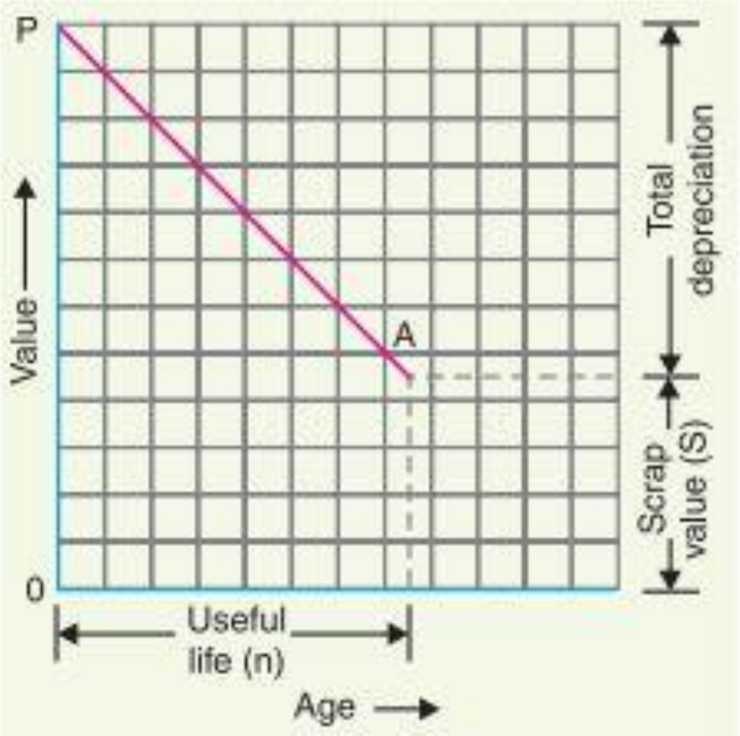
The depreciation curve (PA) follows a straight line path, indicating constant annual depreciation charge. However, this method suffers from two defects. Firstly, the assumption of constant depreciation charge every year is not correct. Secondly, it does not account for the interest which may be drawn during accumulation.



(ii) Diminishing value method.

In this method, depreciation charge is made every year at a fixed rate on the diminished value of the equipment. In other words, depreciation charge is first applied to the initial cost of equipment and then to its diminished value. As an example, suppose the initial cost of equipment is Rs 10,000 and its scrap value after the useful life is zero. If the annual rate of depreciation is 10%, then depreciation charge for the first year will be $0{\cdot}1 \times 10{,}000$ = Rs 1,000. The value of the equipment is diminished by Rs 1,000 and becomes Rs 9,000. For the second year, the depreciation charge will be made on the diminished value (i.e. Rs 9,000) and becomes $0{\cdot}1 \times 9{,}000$ = Rs 900.

The value of the equipment now becomes $9000 - 900$ = Rs 8100. For the third year, the depreciation charge will be $0{\cdot}1 \times 8100$ = Rs 810 and so on.

Mathematical treatment Let P = Capital cost of equipment n = Useful life of equipment in years S = Scrap value after useful life Suppose the annual unit* depreciation is x. It is desired to find the value of x in terms of P, n and S. Value of equipment after one year $= P - Px = P(1 - x)$ Value of equipment after 2 years = Diminished value − Annual depreciation $= [P - Px] - [(P - Px)x] = P - Px - Px + Px^2 = P(x^2 - 2x + 1) = P(1 - x)^2$ ∴ Value of equipment after n years $= P(1 - x)^n$

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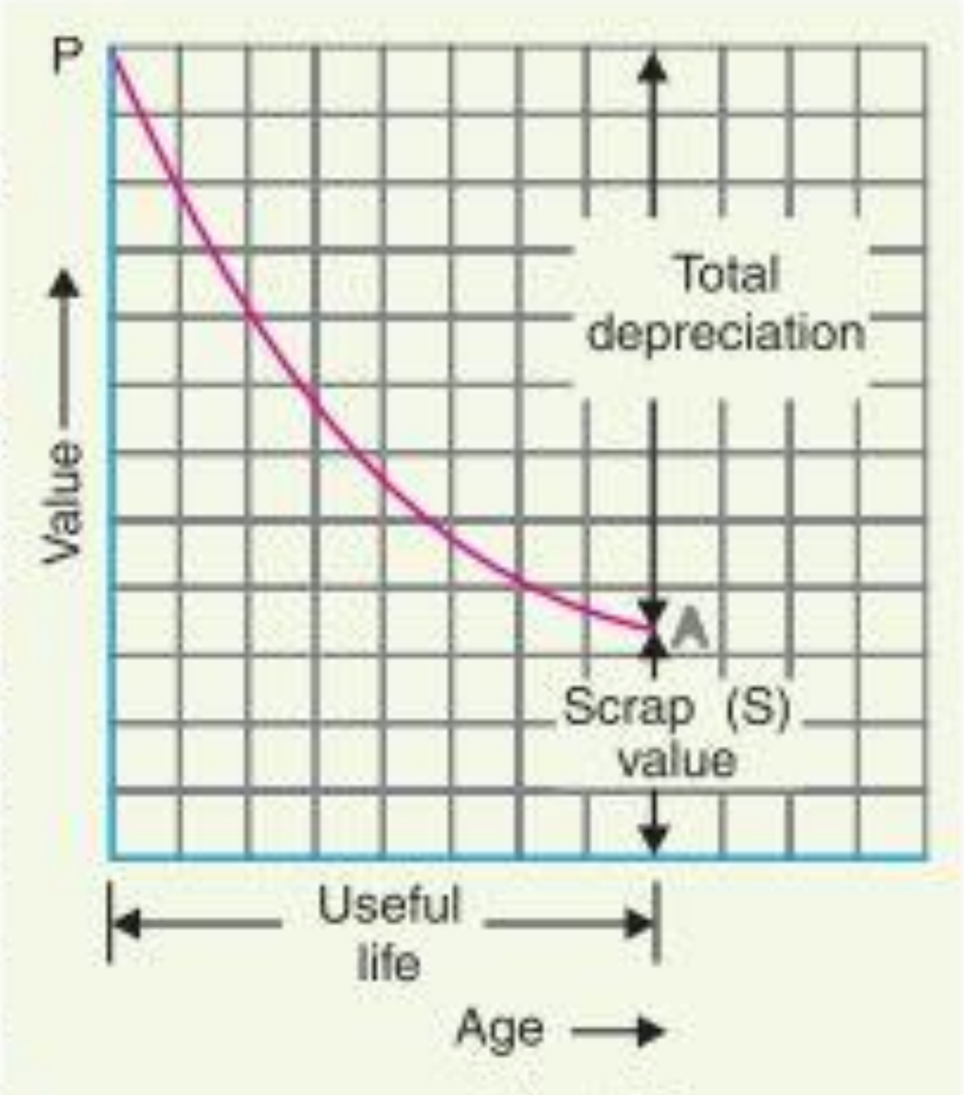
But the value of equipment after n years (i.e., useful life) is equal to the scrap value S. ∴ $S = P(1 - x)^n$ or $(1 - x)^n = S/P$ or $1 - x = (S/P)^{1/n}$ or $x = 1 - (S/P)^{1/n}$ ...(i) From exp. (i), the annual depreciation can be easily found. Thus depreciation to be made for the first year is given by : Depreciation for the first year = $xP = P[1 - (S/P)^{1/n}]$ Similarly, annual depreciation charge for the subsequent years can be calculated. This method is more rational than the straight line method. Fig shows the graphical representation of diminishing value method. The initial value P of the equipment reduces, through depreciation, to the scrap value S over the useful life of the equipment. The depreciation curve follows the path PA. It is clear from the curve that depreciation charges are heavy in the early years but decrease to a low value in the later years. This method has two drawbacks. Firstly, low depreciation charges are made in the late years when the maintenance and repair charges are quite heavy. Secondly, the depreciation charge is independent of the rate of interest which it may draw during accumulation. Such interest moneys, if earned, are to be treated as income


P
Value
Total
depreciation
A
Scrap (S)
value
Useful
life
Age

(iii) Sinking fund method.

In this method, a fixed depreciation charge is made every year and interest compounded on it annually. The constant depreciation charge is such that total of annual instalments plus the interest accumulations equal to the cost of replacement of equipment after its useful life. Let P = Initial value of equipment n = Useful life of equipment in years S = Scrap value after useful life r = Annual rate of interest expressed as a decimal Cost of replacement = P − S Let us suppose that an amount of q is set aside as depreciation charge every year and interest compounded on it so that an amount of P− S is available after n years. An amount q at annual interest rate of r will become *q(1 + r) n at the end of n years. Now, the amount q deposited at the end of first year will earn compound interest for n − 1 years and shall become q(1 + r) n − 1 i.e., Amount q deposited at the end of first year becomes = q (1 + r) n − 1

Amount q deposited at the end of 2nd year becomes = q (1 + r) n − 2

Amount q deposited at the end of 3rd year becomes = q (1 + r) n − 3

Similarly amount q deposited at the end of n − 1 year becomes = q (1 + r) n − (n − 1) = q (1 + r) ∴

Total fund after n years = q (1 + r) n − 1 + q (1 + r) n − 2 + ... + q (1 + r) = q [(1 + r) n − 1 + (1 + r) n − 2 + ... + (1 + r)]