CHAPTER 12

# DEPRECIATION

## 12.1 INTRODUCTION

The concept of depreciation occupies a significant place in the determination of income and in the measurement of service potential of the fixed assets. Depreciation is the loss of value of the physical assets used in production. Whenever any machine or equipment performs useful work, its wear and tear is bound to occur. This can be minimised upto some extent by proper care and maintenance but can't be totally prevented. Its efficiency also reduces with the lapse of time and at one time it becomes uneconomical to be used further and needs replacement by another new unit. Therefore, we can say that efficiency and value of machine or assets constantly reduces with the lapse of time during use, which is known as **Depreciation**. So some money must be set aside yearly from the profit, so that when that equipment becomes uneconomical, it can be replaced by the new one. The money which is deducted yearly, is called **depreciation charge.** This amount of money is deposited in a fund, called **Depreciation fund** or **sinking fund.** This recovered capital is, then, reinvested in a general way to maintain a company's physical plant and to pursue new ventures.

## 12.2 MEANING

Depreciation means a decrease in worth. Most assets are worth less as they age. Depreciation is a permanent, continuing and gradual shrinkage in the book value of a fixed asset. There are three different meanings attached to depreciation. **In physical sense,** depreciation is a decline in the physical ability of the equipment in the process of production. **In economic sense,** it is a decline in the worth of an asset due to obsolescence of the technology, changes in taste and preference against the asset and due to the psychological factors. In **Accounting sense**, depreciation is the estimated value of fall in the worth of an asset. In accounting, depreciation is taken as a part of cost of production, but this part is taken as implicit cost. The aim of depreciation accounting is to allocate the cost of asset over its service life in a systematic way.

## 12.3 Causes of Depreciation

Assets depreciate in value for several reasons. Important of these reasons are outlined here.

1. **Physical Depreciation :**

   Everybody knows that when any machinery performs work, wear and tear of certain components takes place, although sufficient precautions are taken, i.e., proper lubricating and cooling is done, which minimises wear and tear but can't be totally prevented. So the cost of replacement because of this cause, is the value of depreciation due to wear and tear.

2. **Depreciation due to physical decay :**

   There are certain items in a factory, such as insulation of material, furniture, electric, cables, poles, buildings, chemical vessels, etc., which get decay, because of climatic and atmospheric effect with the result the value of these articles goes on reducing with the lapse of time. Although every effort is made by the owner to keep them in serviceable condition, even then because of climatic and atmospheric effect, there will be reduction in their costs. This reduction in cost is depreciation due to physical decay.

3. **Time factors :**

   There are certain assets with a fixed period of legal life such as lease, patents and copy-rights which do lose value after this life time. This is the depreciation due to time factors.

4. **Depreciation due to accident / Sudden failure :**

   An asset may reduce in value because of meeting of an accident. Although, the machine might have installed even few days back and sufficient care is taken to prevent accident, even then accident may occur due to some wrong operation, or some loose component, or some other cause, which may result in a heavy damage. So the depreciation in machine caused due to this reason is called accidental depreciation.

5. **Depreciation due to Depletion :**

   Some assets like mines, quarries and oil wells etc. are of a wasting character perhaps due to the extraction of raw materials from them. This cause depreciation.

6. **Depreciation due to "Deferred maintenance and neglect" :**

   Every manufacturer supplies certain instruction for the smooth and efficient running of an equipment. For example, in the case of a vehicle, a manufacturer gave the following instructions :

(i) Lubricating oil S. A. E - 30 should be used in Engine.

(ii) Oil should be drained and new S. A. E 30 oil should be refilled after 2000 kms. running.

(iii) All the bolts and nuts should be re-tighten after 1000 kms. running.

(iv) Decarbonising after 6000 kms. running and so on.

Now, if there instructions are not properly followed because of neglect and if proper maintenance is not done as recommended by manufacturer; then the value of the vehicle will be reduced and depreciation occur.

**7. Depreciation due to inadequacy / Functional Depreciation :**

This is the form of functional depreciation. Inadequacy has two interpretations. Firstly, it means reduction in efficiency of the assets with the lapse of time. This fall in efficiency will reduce the value of assets causing depreciation. Secondly, inadequacy refers to the termination of the use of an asset because of growth and changes in the size of the firm. If the plant can not cope with the increased demand, additional money will be needed to replace with the bigger sized machinery or to install similar sized more plants. This is what is called, depreciation due to inadequacy.

**8. Depreciation by Obsolescence / Technological Depreciation :**

Obsolescence means the process of becoming obsolete or out of date due to the introduction of a new model which produces more than the old machinery. Now, if the product produced by the new are much cheaper and better than the existing one, then the existing machinery has to be replaced to withstand market competition. This is called depreciation by obsolescence and it is of functional type.

## 12.4. Needs For Depreciation

The need for depreciation arises because of the following reasons :

(i) To know the true profits of a firm.

i.e., profit = income earned minus depreciation.

(ii) To show true financial position of a firm.

(iii) To make provision for replacement of assets.

(iv) To provide for the recovery of capital that has been invested in physical property.

(v) To enable the cost of depreciation to be charged to the cost of producing products or services that result from the use of the property. Depreciation cost is deductible in computing profits on which income taxes are paid.

## 12.5 METHODS OF COMPUTING DEPRECIATION CHARGES

Before analysing the methods of computing depreciation of an asset, it is essential to know which properties are depreciable. Depreciable property is property that is allowed a depreciation deduction. Property is depreciable if it meets the following requirements:

1. It must be used in business, or be held for the production of income.
2. It must have a determinable life and that life must be logner than one year.
3. It must be something that wears out, decays, gets used up, becomes absolete, or loses value from natural causes.

In general, if property does not meet all these three conditions, it is not depreciable. Most engineering economic problems are concerned with tangible personal property, such as machinery or equipment.

There are several methods of computing depreciation charges of an asset. These methods require input information about an *asset's basis, useful life, and salvage value* expected at the end of its useful like.

The basis for depreciation is the same as that used for figuring the gain on a sale. The original basis is usually the purchase price, but this may be increased by installation charges and other one-time costs required to bring the equipment into use.

These symbols are used in the development of the formulae :

I = Purchase price, or initial cost of the asset, or investment on the asset.

S = Salvage value, or future value at the end of asset's useful (tax) life.

n = Useful (tax) life of asset.

DC(i)= Annual depreciation charge in $i^{th}$ year;

BV(i) = book value shown on accounting records at the end of $i^{th}$ year; BV(0) = I

Book value, BV(i), is the difference between the purchase price and the amount accumulated in the depreciation reserve after $i^{th}$ year.

The following are the various methods of providing for depreciation with solved problems for clear understanding to students :

1. Straight Line Method
2. Declining Balance Method

### 1. Straight Line Method

This method assumes that the value of an asset depreciates at a constant rate over its life time. In other words, the loss of value of machine is directly proportional to its life time.

The amount of depreciation (d) per year is given by

$$\boxed{d = \frac{I - S}{n}}$$

where, 'I' is the cost of the fixed asset or investment on the asset.

'S' is the salvage value or scrap value of the asset at the end of its life.

'n' is the life of the asset in years.

The rate of depreciation to the initial investment is given by

$$\boxed{D = \frac{d}{I} \times 100}$$

This will be clear by the following numerical problem :

If I = Rs. 5000/-

S = Rs. 1400/-

n = 4 years

then $d = \frac{\text{Rs.}(5000 - 1400)}{4} = \text{Rs. } 900$

and, $D = \frac{d}{I} \times 100 = \frac{\text{Rs. } 900}{\text{Rs. } 5000} \times 100 = 18\%$

Therefore, the rate of depreciation is 18% of Rs. 5000/-, the initial cost of the asset.

**Example - 12.1.** *Computers purchased by a public utility cost Rs. 25,000 each. Pst records indicate that they should have a useful life of 10 years, after which they will be disposed of, with a salvage value of Rs. 2,000 each. Determine,*

*(a) The depreciation charge during year 1.*

*(b) The depreciation charge during year 2.*

*(c) The depreciation reserve accumulated by the end of year 3.*

*(d) The book value of the computers at the end of year 3.*

**Soln.** Since the annual depreciation cost is constant under straight – line method the charges for both the first and second years are

$$DC(1) = DC(2) = \frac{I - S}{n} = \frac{\text{Rs. } 25{,}000 - \text{Rs. } 2000}{10} = \text{Rs. } 2{,}300$$

The depreciation reserve at the end of the third year is sum of the annual depreciation charges for the first 3 years and is,

$= 3\ (\text{Rs. } 2{,}300) = \text{Rs. } 6{,}900$

The book value at the end of the third year is,

$$BV(3) = I - \frac{i}{n}(I - S)$$

$$= \text{Rs. } 25,000 - \frac{3}{10} \times \text{Rs. } 23,00 \quad = \text{Rs. } 18,100$$

The amount of depreciation charged during each period of the asset's life is constant. If the charge of depreciation is plotted annually on a graph paper and the points joined together, then the graph will reveal a straight line. So, it is the Straight Line Method.

This method of calculating depreciation fund is also known as "Fixed Instalment" method, because every year some (fixed) amount is deducted and no consideration is made about the maintenance and repair charges, which gradually increases as the machine is getting old.

**2. Declining Balance Method**

This method is also called as *Diminishing Balance Method* or *Reducing Balance Method.* This method is based on the assumption that the value of an asset declines at a decreasing rate, i.e., the amount of depreciation annually decreases with life of the assets. The amount of depreciation is given by the formula

$$DC(i) = \frac{R}{n} \cdot BV(i-1)$$

R - maximum Rate R is used

where $R = 1 - \left(\frac{S}{I}\right)^{1/n}$

Then, the book value of the asset is given by

$$BV(i) = I(1-R)^i$$

$$= I\left\{1 - \left[\left(1 - \frac{S}{I}\right)^{1/n}\right]\right\}^i \qquad = I\left(\frac{S}{I}\right)^{i/n}$$

e.g., If I = Rs. 5000/-
S = Rs. 1400/-
n = 4 years

Then $R = 1 - \left(\frac{\text{Rs. } 1400}{\text{Rs. } 5000}\right)^{1/4} = 0.273$

$$BV(1) = \text{Rs. } 5000(1 - 0.273) = \text{Rs. } 3635$$

So, $$DC(2) = \frac{0.273}{4} \times \text{Rs. } 3635 = \text{Rs. } 248.08$$

Under this method, the book value of the machine goes on decreasing as its existence continues. A certain percentage of the current book value is taken as the depreciation. Therefore, this is also called "*percentage on Book Value*" method. In this method of depreciation, a constant percentage of the book value of the previous period of the asset will be charged as the depreciation amount for the current period. The book value at the end of the life of the asset may not be exactly equal to the salvage value of the asset. This is a major limitation of this method.

## SHORT TYPE QUESTIONS

1. What is depreciation ?
2. What is the necessity of sinking fund ?
3. Give different interpretations of depreciation.
4. Give two important causes of depreciation.
5. Why does study of depreciation significant ?
6. When does a property said depreciable ?
7. What are the informations required to compute depreciation charges ?
8. What is the assumption behind straight line method ?
9. What is the assumption behind declining balance method ?
10. Why does straight line method so called ?
11. Why straight line method is known as fixed instalment method ?
12. What is the important draw back of declining balance method ?

## LONG TYPE QUESTIONS

1. What is depreciation? What are the causes of depreciation? Explain.
2. What is depreciation? Why there is need for depreciation accounting?
3. What conditions must a property satisfy to be considered "depreciable"?
7. XYZ company has just purchased a machine for Rs. 10,00,000. The plant engineer estimates that the machine has a useful life of five years and a salvage value of Rs. 25,000 at the end of its useful life. Compute the depreciation charge by (a) straight-line method, (b) declining balance method of depreciation.
8. An automobile company has purchased a wheel alignment device for Rs. 5,00,000. The device can be used for 10 years. The salvage value at the end of the life of the device is 10% of the purchase value. Find the following using the declining balance method of depreciation:
   (a) Depreciation at the end of the seventh year.
   (b) Depreciation at the end of the eighth year.
   (c) Book value at the end of the eighth year.
9. A company has purchased a bus for its officers for Rs. 12,00,000. The expected life of the bus is 10 years. The salvage value of the bus at the end of its life is Rs. 4,00,000. Find the following using the declining balance method of depreciation:
   (a) Depreciation at the end of the third and fifth year.
   (b) Book value at the end of the second year and eighth year.