

INTRODUCTION

→ Objective of a business is to ~~to~~
maximize the value of firm

↳ also maximize the value of
 share holders.

Financial Management

Decision making

↓
 financing decision, Investment decision, Dividend decision.

↓
 how much funding?
 (Fund raising)

↓
 debt fund

equity

↓
 borrowed fund

(Bank loan)

(Issue of Debentures/Bonds)

(Issue of preference shares)

Equity

- ↳ Own savings
- ↳ Family & friends
- ↳ Angel investors
- ↳ Venture capital.

O Investment decisions

- ↳ how to invest the funds
- ↳ where to invest in order to guarantee higher return.

★ Goals

↳ EPS (Earning per share)

↳ Profit after taxes

total shares.

→ growth shares

↳ shares whose price fluctuate a lot.

* TVM (Time value of Money)

→ Value of money today is more than value of money in future.

↳ Value of money / rupee received today is more valuable, so a rational investor/individual would prefer current receipts to future receipts.

↳ this is called Time Preference of Money.

→ Money received today has investment opportunity higher than money received in future.

⇒ Time Value of Money Techniques

Technique to Find Future Value

Technique to Find Present Value

↓
Future Value (Compounding technique) Present value (Discounting technique)

Future value

↳ what will be the value of money in future if invested today.

⇒ Future value of Single Amount (lumpsum)

$$FV = PV \times (1 + i)^n$$

↑ present value ↑ years
 ↓ interest

$$FV = PV \times FVIF$$

↳ Future value interest factor

for single amount

⇒ Future value of Annuity

↳ Annuity is a stream of cashflows of equal amount at regular intervals.

→ When cashflow occurs at end of period, it is called

Deferred Annuity and when

CF occur at beginning of period, it is called Annuity Due

→ Future Value of Deferred Annuity
(End of Period)

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

OR

$$FV = A \times FVIFA_{(i+1\%, n \text{ yrs})}$$

future value factor for interest
annuity.

→ Future value of Annuity Due

$$FV = A \left[\frac{(i+1)^n - 1}{i} \right] \times (i+1)$$

Interest on last payment + interest on all other payments

OR

$$FV = A \times FVIFA_{(i+1\%, n \text{ yrs})} \times (i+1)$$

★ Doubling Period

↳ Shows how long will it take to double the investment at given rate of interest.

O Rule of 72

$$n = \frac{72}{i}$$

O Rule of 69

$$n = \frac{69}{i}$$

\Rightarrow Rate of interest is to be taken in decimal.

Q-6.1 (Not mentioned anything, hence lumpsum)

$$PV = 1000$$

$$n = 5 \text{ yrs}$$

(a) $8\% = i$

$$\therefore i = 0.08 \text{ (in decimal)}$$

$$FV = PV \times (1+i)^n$$

$$= 1000 \times (1.08)^5$$

$$FV = 1469.328$$

Q.B.

$$FV = PV \times FVIF$$

$$= 1000 \times 1.469$$

$$\boxed{FV = 1.469}$$

Q-6.2

$$n = \frac{72}{i}$$

$$72 = \frac{72}{i}$$

~~12~~

$$\therefore \boxed{n = 6}$$

Investment today = 5000

$$FV = 1,60,000$$



The amount will grow to
1,60,000 in 30 yrs.

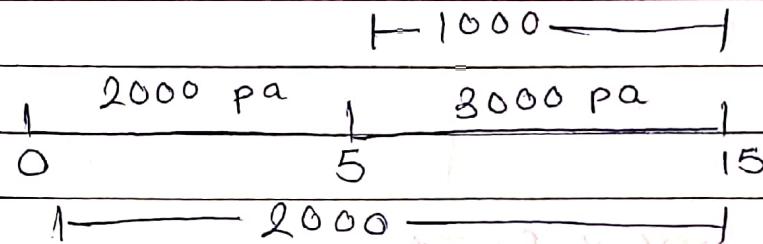
Q-6.4

Savings = 25000 per annum for
5 yrs & 3000 p.a

for 10 yrs, thereafter

Total n = 15 yrs

$$r = 10\% \times n$$



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

$$= 2000 \left[\frac{(1.10)^{15} - 1}{0.10} \right] + 1000 \left[\frac{(1.10)^{10} - 1}{0.10} \right]$$

$$= (2000 \times 31.772) + (1000 \times 15.937)$$

$$= \boxed{99481}$$

OR

$$FV = 2000 \times FVIFA_{(10\%, 15 \text{ yrs})}$$

~~(10\%, 10 yrs)~~

$$+ 1000 \times FVIFA_{(10\%, 10 \text{ yrs})}$$

~~FVIFA~~ [CVFA]

d 6.5

$$FV = 10,00,000$$

$$n = 10 \text{ yrs}$$

$$i = 12\%$$

$$A = ?$$

$$PV = A \times PVIFA_{(10\%, n \text{ yrs})}$$

$$\Rightarrow 10,00,000 = A \times 8.00617.549$$

$$A = 1256983 = A$$

$$\text{Q-6.6} \quad FV = PV(1+i)^n$$

$$10000 =$$

$$FV = 10000, A = 1000, n = 6 \text{ yrs}$$

↓

$$FV = A \times FVIFA_{(i=10\%, 6 \text{ yrs})}$$

$$\therefore 10 = FVIFA_{(i=10\%, 6 \text{ yrs})}$$

$$\therefore i = 9.10 \quad \text{or} \quad i = 20.10$$

$i = 9.10$ $FVIFA_{(i=9.10\%, 6 \text{ yrs})} = 10.183$	$i = 20.10$ $FVIFA_{(i=20.10\%, 6 \text{ yrs})} = 9.93$
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→ So actual rate will lie between
21.0% & 20.1%

⇒ Using linear interpolation,

i = lower rate of return

+

difference btw two rates

$\frac{\text{Val. req} - \text{Value at lower rate}}{\text{Val. at higher rate} - \text{Value at lower rate}}$

$\frac{\text{Val. at higher rate} - \text{Value at lower rate}}{\text{Val. at higher rate} - \text{Value at lower rate}}$

$$\therefore i = 20 + 1 \left[\frac{10 - 9.930}{10.183 - 9.930} \right]$$

$$i = 20.28\%$$

$$\text{Ql-6.7} \quad FV = 5000$$

$$PV = 1000$$

$$n = 10 \text{ yrs}$$

$$FV = PV \times FVIF_{(i=10, 10)}$$

$$5 = FVIF_{(i=10, 10)}$$

$$i = 17\% \text{ or } 18\%$$

$$\therefore i = 17 + 1 \left[\frac{5 - 4.807}{5.234 - 4.807} \right]$$

$$i = 17.45\%$$

* Present value & discounting technique

Present value
of single
amount
(lumpsum)

$$PV = \frac{FV}{(1+i)^n}$$

Present value
of annuity
(deferred)

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

OR

$$PV = FV \times PVIF$$

$$PV = A \times PVIFA_{(i, n \text{ yrs})}$$

↳ Table C

* Present value of annuity due

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

OR

$$PV = [A \times PVIFA_{(i, n \text{ yrs})}] \times (1+i)$$

* Present value of perpetuity

Infinite period

$$PV = \frac{A}{i}$$

* Present value of growing annuity

here the amount of annuity will increase every year at a particular rate (growth rate)

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

growth rate

* Present value of uneven cash flows

(1+i)ⁿ x P (the amount of deposits/saving are changing every year)

$$PV = \frac{A_1}{(1+i)} + \frac{A_2}{(1+i)^2} + \dots + \frac{A_n}{(1+i)^n}$$

(6.8)

$$A = 10000$$

$$n = 8$$

$$(i) r = 10$$

Given $A = 10000$, $n = 8$, $r = 10\%$

$$\therefore PV = 10000$$

$$\text{using } C(1+i)^n$$

and $PV = \frac{A}{(1+i)^n}$

$$PV = 4665.07$$

(6.9)

$$A = 2000$$

$$r = 10\% = 0.1$$

$$n = 5 \text{ yrs}$$

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

$$= 2000 \left[\frac{(1.1)^5 - 1}{0.1(1.1)^5} \right]$$

$$PV = 1582$$

(6.10) → Since the logic is that one cannot compare PV & FV

$$\underline{\text{Alt-1}} \quad PV = A \times PVIFA(15\%, 15 \text{ yrs})$$

$$= 10,000 \times PVIFA$$

$$= 10,000 \times 5.847$$

$$\boxed{PV = 58470}$$

→ ∵ Mr. Jingo should select Alt-1
as PV is higher than Alt-2.

$$\underline{\text{Alt-1}} \quad FV = A \times FVIFA(15\%, 15 \text{ yrs})$$

$$= 10,000 \times 47.580$$

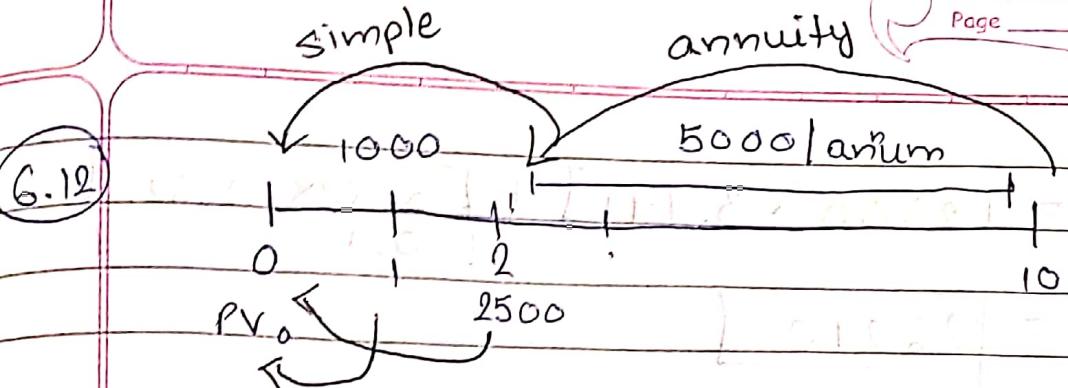
$$\boxed{FV = 475,800}$$

$$\underline{\text{Alt-2}} \quad FV = PV \times FVIF(15\%, 15 \text{ yrs})$$

$$= 50000 \times 8.137$$

$$\boxed{FV = 406,850}$$

∴ Alt-1 is better



$$\text{PV}_0 = \left(1000 \times \text{PVIF}_{(12\%, 1y)} \right) + \left(2500 \times \text{PVIF}_{(12\%, 2y)} \right)$$

$$+ \left(5000 \times \text{PVIFA}_{(12\%, 8y)} \right) \times \text{PVIF}_{(12\%, 1y)}$$

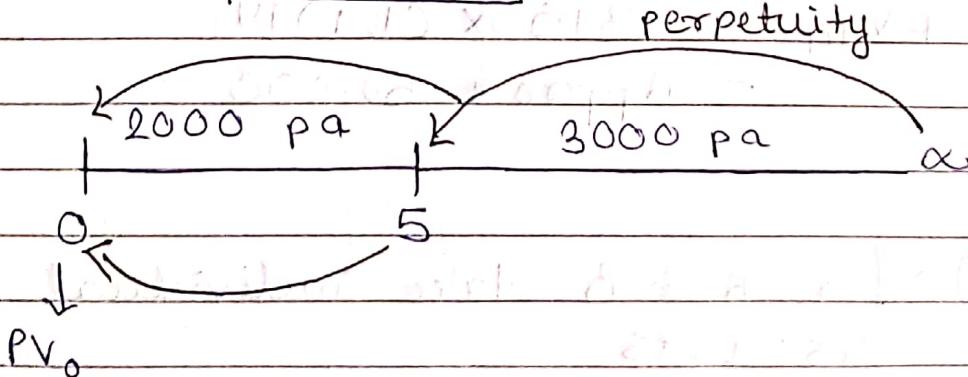
$$= [1000 \times 0.893] + [2500 \times 0.797]$$

$$+ [5000 \times 4.968 \times 0.797]$$

$$= 893 + 22682.98$$

$$= 22683$$

6.13

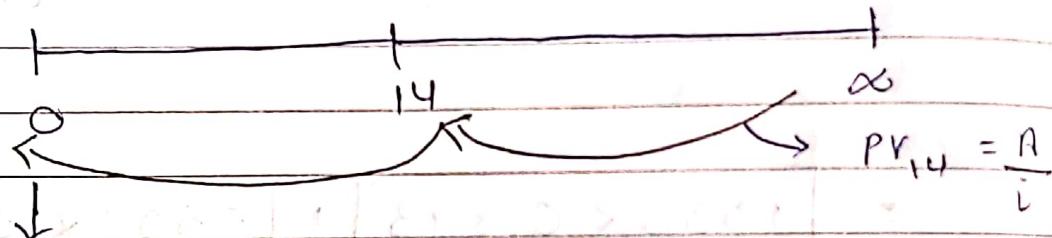


$$\text{PV}_0 = [2000 \times \text{PVIFA}_{(10\%, 5y)}]$$

$$+ \left[\frac{3000}{.10} \times \text{PVIF}_{(10\%, 5y)} \right]$$

$$\begin{aligned}
 &= [9000 \times 3.791] + \left[\frac{3000 \times 0.691}{0.1} \right] \\
 &= 26210
 \end{aligned}$$

6.14 → First we have, cal PV of perpetuity which gives the P.V. @ the end of 14 yrs and then discount it to yr. 0



$$PV_0 = 50000 \times PVIF (10\%, 14y)$$

$$\begin{aligned}
 &= \frac{5000}{0.1} \\
 &= 50000
 \end{aligned}$$

$$PV = 13150$$

$$\begin{aligned}
 \rightarrow FV_{14} &= 13150 \times (1.17)^{14} \\
 &= \text{Appox 50,000}
 \end{aligned}$$

6.16 → For A & B take individual discounts

→ For C take annuity present value

* Loan Amortization

(6.40)

$$PV = 1,00,000$$

$$i = 9.5\% = 0.095$$

$$n = 5 \text{ yrs}$$

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

$$1,00,000 = A \left[\frac{(1.095)^5 - 1}{0.095(1.095)^5} \right]$$

$$\therefore 100000 = 3.838 A$$

$$\therefore A = 26054.48 \\ \approx 26055$$

Loan Amortization schedule [③-④] [②-⑤]

① Yrs.	② Opening amt.	③ Install	④ Interest	P 9.5%	⑥ Closing
1	1,00,000	26055	9500	16555	83445
2	83445	26055	7927	18128	65317
3	65317	26055	6205	19850	45467
4	45467	26055	4319	21736	23731
5	23731	26055	2324	23731	0

(Q. 34)

$$A = 12 \text{ cr}$$

$$i = 12\% = 0.12$$

$$g = -3\% = -0.03$$

ix If pipeline is used forever
(perpetuity)

$$PV = \frac{A}{i-g} = \frac{12000000}{0.12 - (-0.03)}$$

$$= 80000000$$

$$= 80 \text{ cr}$$

ix If pipeline is scrapped after
25 yrs

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

$$= 10 \text{ cr} (1 - 0.03) \left[\frac{1 - (1 - 0.03)^{25}}{(1 - 0.12)^{25}} \right] \\ 0.12 - (-0.03)$$

$$= 75.468 \text{ cr}$$

(G.35) Number of barrels produced

per year = 50000

Growth rate = -5% = -0.05
barrel

Oil price = 50

Growth for oil prices = 3% = 0.03

$n = 15$ years

$i = 10\% = 0.1$

→ PV of well's production

$$\rightarrow PV_0 = AC(1+g) \left[\frac{1 - \frac{(1+g)^n}{(1+i)^n}}{i - g} \right]$$

$$g = (1 - 0.05)(1 + 0.03) - 1 \\ = (0.95 \times 1.03) - 1$$

$$g = 1 - 0.0215$$

$$\therefore PV_0 = (50000 \times 50)(1 - 0.0215) \left[\frac{1 - (1 - 0.0215)^{15}}{0.1 - 0.0215} \right]$$

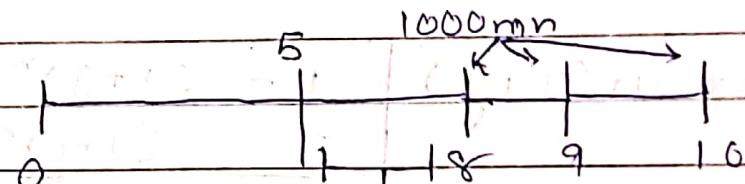
$$= 24,46,250 \left[\frac{0.827}{0.1215} \right] = 16651623.75$$

$$\Rightarrow \text{Net } g = (1+g_1)(1+g_2) - 1$$

* Sinking fund

term used by company, that need some fund at particular time, to make deposits and repay that related with the concept of FV with annuity

Q. 28



→ Invest annually → no deposits

Part A → Discounted value of debenture to be redeemed/repaid b/w 8 & 10 years is calc. at the end of 5th yr.

$$\therefore PV_5 = 1000 \text{ mn} \times PVIF_{(8\% \text{ for } 3 \text{ yrs})} \times PVIF_{(8\% \text{ for } 1 \text{ yr})}$$

$$\times PVIF_{(8\% \text{ for } 5 \text{ yrs})}$$

$$= 1000 \text{ mn} \times (0.7941 + 0.735 + 0.681)$$

$$= 2.21 \times 1000$$

$$= 2210 \text{ mn} = PV_5$$

Now,

Part B → Annual deposit to be made in sinking fund from yr 0 to 5

$$PV_5 = FV$$

$$FV = A \times FVIFA (8\%, 5 \text{ yrs})$$

$$\therefore 2210 = A \times FVIF (8\%, 5 \text{ yrs})$$

$$2210 = A \times 5.867$$

$$A = 376.68 \text{ mn}$$

(6.93)

$$FV = 50000$$

$$n = 10 \text{ yrs}$$

$$i = 12\% = 0.12$$

$$A = ?$$

Beggingning = annuity due

$$\therefore FV = A \times FVIFA (12\%, 10 \text{ yrs}) \times (1.12)$$

$$\therefore 50000 = n \times 17.549 \times 1.12$$

$$\therefore \frac{n}{A} = 2543.897$$

$$| A \approx 2544 |$$

* Multi-period compounding

* Single Amount

$$FV = PV \times \left[1 + \frac{i}{m} \right]^{n \times m}$$

m = no. of compounding

→ semi-annually $\Rightarrow m=2$

Quarterly $\Rightarrow m=4$

monthly $\Rightarrow m=12$

weekly $\Rightarrow m=52$

daily $\Rightarrow m=365$

* Annuity

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

i

m

* Effective Interest rate (EIR)

↳ shows how the compounding freq impacts the EIR

→ Effect of increasing the freq of compounding additional gains is in the form of interest

$$EIR = \left[1 + \frac{i}{m} \right]^m - 1$$

Q.17

$$PV = 10000$$

$$i = 16\% = 0.16$$

$$n = 5 \text{ yrs}$$

Quarterly compounding $\Rightarrow m=4$

$$FV = PV \left(1 + \frac{i}{m} \right)^{n \times m}$$

$$= 10000 \left(1 + \frac{0.16}{4} \right)^{5 \times 4}$$

$$= 10000 (1.04)^{20}$$

$$= \boxed{21911.23}$$

Q Calc. EIR:

$$EIR = \left(1 + \frac{i}{m}\right)^m - 1$$

$$= \left(1 + \frac{0.16}{4}\right)^4 - 1$$

$$EIR = 0.16985 \text{ or } 16.985\%$$



$$FV = 10000 \times (1.16985)^5$$

$$FV = 21,911.23 \rightarrow \text{turns out to be same as calculated before.}$$

6.18

$$PV = 5000 \times \left(1 + \frac{i}{m}\right)^{-n}$$

$$i = 12\% = 0.12$$

$$m = 4$$

$$n = 5 \times 4 = 20$$

$$\therefore FV = -PV \left(1 + \frac{i}{m}\right)^{n \times m}$$

$$= 5000 \left(1 + \frac{0.12}{4}\right)^{20}$$

$$\therefore FV = 9030.556 \quad (1)$$

Q Calculate EIR

$$EIR = \left(1 + \frac{i}{m} \right)^m - 1$$

$$= \left(1 + \frac{0.12}{4} \right)^4 - 1$$

$$EIR = 0.1255$$

$$FV = 5000 \times (1.1255)^5$$

$$\therefore FV = 9030 \quad (2) \text{ (Same as 1)}$$

(6.19)

$$A \rightarrow 12.616 \%$$

$$B \rightarrow 26.248 \%$$

$$C \rightarrow 26.824 \%$$

6.99

$$PV = 10000$$

$$i = 10\% = 0.1$$

$$m = 2$$

$$n = 10 \text{ yrs}$$

$$FV = PV \left[1 + \frac{i}{m} \right]^{mxn}$$

$$= 10000 \left[1 + \frac{0.1}{2} \right]^{10 \times 2}$$

$$\boxed{FV_{10} = 26532.98}$$

→ Value of FV_{10} in terms of current rupee if inflation rate is 8.1.

$$PV = \frac{FV}{(1+i)^n}$$

$$= \frac{26532.98}{(1.08)^{10}}$$

$$\boxed{PV = 12289.90}$$