GENAI CA-2

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Generate a model in Python to represent a Housing loan scheme and create a chart to display the Emi based on rate of interest and reducing balance for a given period. If a customer wishes to close the loan earlier, print the interest lost distributed over the remaining no. Of months. Assume suitable data and inputs as necessary.

Start

1. **Input Data**
   - Principal (loan amount)
   - Rate (annual interest rate)
   - Tenure (loan duration in months)
   - Months Paid (number of months already paid)
2. **Calculate EMI**
   - Compute the EMI using the formula.
3. **Calculate Interest Lost for Early Closure**
   - Determine the total amount of interest lost if the loan is closed early.
4. **Generate EMI Chart**
   - Plot the EMI amount over the tenure to visualize payments.
5. **Display Results**
   - Print the EMI and the interest lost due to early closure.

End

CODE -

```
import matplotlib.pyplot as plt

# Function to calculate EMI

def calculate_emi(principal, rate, tenure):

    monthly_rate = rate / (12 * 100)

   emi = (principal * monthly_rate * (1 + monthly_rate) ** tenure) / ((1 + monthly_rate) ** tenure - 1)

return emi

# Function to calculate early closure interest loss

def early_closure_interest_loss(principal, rate, tenure, months_paid):
```

```
    emi = calculate_emi(principal, rate, tenure)
    remaining_tenure = tenure - months_paid
    balance = principal - emi * months_paid
    interest_loss = (emi * remaining_tenure) - balance
    return interest_loss
# Example Data
principal = 500000 # Loan amount
rate = 8.5         # Annual interest rate
tenure = 120       # 10 years in months
months_paid = 60   # Early closure after 5 years
# Calculate EMI and interest loss
emi = calculate_emi(principal, rate, tenure)
print(f"Monthly EMI: {emi:.2f}")
interest_loss = early_closure_interest_loss(principal, rate, tenure, months_paid)
print(f"Interest Lost if Closed Early: {interest_loss:.2f}")
# Generate EMI chart over tenure
months = list(range(1, tenure + 1))
emi_values = [emi] * tenure
plt.plot(months, emi_values)
plt.title("EMI vs Months")
plt.xlabel("Months")
plt.ylabel("EMI Amount")
plt.show()
```

EXPLANATION -

1. Calculate EMI:
   Formula: EMI = P × r × (1+r)^n / (1+r)^n - 1 .
   Here P is the principal, r is the monthly interest rate, and n is the number of months.
   How it works: The formula calculates the fixed monthly payment (EMI) for a loan, considering that each payment covers both the interest and a part of the principal.

2. Early Closure Interest Loss:
   How it works: Computes the total amount of interest that would be saved if the loan is closed early.
   Steps:
   - Compute the EMI for the remaining tenure after early closure.
   - Calculate the total interest for the remaining period and subtract the actual balance to find the interest lost.
3. Generate EMI Chart:
   Purpose: Visualizes the EMI amount over the loan tenure to help understand how the payment remains constant over time.