***LOAN CALCULATOR***

This Python program is a Loan EMI Calculator that calculates monthly loan installments based on user input and predefined test cases. It includes features like exception handling, logging, and result saving. Here’s a breakdown:

### ***Key Components***

1. Custom Exceptions:
   1. InvalidRateException: Raised when the interest rate is negative.
   2. InvalidLoanDurationException: Raised when the loan duration is <= 0 or > 30 years.
2. calculate\_monthly\_installment Function:
   1. Calculates the Equated Monthly Installment (EMI) using the formula for loans.
   2. Handles special cases like 0% interest.
3. run\_test\_case Function:
   1. Validates input values for interest rate and loan duration.
   2. Computes the EMI and logs the result.
   3. Writes the output (or error) to a file.
4. run\_all\_test\_cases Function:
   1. Runs predefined test cases for principal, rate, and years.
   2. Logs and saves results for each case.
5. main Function:
   1. User Input: Takes user-provided values for loan amount, interest rate, and duration.
   2. Validation: Ensures inputs are valid and within constraints.
   3. Error Handling: Provides 3 attempts for valid input; exits if all attempts are used.
   4. Test Cases: Calls run\_all\_test\_cases after user inputs.
   5. File Output: Saves all results to a text file.
6. Logging:
   1. Provides detailed logs (INFO, ERROR, WARNING) for debugging and tracking execution flow.

***Workflow***

1. Program Start - Logs the start of the program and opens a file to save results.
2. User Input -
3. Prompts the user for loan details and validates inputs.
4. Calculates and displays the EMI for valid inputs.
5. Error Handling -
6. Handles invalid inputs like negative rates or unrealistic loan durations.
7. Provides feedback and multiple attempts to correct errors.
8. Test Cases - Runs predefined scenarios and saves the results.
9. Program End:
10. Saves all outputs to LoanTestCasesOutput.txt.
11. Logs the completion of the program.

### ***Predefined Test Cases***

The run\_all\_test\_cases function uses these test cases:

* 1. Principal: 100,000, Rate: 5%, Years: 10
  2. Principal: 200,000, Rate: 0%, Years: 20
  3. Principal: 50,000, Rate: -7.5%, Years: 5 (Invalid)
  4. Principal: 300,000, Rate: 10%, Years: -15 (Invalid)
  5. Principal: 1,000,000, Rate: 3%, Years: 25

Invalid cases test exception handling.

***Output***

1. On Console: Displays EMI and logs errors/warnings.
2. In File: Writes results of user input and test cases.