Exploring Cumulative Sinking Funds: A Mathematical Perspective on Capital Repayment and Redemption

Merry Mariam Mathews

Online Tutor, Teacher On.
Email id: *merrynaveen[at]gmail.com*

Abstract: *The article delves into the concept of cumulative sinking funds, providing a mathematical insight that is accessible to non - math major students. It explains the fundamentals of sinking funds, cumulative sinking funds, capital repayments, and redemption prices while highlighting their interrelationships. Furthermore, it explores the benefits of cumulative sinking funds and offers practical examples. By reinvesting interest, companies can harness compound interest to their advantage. The article also discusses the relationship between capital repayments and the loan term when redemption price remains constant. Drawing from various sources, this article simplifies the concept with clear explanations and illustrative examples.*

Keywords: Sinking funds, cumulative sinking funds, capital repayment, redemption price, compound interest

1. Introduction

This topic describes the cumulative sinking funds in a mathematical way to make it easier for the non - math major students. It explains sinking funds, cumulative sinking funds, capital repayments, redemption price and the relationship among all these.

Sinking funds
Definition: It is a fund or account - into which company deposit money on a regular basis in order repay debt or any other liability that will come due in the future.

For example, if one has a loan with a maturity of 7years one may put money into the sinking fund for 7 years in order to be ready, to pay off the principal, when it becomes due.

In other words, money is set aside in a special account to which regular contributions are made by the way of additional money or interest on money with the plans that by a specified date the fund will be sufficient for a particular purpose.

Cumulative sinking funds
It is a fund where the amount received as interest from the sinking fund is also reinvested so the company earns compound interest.

The benefits of having cumulative sinking fund are that either the interest or the profit thereof the reinvested fund can be utilized by the company for some other purpose or it can be treated as additional income to the company.

The second option is that the company can reduce the annual contribution to the yearly sinking fund by such amount of the estimated interest or profits reinvested.

Example: A company has to redeem 50000 worth bond is 5 years through cumulative sinking fund method which earns an annual interest rate of 10%. (Interest for the sinking fund) = 10000.

The options are,

1) At the end of 5th year, you will have Rs.60000 in your cumulative sinking fund account. So, you can use Rs.50000 to pay back to your liability and 10000 can be used for any other actively or can be treated as an additional income.
2) The estimated interest benefit of sinking fund interest for 5 years is Rs.10000. Your amount is to be redeemed at the end of 5th year is Rs.50000. So, the sinking fund contribution needed every year is (50000 - 10000) /5 = 8000

The relationship between successive capital repayments and the term of the loan when the redemption price is constant.

Successive repayment:

It is a process where the capital to be redeemed or paid in certain equal installments during the tenure of the loan.

The relationship between successive capital repayment and it's term of loan when the redemption price is constant is inversely proportional. i. e. if the term of loan is increased or decreased, the capital repayments are decreased or increased correspondingly. This can be explained with the following illustration.

A loan of Rs.50000 is to be repaid is 5years where the interest is based on annual rest. That means you will have to make the payments of Rs.10000 every year towards successive capital repayments to redeem the loan in 5 years.

In case if you increase the term of loan to 10 years, your successive capital repayment will also decrease to 10 equal installments. I. e. of Rs.5000 per year because the redemption price is constant which is Rs.50000/. (Redemption price is always constant and there must be a difference or change in the payment of amount).

2. Conclusion

This article synthesizes information from diverse references, presenting a comprehensive understanding of cumulative sinking funds with straightforward examples. It serves as a valuable resource for both students and professionals seeking to grasp the mathematical intricacies of capital repayment and redemption price in financial contexts.

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