***loan amortization***

As it is known, the debtor or the institution that needs funds resorts to the medium or long-term borrowing process, whether from a person, a bank or any financial institution, so when paying off that loan, it resorts to the process of amortizing the loans.

The loan takes the form of a certain amount or amounts, so it is called a regular loan, and it may take the form of bonds, each of which represents part of the loan, so it is called a bond loan.

The regular loan is the one received from one lender (the bank, person, financial institution, etc.), in contrast to the bond loan, in which several lenders participate.

Paying the loan in the sense of the original amount and its interest once upon its due date does not suit the interest of the debtor, so the long-term loan contracting parties agree to consume and settle it over certain periods of time, through equal installments of the principal only without the interest or what is called the diminishing installment method or what It is called the equal depreciation installment method, or by equal installments of principal and interest together, or what is called the equal installment method.

Here, the focus will be on amortizing the normal loan through the equal and diminishing installment methods.

First: The method of amortizing loans in equal payments or instalments

The equal installment method is one of the most important prevailing methods, according to which the debtor repays the loan in equal installments at the end of regular periods of time, usually a year, meaning regular payments (end-of-term payments), where it includes (contributes) the amount of the payment or installment that is symbolized by the symbol a In paying part of the principal of the loan in addition to paying part of the accrued interest.

1- Calculating the installment or equal payment

Since the installments are equal at the end of each time period given that the loan is usually repaid at the end of the period, the present value of these (normal) installments or payments is equal to the loan amount.

permission:

Loan value = present value of regular installments or payments

any:

Vo=a[〖1-(1+t)〗^(-n)/t]

a=Vo/(〖1-(1+t)〗^(-n)/t)

a=Vo[t/〖1-(1+t)〗^(-n) ]

where:

 a = the value of the installment or fixed payment

Vo = the value or principal of the loan

 t = rate of interest

 n = loan term

The fraction t/〖1-(1+t)〗^(-n) is given directly from Financial Table No. 05

The fixed installment law can also be derived through the wholesale law, by equating the total principal of the loan with the total installments allocated for the amortization of the loan.

any:

〖Vo(1+i)〗^n=a[(〖(1+t)〗^n-1)/t]

a=Vo[t/〖1-(1+t)〗^(-n) ]

2- Loan amortization schedule

An agreement is made between the debtor and the bank to repay the loan in installments or equal installments, where the payment includes a part of the loan called amortization, and interest on the remaining loan amount, where:

Interest = Amount of the loan at the beginning of the period \* Compound interest rate

I = Vo\*t

Installment or Fixed Payment = a=Vo[t/〖1-(1+t)〗^(-n) ]

Straight Line Value = Depreciation + Interest Depreciation = Straight Line Value - Interest

m = a-I

Loan amount at the end of the period = Loan amount at the beginning of the period - Amortization of the period

Noting that the loan amount at the beginning of the period is the same or equal to the loan amount at the end of the previous period

It is noted that consumption increases from one period to another, while the interest decreases (as it is calculated from the loan amount at the beginning of the period, which decreases as a result of decreasing or subtracting the value of consumption in each period).

Example 1: A person borrowed 100,000 DZD from the bank and pledged to pay it back in 5 equal annual installments. If you know that the interest rate is 5% annually. Prepare an amortization schedule for this loan.

the solution:

 = Vo 100000 DZD

 t = 5% annually

 n = 5 batches

Preparing the loan amortization schedule:

Period The loan amount at the beginning of the interest period

 I straight line a depreciation

 m Loan amount at the end of the period

01 100000 5000 23097.5 18097.5 81902.5

02 81902.5 4095.125 23097.5 19002.375 62900.125

03 62900.125 3145.00 23097.5 19952.5 42947.625

04 42947.625 2147.381 23097.5 20950.119 21997.506

05 21997.506 1099.875 23097.5 21997.625 0

\* Interest in the first period = 100,000 \* 0.05 = 5,000 DZD.

\* Installment or fixed payment:

a=Vo[t/〖1-(1+t)〗^(-n) ]

a=100000[0.05/〖1-(1+0.05)〗^(-5) ]

a=100000(0.230975)

a=23097.5 DA

 \*First period amortization = Straight Line – First period interest

 = 23097.5 – 5000 = 18097.5 DZD

 \* Loan amount at the end of the first period = Loan amount at the beginning of the first period - Amortization of the first period

 = 100000 - 18097.5 = 81902.5 DZD

\* The amount of the loan at the beginning of the second period = the amount of the loan at the end of the first period = 81902.5 DZD

And so we recalculate the same items for the other remaining periods.

Example 2: A person borrowed an amount of 25,324.5 DZD from the bank, provided that he pays the principal and the interest in equal installments to be paid every half year for a period of 3 years. If you know that the annual interest rate is 12%, and that the interest is added sixfold, prepare the amortization schedule for this loan.

the solution:

 = Vo25324.5 DZD

 t = 12% annually, and as long as the interest is paid six-fold, then the annual rate of 12% is converted into a six-month rate of 12/2 = 6% semi-annually.

 n = interest is paid six times over a period of 3 years, meaning that it gives n = 2 \* 3 = 6 payments

Preparation of loan amortization schedule:

Period The loan amount at the beginning of the interest period

 I straight line

 a consumption

 m Loan amount at the end of the period

01 25324.5 1519.47 5150 3630.53 21693.97

02 21693.97 1301.63 5150 3848.37 17845.6

03 17845.6 1070.73 5150 4079.27 13766.33

04 13766.33 825.97 5150 4324.03 9442.3

05 9442.3 566.53 5150 4583.47 4858.83

06 4858.83 291.52 5150 4858.48 0

\* Interest in the first period = 25324.5 \* 0.06 = 1519.47 DA.

\* Fixed Installment:

a=Vo[t/〖1-(1+i)〗^(-n) ]

a=25324.5[0.06/〖1-(1+0.06)〗^(-6) ]

a=25324.5(0.203362)

a=5150 DA

 \*First period amortization = Straight Line – First period interest

 = 5150 - 1519.47 = 3630.53 DZD

 \* Loan amount at the end of the first period