**FINANCIAL ANALYSIS**

**Annuity**

An annuity is a series of cash payments made over a continuous period. Eg: savings for retirement, insurance payments, home loan, mortgage.

In general, a positive number represents cash received and a negative number represents cash paid out.

**Present Value** – PV is the present value of a future sum of money. It is calculated using a discounted rate of return.

In excel, we have the formula for calculating Present Value is

=**PV (rate, nper, pmt, [fv ], [type])**

Rate = discounted rate,

nper = period,

pmt = future sum of money,

type = at the beginning of the month or at the end of month

**Net Present Value –** NPV is the net present value of a series of periodic future cashflows. The excel formula is

**=NPV (rate, value1, value2…)**

If the cashflows are not periodic, we use the formula of XNPV given by

**=XNPV (rates, values, dates)**

**EMI –** Equated Monthly Investment is the amount a borrower pays a lender periodically at a specific interest rate.

We also have excel formulas for calculating the EMI for loan. It is given by

**=PMT (rate, nper, pv, [fv], [type])**

We can also find out the interest amount of a loan and the principal of a loan using IPMT and PPMT functions. To calculate interest amount we use

**=IPMT (rate,nper,pv,[fv],[type])** and to calculate the principal amount we use

**=PPMT(rate,nper,pv,[fv],[type]).**

We can also use calculate the rate and period of a loan in excel using

**=RATE (nper, pmt, pv, [fv], [type], [guess])**

**=NPER (rate, pmt, pv, [fv], [type])**

**Decision on Investments**

We can use Net Present Values to compare investments and make decisions on which is better. We can calculate for investments where cashflow happens on the beginning of a year or middle or end of a year.

For end of year, formula is same as NPV.

For beginning of year, we do not include the first cashflow for calculating the NPV, NPV is calculated from second cashflow onwards and adding the first year value to it.

For middle of the year, we take the square root of (1+rate) and multiply with the calculated NPV for end of year.

If the payments are non-periodic we use XNPV to calculate the net present value of future sum of payments. It’s excel formula is given by

**= XNPV (rate,values,dates)**

**Internal Rate of Return (IRR)**

Internal rate of return is the rate at which the NPV becomes zero. It is that discounted rate for which the investment is neither profitable nor is incurring loss. In excel we have the formula to calculate IRR given by

**=IRR(Value1,Value2 …,[guess])**

For an investment, there are 3 cases:

1. There is an IRR and it is unique,
2. There is an IRR, but not unique,
3. There is no IRR at all.

If there is only one sign change in the cash flows, then we will have an IRR which is unique. If there are multiple sign changes, there may not be an IRR, or if it is there, it is not unique.

When making decisions on mutually exclusive events of investment, IRR and NPV may give us different decisions. This difference occurs due to

1. Scale of the investments
2. Difference in cashflow timings

Mostly use NPV for such cases.

**IRR of irregularly spaced cash flows**

If the cashflows are not regular, we can’t use IRR. For that we use XIRR function in excel. It is given by

**=XIRR (values, dates, [guess])**

**Modified IRR**

In IRR we consider the investment of positive cash flow happening with the same interest as the finance rate. But this may not be the case. In such cases, we use modified IRR. It is given by

**=MIRR (values, finance rate, reinvestment rate)**