**TIME VALUE OF MONEY**

# CLASS ASSIGNMENT 1

1. For each of the following cases, calculate the amount of money in the account at the end of the deposit period :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case | Amt. Deposited (Rs.) | Rate of int. (p.a.) | Deposit period (yrs) | Compounding period (mths) | Amt. |
| A | 1,000 | 11% | 10 | 12 |  |
| B | 2,000 | 10% | 5 | 6 |  |
| C | 4,000 | 8% | 4 | 3 |  |
| D | 3,000 | 12% | 3 | 1 |  |
| E | 5,000 | 12% | 4 | 2 |  |
| F | 4,000 | 16% | 6 | 4 |  |

1. In each of the following cases calculate the sum of the annuity generated by the deposit given the rate and time period:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Case | Amt. of deposit (Rs.) | Rate of int (p.a.) | No. of yrs | Sum |
| A | 2,000 | 10% | 5 |  |
| B | 10,000 | 12% | 10 |  |
| C | 5,000 | 8% | 4 |  |
| D | 6,000 | 14% | 12 |  |

1. For each of the following loans, determine the amount of the equal annual payment required to fully amortise or repay it over the stated period :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Loan** | **Principal Amt. (Rs.)** | **Int. rate** | **Life in years** | **Annuity** |
| A | 10,000 | 10% | 4 |  |
| B | 5,000 | 8% | 6 |  |
| C | 200,000 | 9% | 10 |  |
| D | 100,000 | 12% | 12 |  |
| E | 50,000 | 14% | 5 |  |

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CLASS ASSIGNMENT 2

1. Mr. X deposits Rs. 10,000 at the beginning of every year for 15 years in his saving account paying 9% interest compounded annually. He wants to determine how much sum of money he will have at the end of the 15th year.
2. Mr. Y wishes to determine the present value of the annuity consisting of cash inflows of Rs.1,000 per year for 5 years. The rate of interest he can earn from his investment is 10%.
3. If ABC company expects cash inflows from its investment proposal it has undertaken in time zero period, Rs. 2,00,000 and Rs. 1,50,000 for the first two years respectively and then expects annuity payment of Rs. 1,00,000 for next eight years, what would be the present value of cash inflows, assuming 10% rate of interest ?
4. A limited company borrows from a commercial bank Rs. 10,00,000 at 12% rate of interest to be paid in equal annual end-of-year instalments. What would the size of the instalment be? Assume the repayment period is 5 Years.
5. The XYZ company is establishing a sinking fund to retire Rs.5,00,000 debentures 10 years from today. The company plans to put a fixed amount into the fund each year for 10 years. The first payment will be made at the end of current year. The company anticipates that the fund will earn 6% a year. What equal annual contributions must be made to accumulate Rs. 5,00,000, 10 years from now ?

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**CLASS ASSIGNMENT 3**

1. As winner of a competition, you can choose one of the following prizes:

(a) Rs.100,000 now

(b) Rs.180,000 at the end of 5 years.

(c) Rs.11,400 a year forever.

(d) Rs.19,000 for each of 10 years.

(e) Rs.6,500 next year and increasing thereafter by 5 percent a year forever.

If the interest rate is 12 percent, which is the most valuable prize?

2. New Autos is offering free credit on a new Rs.10,00,000 car. You pay Rs.1,00,000 down and then Rs.30,000 a month for the next 40 months. Turtle Motors next door does not offer free credit but will give your Rs.1,00,000 off the list price. If the rate of interest is 15 percent a year, which company is offering the better deal? Does your answer change if the rate of interest is 12% p.a ?

3. It costs Rs.259000 to insulate your home. Next year’s fuel saving will be Rs.22000. If the interest rate is 12 percent, what percentage growth rate in fuel prices is needed to justify insulation? Assume fuel prices will grow in perpetuity at the rate g.

4. Harold is 30 years of age and his salary next year will be Rs.20,000. Harold forecasts that his salary will increase at a steady rate of 5 percent per annum until his retirement at age 60. If the discount rate is 8 percent, what is the present value of these future salary payments.

5. You own an oil pipeline which will generate a Rs.2 million cash return over the coming year. The pipeline’s operating costs are negligible, and it is expected to last for a long time. Unfortunately, the volume of oil shipped is declining, and cash flows are expected to decline by 4 percent per year. The discount rate is 10 percent.

(a) What is the present value of the pipeline’s cash flows if its cash flows are assumed to last forever?

(b) What is the present value of the cash flows it the pipeline is scrapped after 20 years?

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**CLASS ASSIGNMENT 4**

1. After five years Mr. Ramesh will receive a pension of Rs. 60000 per month for 15 years. How much can Mr. Ramesh borrow now at 12 per cent interest so that the borrowed amount and interest can be paid with 30 per cent of the pension amount ? The interest will be accumulated till the first pension amount becomes receivable.
2. Mr. Prakash buys a scooter with a bank loan of Rs. 60,000. An instalment of Rs. 3,000 is payable to the bank for each of 24 months towards the repayment of loan with interest. What interest rate does the bank charge ?
3. A personal loan advertisement of a bank says “ Take a loan of Rs.100,000 and repay in convenient monthly instalments of Rs.9,000 over the next 12 months”. What is the interest rate that the bank is charging assuming no processing fee or any other charges.
4. A father is planning a savings program to put his daughter through college. His daughter is now 13 years old. She plans to enroll at the university in 5 years and it should take her four years to complete her education. Currently the cost per year is Rs.125,000 but a 5%annual inflation rate in these costs is forecasted. The daughter recently received Rs.75,000 from her grandfather, which is invested in a bank account paying 8% per annum compounded yearly. This will be used to meet the cost of the daughter’s education. The rest of the costs will be met by the money the father will deposit in the savings account. He will make 6 equal deposits to the account, one deposit in each year from now until his daughter starts college. The deposits will begin today and will also earn 8% interest compounded yearly.
5. What will be the present value of the cost of four years of education at the time the daughter becomes 18 ?
6. What will be the value of the Rs.75,000 that the daughter received from her grandfather when she starts the college at age 18 ?

If the father is planning to make the first of the six deposits today, how large must each deposit be for him to be able to put his daughter through college ?

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**CLASS ASSIGNMENT 5**

This is a classic “retirement” problem. A time line will help in solving it. Your friend is celebrating her 25th birthday today and wants to start saving for her anticipated retirement at age 65. She wants to be able to withdraw Rs.1,500,000 from her savings account on each birthday for 12 years following her retirement; the first withdrawal will be on her 66th birthday. Your friend intends to invest her money in the local bank, which offers 9 percent interest per year. She wants to make equal, annual payments on each birthday into the account established at the bank for her retirement fund.

1. If she starts making these deposits on her 26th birthday and continues to make deposits until she is 65 (the last deposit will be one her 65th birthday), what amount must she deposit annually to be able to make the desired withdrawals at retirements?
2. Suppose your friend has just inherited a large sum of money. Rather than making equal annual payments, she has decided to make one lump-sum payment on her 26th birthday to cover her retirement needs. What amount would she have to deposit?
3. Suppose your friend’s employer will contribute Rs.2500 into the account every year as part of the company’s profit-sharing plan. In addition, your friend expects a Rs.1,000,000 distribution from a family trust on her 55th birthday, which she will also put into the retirement account. What amount must she deposit annually now to be able to make the desired withdrawals at retirement?