CONCEPT OF PRESENT VALUE

PV of Future Sum

How much should be invested at 6% so that after 4 years the amount will be Rs. 2500 when the interest is compounded (i) annually (ii) quarterly (iii) monthly?.

Future Value(FV) or amount (A)		₹2,500.00	
Rate of Interest (r)		6%	
Time in years (t)		4	
No. of times compounding in a year (m)		12	
Present value using formula	A*(1+r/m)^(-m*t)	₹1,967.75	2500*(1+0.06/12)^(-4*12)
	Using Excel Formula		
Present value	PV(r/m,m*t,0,FV,0)	-₹1,967.75	PV(RATE,NPER,PMT,[FV],[TYPE])

PV of series of Equal Annual cash flows

Chirag has just one million rupees, the prize is awarded in 10 annual payments of Rs. 1,00,000 each. Annual payments are received at the end of each year. He has option of receiving a single lump-sum payment of Rs. 6,00,000 instead of million rupees annuity. Find out which option is more in today's rupees. Money is worth 10% compounded annually.

Periodic Payment/Annuity (PMT)		₹100,000.00		
Rate of Interest (r)		10%		
Time in years (n)		10		
No. of times compounding in a year (m)		1		
Present value using formula	Periodic payments*PVAF	₹614,500.00	1000000*6.145	PVAF for 0.1 and 10 years 6.145
	Using Excel Formula			
Present value	PV(r/m,m*t,PMT,0,0)	-₹614,456.71	PV(RATE,NPER,PMT,[FV],[TYPE])	

PV of an Annuity Due

A purchases a house from B and agrees to pay B twenty annual instalments of Rs. 20000 each, the first is to be paid immediately. If money is worth 8% effective, what is the equivalent cash price of the house?

Periodic Payment/Annuity (PMT)		₹20,000.00	
Rate of Interest (r)		8%	
Time in years (n)		20	
No. of times compounding in a year (m)		1	
Present value using formula	**Periodic payments*PVAF*(1+r/m)**	**₹212,071.98**	**20000*9.81814741*(1+8%/1)**

PVAF for 0.08 and 20 years   9.81814741

	Using Excel Formula		
Present value	**PV(r/m,m*t,PMT,0,1)**	**-₹212,071.98**	**PV(RATE,NPER,PMT,[PV],[TYPE])**

PV of Perpetuity

A bank makes an offer to deposit with it sum of Rs. 16000 and then receive a return of Rs. 1800 p.a. perpetually. Should the offer be accepted by an investor whose opportunity rate of return is 12 %? Will the decision change if the rate of return is 10%?

Current Deposit		₹16,000.00	
Annual Return (perpetuity)		1800	
Opportunity cost (i)		0.12	
Opportunity cost (ii)		0.1	
	(i) @12%	(ii) @10%	
Present value of Cash flows (perpetuity)	**₹15,000.00**	**₹18,000.00**	**ANNUAL RETURN/RATE OF INTEREST**

PV of Series of Unequal future cash flows

X sells goods for which he offers following option of payment: (i) Pay Rs. 2500 now, or (ii) Pay Rs. 800 , 900, and 1000 at the end of first, second and third year from now. The customer has opportunity cost of 10% so which option will he choose ?

YEAR	CASH FLOWS	OPPORTUNITY COST	10%
1	800		
2	900		
3	1000		
NPV	₹2,222.39	NPV(rate, Value1, Value2………)	

PRESENT VALUE

$$PV = FV \left[1 + \frac{r}{m}\right]^{-(m \times t)}$$

where   PV = Present value

     FV = Future Value

     r = rate of interest
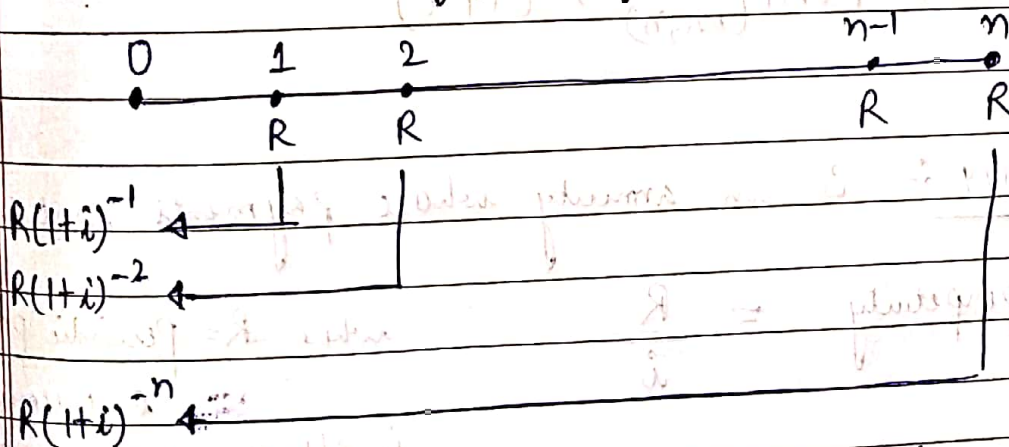
     m = No. of times compounding in a year.

     t = time period in years

or $PV = FV \times PVF_{(r/m\%, \, m \times t)}$

Present Value of an Annuity (i.e. a series of Equal future cash flows)

→ **PV of an Ordinary Annuity**

$R(1+i)^{-1}$

$R(1+i)^{-2}$

$R(1+i)^{-n}$

PV of first payment $= R(1+i)^{-1}$

PV of second payment $= R(1+i)^{-2}$

|

|

PV of nth payment $= R(1+i)^{-n}$

Thus, $PV = R(1+i)^{-1} + R(1+i)^{-2} \cdots\cdots + R(1+i)^{-n}$

Geometric series of n terms with first term $R(1+i)^{-1}$ and common ratio $(1+i)^{-1}$. Hence its sum given by

$$PV = R(1+i)^{-1}\left[\frac{1-(1+i)^{-n}}{1-(1+i)^{-1}}\right] = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

or $\qquad PV = R \times PVAF_{(i\%, n)}$

where PV = Present Value

R = periodic amount

PVAF = Present Value Annuity Factor

$i = \dfrac{r}{m}$; $\quad n = m \times t$.

Present Value of Annuity Due

$= R \times PVAF_{(i\%, n)} \times (1+i)$

PERPETUITY :- is an annuity whose payments continue forever.

PV of perpetuity $= \dfrac{R}{i}$
where R = periodic payment/ installment

i = effective rate or $\dfrac{r}{m}$.

CONCEPT OF PMT

ABC Ltd. raised a loan of Rs. 3,00,000 from a bank at an interest rate of 8% for 5 years. The loan is to be repaid in five equal installments. Calculate the size of installment.

LOAN	300000	
INTEREST RATE	8%	
YEARS	5	
INSTALLMENT	($75,136.94)	PMT(rate, nper,pv,[fv],[type])
	PMT(B6,B7,B5)	

XYZ Ltd. requires Rs. 3,00,000 at the end of 10 years. The company wants to establish a fund and invest it at 10% p.a.. Calculate the annual investment to be made

FV	300000	
INTEREST RATE	10%	
YEARS	10	
ANNUAL INVESTMENT	($18,823.62)	PMT(rate, nper,pv,[fv],[type])
	PMT(B15,B16,0,B14)	