obsolete and out of date.

V. **Accidents.** Accidents may also cause a permanent fall in the useful life as well as in the value of assets.

VI. **Permanent fall in price.** A permanent fall in the market value of investments is recorded as depreciation. Other assets are depreciated on the basis of its useful life.

Factors affecting the amount of depreciation

Assessment of depreciation and the amount to be charged in respect thereof in an accounting period are usually based on the following three factors:

i. historical cost or other amount substituted for the historical cost of the depreciable asset when the asset has been revalued;

ii. expected useful life of the depreciable asset; and

iii. estimated residual value of the depreciable asset.

SERVICE LIFE The period during which the use of a property is economically feasible is known as the service life of the property.

SALVAGE VALUE Salvage value is the net amount of money obtainable from the sale of used property over and above any charges involved in removal and sale. If a property is capable of further service, its salvage value may be high. The term salvage value implies that the asset can give some type of further service and is worth more than merely its scrap or junk value. If the property cannot be disposed of as a useful unit, it can often be dismantled and sold as junk to be used again as a manufacturing raw material. The profit obtainable from this type of disposal is known as the scrap, or junk value.

METHODS FOR DETERMINING DEPRECIATION

Depreciation costs can be determined by a number of different methods, and the design engineer should understand the bases for the various methods. The Federal government has definite rules and regulations concerning the manner in which depreciation costs may be determined. These regulations must be followed for income-tax purposes as well as to obtain most types of governmental support. Since the methods approved by the government are based on sound economic procedures, most industrial concerns use one of the government sanctioned methods for determining depreciation costs, both for income-tax calculations and for reporting the concern's costs and profits.? It is necessary, therefore, that the design engineer keep abreast of current changes in governmental regulations regarding depreciation allowances.

In general, depreciation accounting methods may be divided into two classes: (1) arbitrary methods giving no consideration to interest costs, and (2) methods taking into account interest on the investment. Straight-line, declining-balance, and sum-of-the-years-digits methods are included in the first class, while the second class includes the sinking-fund and the present-worth methods.

Straight-Line Method In the straight-line method for determining depreciation, it is assumed that the value of the property decreases linearly with time. Equal amounts are charged for depreciation each year throughout the entire service life of the property. The annual depreciation cost may be expressed in equation form as follows:

$$d = \frac{V-v}{n} \qquad (1)$$

where d = annual depreciation, $/year V = original value of the property at start of the service-life period, completely installed and ready for use, dollars V, = salvage value of property at end of service life, dollars n = service life, years

The asset value (or book value) of the equipment at any time during the service life may be determined from the following equation:

$$V_a = V\text{-}ad \qquad (2)$$

Declining-Balance (or Fixed Percentage) Method

When the declining-balance method is used, the annual depreciation cost is a fixed percentage of the property value at the beginning of the particular year. The fixed-percentage (or declining-balance) factor remains constant throughout the entire service life of the property, while the annual cost for depreciation is different each year. Under these conditions, the depreciation cost for the first year of the property's life is Vf, where f represents the fixed-percentage factor. At the end of the first year

$$\text{Asset value} = V_a = V(1 - f) \qquad (3)$$

At the end of the second year

$$V_a = V(1 - f)^2 \qquad (4)$$

At the end of a years

$$V_a = V(1 - f)^a \qquad (5)$$

At the end of n years (i.e., at the end of service life)

$$V_a = V(1 - f)^n = V_s \qquad (6)$$

Therefore,

$$f = 1 - \left(\frac{V_s}{V}\right)^{1/n} \qquad (7)$$

Sinking-Fund Method

The use of compound interest is involved in the sinking-find method. It is assumed that the basic purpose of depreciation allowances is to accumulate a sufficient fund to provide for the recovery of the original capital invested in the property. An ordinary annuity plan is set up wherein a constant amount of money should theoretically be set aside each year. At the end of the service life, the sum of all the deposits plus accrued interest must equal the total amount of depreciation. Derivation of the formulas for the sinking-fund method can be accomplished by use of the following notations in addition to those already given:

i = annual interest rate expressed as a fraction
R = uniform annual payments made at end of each year (this is the annual depreciation cost), dollars
$V - V_s$ = total amount of the annuity accumulated in an estimated service life of n years (original value of property minus salvage value at end of service life), dollars

According to the equations developed for an ordinary annuity in Chap. 7 (Interest and Investment Costs),

$$R = (V - V_s)\frac{i}{(1 + i)^n - 1} \tag{8}$$

The amount accumulated in the fund after a years of useful life must be equal to the total amount of depreciation up to that time. This is the same as the difference between the original value of the property V at the start of the service life and the asset value V_a at the end of a years. Therefore,

$$\text{Total amount of depreciation after } a \text{ years} = V - V_a \tag{9}$$

$$V - V_a = R\frac{(1 + i)^a - 1}{i} \tag{10}$$

Combining Eqs. (8) and (10),

$$V - V_a = (V - V_s)\frac{(1 + i)^a - 1}{(1 + i)^n - 1} \tag{11}$$

Asset (or book) value after a years = V_a

$$V_a = V - (V - V_s)\frac{(1 + i)^a - 1}{(1 + i)^n - 1} \tag{12}\dagger$$

SUM OF YEAR DIGIT METHOD

The **sum of years' digits method** is a form of accelerated depreciation that is based on the assumption that the productivity of the asset decreases with the passage of time. Under this method, a fraction is computed by dividing the remaining useful life of the asset on a particular date by the sum of the year's digits. This fraction is applied to the depreciable cost of the asset to compute the depreciation expense for the period.

Sum of years' digits method attempts to charge a higher depreciation expense in early years of the useful life of the asset because the asset is most productive in early years of its life. Also the asset loses much of its productive efficiency in early years.

Formula:

The following formula is used to calculate depreciation expense under sum of years' digits method

$$\text{Depreciation expense} = \frac{\text{Remaining useful life of the asset}}{\text{Sum of the years' digits}} \times \text{Depreciable cost}$$

Example:

The Monster company purchased a machine on January 1, 2015. The relevant information is given below:

Cost of the machine: $250,000

Expected useful life of machine: 5 years

Salvage value: $25,000

Required: Prepare a schedule showing the depreciation expense of each year of the useful life of the machine using sum of years' digits method.

Solution:

Year	Depreciation base	Remaining life of machine	Depreciation fraction	Depreciation expense	Book vale
	$			$	$
1	225,000	5	5/15*	75,000	175,000
2	225,000	4	4/15	60,000	115,000
3	225,000	3	3/15	45,000	70,000
4	225,000	2	2/15	30,000	40,000
5	225,000	1	1/15	15,000	25,000
				225,000	

*1 + 2 + 3 + 4 + 5 = 15

- Depreciable cost (depreciable base): $250,000 – $25,000 = $225,000
- Depreciation expense at the end of the first year: $225,000 × (5/15) = $75,000
- Book value at the end of the first year: $250,000 – $75,000 = $175,000

Note that as the remaining life of the machine decreases, the depreciation expense also decreases.