γ_{im} = −1 ... 0 ... +1

β_A = −3 −2 ... 2 ... 3

σ_R^2 = variance of R

$\Sigma (R_i - \bar{R_i})^2 prob$

$\Sigma (R_i - \bar{R_i})(R_i - \bar{R_i}) prob$ = variance of R

$\Sigma (R_i - \bar{R_i})(R_j - \bar{R_j}) prob$ = variance of R & J

Q19

Jaybury $R = \frac{D + CA}{BP}$

J	M	JM	M^2
25.62	12.62	323.32	159.26
20.07	21.79	437.32	474.80
17.05	5.32	90.71	28.30
20.91	13.24	851.35	662.36

$$\beta = \frac{\Sigma JM - n\bar{J}\bar{M}}{\Sigma M^2 - n\bar{M}^2}$$

$$= \frac{851.35 - 3 \times 20.91 \times 13.24}{662.36 - 3 \times 13.24^2} = \frac{20.80}{136.46} = 0.15$$

CAPM

Market Risk premium

Securities Risk premium

	FD	Market	TATA Motors
	Rf	Rm	Rj
R	4%	15%	?
β	0	1	1.2

11%

1

13.2

1.2

Fair Return
Theoretical Return
CAPM Return
Required Return
Ke

$$= 4 + \frac{11\%}{1} \times 1.2 =$$

$$R_i = \underbrace{4}_{\text{Minimum Return without any Risk}} + \underbrace{13.20}_{\text{Premium for securities risk}} = 17.20$$

$$R_i = R_f + \frac{\beta_i}{\beta_m}(R_m - R_f)$$

$$R_i = R_f + \beta_i\,(R_m - R_f)$$

Market Risk premium

Securities Risk premium

Minimum Required Rate of Return

Q24

Expect 100 110 $\frac{10}{100} = 10\% \rightarrow$ CAPM = Required Return

Actual 90 110 $\frac{20}{90} = 22.22\%$ 8%

Actual Return Lower → Shares are selling at Higher price → Shares are overvalued → Sell

Actual Return Higher → Shares are selling at lower price → shares are undervalued → Buy

	Buy	Sell	Hold
Shares	Under valued	over valued	Correctly valued
Shares are selling at	Lower price	Higher price	Equal price
	Actual Return > Required Return	Actual Return < Required Return	Actual Return = Required Return

CAPM

$R_j = R_f + \beta(R_m - R_f)$

Regression Analysis

Correlation Analysis

$\beta_i = \dfrac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma y^2 - n\bar{y}^2}$ $\beta_i = \dfrac{cov_{im}}{\sigma_m^2}$

$cov_{im} \rightarrow \Sigma(R_i - \bar{R}_i)(R_m - \bar{R}_m)$ prob.

$\sigma_m^2 \rightarrow \Sigma(R_m - \bar{R}_m)^2$ prob.

1.40] constant | memory
×
2
= 2.8
= 3.92
=

Q28

D_0 = 2 2.8 3.92 5.49 7.69 10.76

MP_0 ← Ke ← $MP_5 = \dfrac{D_6}{Ke - g} = \dfrac{D_5(1+g)}{Ke - g} = \dfrac{10.76(1.15)}{0.1975 - 0.15} = 260.50$

MP_5 = 260.50

0.1975
−
0.15
=
÷
=
×
10.76
×
1.15
=

$Ke = R_f + \beta(R_m - R_f)$
$= 11 + 1.25(18 - 11)$
$= 19.75$

r c

$\beta = \dfrac{cov_{im}}{\sigma_m^2} = \dfrac{30}{24} = 1.25$

Q36.

	13	14	15	16	17	18	
EPS	2.10	2.42	2.78	3.19	3.67	4.22	4.47
DPS	0.69	0.79	0.91	1.05	1.21	1.39	2.91

6% 65%

MP_0 MP_{18} = 46.19

β 1.40 1.10

1.15
×
0.69
=
=
=

Ke $= R_f + \beta(R_m - R_f)$
$= 6.25 + 1.40 \times 5.50$
$= 13.95$

$= 6.25 + 1.10 \times 5.50$
$= 12.30$

$MP_{18} = \dfrac{D_{19}}{Ke - g}$

$= \dfrac{2.91}{0.1230 - 0.06}$

$= 46.19$

Q37

12.20 $\xrightarrow{g}$ EPS 14
DPS 8.20

NO CHANGE in POLICY

$g = 3.50\%$

$D_0 = 8.20$

CHANGE in POLICY

$g = br$
$= rr \times roi$
$= 0.50 \times 0.15$
$= 7.5\%$

$D_0 = EPS \times DPR$
$= 14 \times 0.50$
$= 7$

$CA = P(1+r)^t$

$F_4 = P_4(1+r)^t$

$14 = 12.20(1+r)^4$

$(1.1475)^{1/4} = (1+r)$

$1.0350 = 1+r$

$r = 3.50\%$

$\frac{1}{4} = \frac{1}{2} \times \frac{1}{2}$

$\sqrt{\ }\ \sqrt{\ }$

$Ke = Rf + \beta \times (Rm - Rf)$
$= 6 + 1.5 \times 4$
$= 12\%$ | 12%

$MP = \frac{D_0(1+g)}{ke-g}$

$= \frac{8.20(1.035)}{0.12-0.035}$ | $\frac{7(1.075)}{0.12-0.075}$

$= 99.85$ | 167.22

Q38

$Rp = Rf + \beta_p(Rm - Rf)$

$15.7 = Rf + 0.50 \times (16.7 - Rf)$

Q 5)

	A	B	Market
R	22	24	
σ	40	38	20
β	0.86	1.24	
γ	0.72		
w	0.70	0.30	

ii) $R_p = \sum W_i R_i = W_A R_A + W_B R_B$

$= 0.70 \times 22 + 0.30 \times 24$

$= 15.4 + 7.2$

$= 22.6$

$$\sigma_p^2 = (w_a \sigma_a)^2 + (w_b \sigma_b)^2 + 2 w_a w_b \underbrace{\sigma_a \sigma_b \gamma_{ab}}_{cov_{AB}}$$

$= (0.70 \times 40)^2 + (0.30 \times 38)^2 + 2 \times 0.70 \times 0.30 \times 40 \times 38 \times 0.72$

$= 784 + 129.96 + 459.65$

$= 1373.61$

$\sigma_p = 37.06$

iii] $R_i = R_f + \beta_i (R_m - R_f)$

A $22 = R_f + 0.86(R_m - R_f)$ ....①

B $24 = R_f + 1.24(R_m - R_f)$ ....②

eqⁿ ② − ①

$2 = 0 + 0.38(R_m - R_f)$

$R_m - R_f = 5.26\%$

put $R_m - R_f = 5.26$ in eqⁿ ①

$22 = R_f + 0.86 \times 5.26$

$22 = R_f + 4.52$

$R_f = 17.48$

$R_m - R_f = 5.26$

$R_m - 17.48 = 5.26$

$R_m = 22.74$

Q53

C

P	C	CxP	$C-\bar{C}$	$(C-\bar{C})^2P$
0.4	18	7.2	7.8	24.34
0.3	13	3.9	2.8	2.35
0.3	-3	-0.9	-13.2	52.27
		$\bar{C}=10.2$		σ_m^2 78.96

Calculator
18
−
10.2
=
=
13
=
3
+/−
=

A

P	A	AxP	$A-\bar{A}$	$(A-\bar{A})(C-\bar{C})P$
0.4	25	10	13.5	42.12
0.3	10	3	-1.5	-1.26
0.3	-5	-1.5	-16.5	65.34
	$\bar{A}$	11.5		106.20

$$\beta = \frac{COV_{AC}}{\sigma_m^2} = \frac{106.20}{78.96} = 1.34$$

$$R_i = R_f + \beta(R_m - R_f)$$
$$= 11 + 1.34(10.2 - 11)$$
$$= 9.93$$

Actual Return (11.50) > CAPM (9.93%)

∴ Shares are undervalued

∴ Make fresh investment in Security A

Q55

	σ	γ_{im}	Portfolio ABC weight
CAR AC	0.30	0.60	0.60
Window AC	0.35	0.70	0.25
Split AC			0.15

Portfolio

	Another company weight	σ	γ_{CM}	β	β×ω
window	0.50			1.225	0.6125
Split	0.50			x	0.50x
		0.50	0.85	$\xrightarrow{\frac{\gamma_{ACM}\sigma_{AC}}{\sigma_M}}$	β_P

$\Sigma w_i\beta_i$

σ_m 0.20
R_m 10
R_f 4

$\beta_{ABC} = \Sigma w_i \beta_i$
$= w_c\beta_c + w_w\beta_w + w_s\beta_s$
$= 0.60 \times 0.9 + 0.25 \times 1.225 + 0.15 \times 3.025$
$= 1.3$
$=$

$\beta_{CAR} = \frac{Cov_{CM}}{\sigma_M^2}$ or $\frac{\gamma_{CM}\sigma_C}{\sigma_M} = \frac{0.60 \times 0.30}{0.20} = 0.90$

R ✗ C ✓

$\beta_{window} = \frac{\gamma_{WM}\sigma_W}{\sigma_M} = \frac{0.70 \times 0.35}{0.20} = 1.225$

$\beta_{split} =$

$\beta_{AC} = \frac{\gamma_{ACM}\sigma_{AC}}{\sigma_M} = \frac{0.85 \times 0.50}{0.20} = 2.125$

$\Sigma w_i\beta_i$
$\beta_{AC} = W_w\beta_w + w_s\beta_s$
$2.125 = 0.50 \times 1.225 + 0.50 \times \beta_s$

$\beta_s = 3.025$

iii] Earlier only Equity $\beta_E = \beta_{company} = 1.3$

$\beta_{company} = \Sigma w_i\beta_i$
$= w_E\beta_E + w_D\beta_D$
$1.30 = 0.50 \times \beta_E + 0.50 \times 0.167$

According to CAPM (Debt)

$$K_d = R_f + \beta_d (R_m - R_f)$$

$$5 = 4 + \beta_d (10-4)$$

$$\boxed{\frac{(5-4)}{(10-4)} = \beta_D}$$

$$\frac{1}{6} = \beta_D$$

$$\beta_D = 0.1667$$

Q57

MARKET LINES

① Capital Market line

$$R_i = R_f + \frac{\sigma_i}{\sigma_m}(R_m - R_f)$$

② Securities Market line [CAPM]

$$R_i = \underset{4}{R_f} + \underline{\beta_i}\,(\overset{15\ -4}{R_m - R_f})\,||$$

$\beta_m = 1$

③ Securities characteristics line

Q57.

1) $R_p = \Sigma w_i R_i$

$= w_M R_M + w_{Rf} R_{Rf}$

$7.5 = w_M \times 8 + (1-w_M) \times 5$

$7.5 = 8w_M + 5 - 5w_M$

$2.5 = 3w_M$

$w_M = 83.33\%$

$w_{Rf} = 16.67\%$

$R_p = \Sigma w_i R_i$

$= w_M R_M + w_{Rf} R_{ef}$

$10 = w_M \times 8 + (1-w_M) \times 5$

$10 = 8w_M + 5 - 5w_M$

$5 = 3w_M$

$w_M = 1.667$ i.e. $166.67\% \times 100000 = 166670$ Invest

$w_{Rf} = -0.667$ i.e. $\underline{-66.67\%} \times 100000 = \underline{-66670}$ Borrow

100% $\qquad$ 100000

2) $\sigma_p^2 = (w_M \sigma_M)^2 + (w_{Rf} \underset{0}{\underline{\sigma_{Rf}}})^2 + 2 w_M w_{Rf} \sigma_M \underset{0}{\underline{\sigma_{Rf}}} \underset{0}{\underline{r_{MRf}}}$

$\sigma_p^2 = (0.8333 \times 6)^2 = 25$

$\sigma_p = 5\%$

Alternative, using CML

$R_p = R_f + \frac{\sigma_p}{\sigma_m}(R_m - R_f)$

$7.5 = 5 + \frac{\sigma_p}{6}(8-5)$

$2.5 = \frac{3\sigma_p}{6}$

$15 = 3\sigma_p$

$\sigma_p = 5$

Q59

old	$\beta = 1.108$	$\times w_0$	$1.108 w_0$
Rf. sec.	$\beta = 0$	$\times 1-w_0$	0
New			0.80

$\beta_N = \Sigma w_i \beta_i$

$= w_0 \beta_0 + w_{Rf} \beta_{Rf}$

$0.80 = w_0 \, 1.108 + 0$

$w_0 = 72.20\%$

Value of New portfolio $= \frac{1200000}{0.7220} = 1662050$

(-) Value of old Portfolio $\qquad$ 1200000

Rf security $\qquad$ 462050

iii) $B_N = B_0 W_0 + B_{rf} W_{rf}$

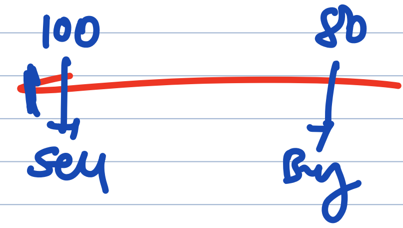
$1.20 = 1.108 \times w_0 + 0$

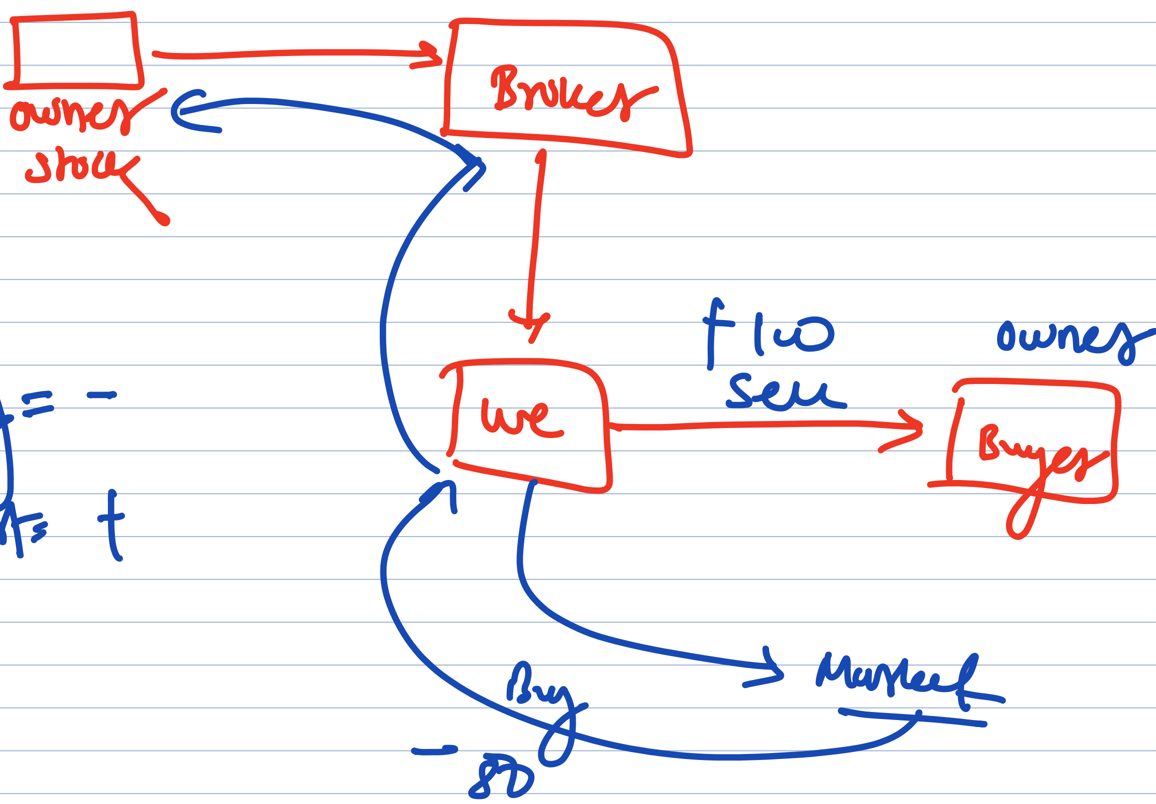
$w_0 = 1.083$

Value of new portfolio $= \frac{1200000}{1.083} = 1108033$

(-) value of old portfolio $\underline{1200000}$

Rf security [Borrow] -91967





Buy = −

Short = +

		ω
$Y = -50000$	Short	-0.50
$X = 150000$	Long	1.50
100000		1

0.50 CGF / -0.50 CGF

$\beta_p = \Sigma w_i \beta_i$ +ve

$= w_x \beta_x + w_y \beta_y + w_{Rf} + \beta_{Rf}$

Factor 1 $= 1.5 \times 0.75 + (-0.50) \times 1.50 = 0.375$ $+\beta$

2 $= 1.5 \times \quad + (-0.50) x$

ii]

	w
$Rf = -100000$	-1
$y = -100000$	-1
$x = 300000$	3
100000	1

CAPM

$R_i = \underline{R_f} + \beta\,(\underline{R_m - R_f})$

iii] $R_i = R_f + \beta_1 \lambda_1 + \beta_2 \lambda_2$

portfolio x $15 = 10 + 0.75\lambda_1 + 0.60\lambda_2 \quad \ldots (1)$

y $20 = 10 + \cancel{1.50}\lambda_1 + 1.10\lambda_2 \quad \ldots (2)$

eqn (1) $\times 2$

$30 = 20 + \cancel{1.50}\lambda_1 + 1.20\lambda_2 \quad \ldots$ eqn (3)

eqn (3) $-$ eqn (2)

$10 = 10 + 0.10\lambda_2$

$0.10\lambda_2 = 0$

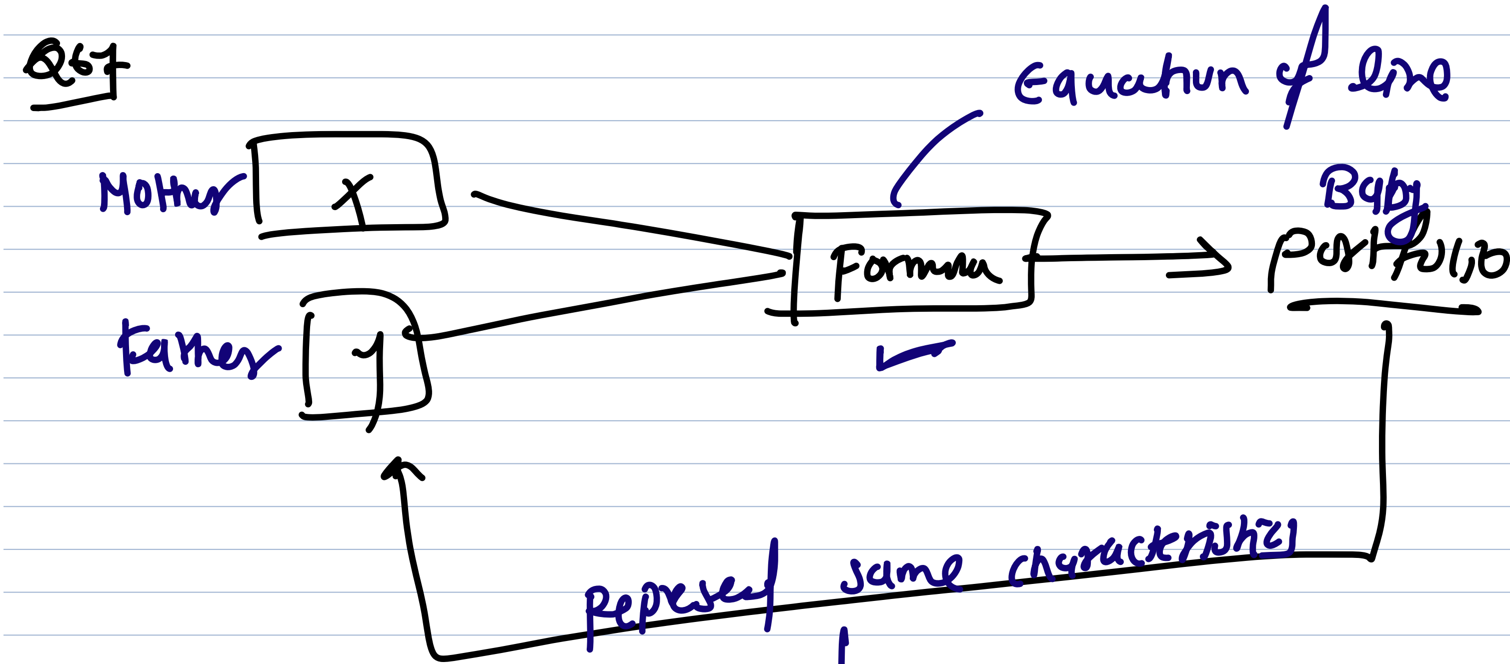
$\lambda_2 = 0$

$\therefore$ put $\lambda_2 = 0$ in eqn (1)

$15 = 10 + 0.75\lambda_1 + 0$

$\lambda_1 = \dfrac{5}{0.75} = 6.67\%$

Q67



constant

$$y = mx + b$$

slope Intercept

$$y = 0.30x + 5$$

Unknown variable

known variable

$w_A = 50\%$

$w_B =$

$w_C =$

$\rightarrow w_B = m w_A + n$ | $w_C = m w_A + n$

portfolio x $\quad 0.40 = m\,0.30 + n$ --- (1)

y $\quad 0.50 = m\,0.20 + n$ --- (2)

eqn (2) − eqn (1)

$0.10 = -0.10m + 0$

$m = -1$

put $m = -1$ in eqn (1)

$0.40 = -1 \times 0.30 + n$

$n = 0.70$

$\therefore$ Eqn of line $w_B = -1 w_A + 0.70$

$w_B = -1 \times 0.50 + 0.70$

$w_B = 0.20$

$w_A + w_B + w_C = 1$

$0.50 + 0.20 + w_C = 1$

$w_C = 0.30$

$\therefore$ New portfolio − on a minimum variance set

A	0.50	4000
B	0.20	1600
C	0.30	2400
		8000

Q68.

$$R_p = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3$$

$$= 4.5 + 1 \times 6.85 + 2.105 \times -3.50 + 5.8 \times 0.65$$

$$R_p = 7.7525$$

$$\beta_p = \sum w_i R_i$$

$$= \omega_{scq}\beta_{scq} + \omega_{scv}\beta_{scv} + \omega_{lcq}\beta_{lcq} + \omega_{lcv}\beta_{lcv}$$

$$\beta_{p_1} = 0.25 \times 0.80 + 0.10 \times 0.90 + 0.50 \times 1.165 + 0.15 \times 0.85 = 1$$

$$\beta_{p_2} = 0.25 \times 1.39 + 0.10 \times 0.75 + 0.50 \times 2.75 + 0.15 \times 2.05 = 2.105$$

$$\beta_{p_3} = 0.25 \times 1.35 + 0.10 \times 1.25 + 0.50 \times 8.65 + 0.15 \times 6.75 = 5.80$$

R_p — Not Reco. — $\sum w_i R_i$

R_p — Reco. — APT

$\sum w_i R_i \longrightarrow APT = R_i = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3 = (1)$

$R_i = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3 = (2)$

$= R_i = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3 = (3)$

$R_i = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3 = (4)$

APT $\downarrow$

$$R_i = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \beta_3\lambda_3$$

$$\sum w_i \beta_i$$

$$= \omega_{scq}\beta_{scq} + \omega_{scv}\beta_{scv} + \omega_{lcq}\beta_{lcq} + \omega_{lcv}\beta_{lcv}$$

$$= \omega_{scq}\beta_{scq} + \omega_{scv}\beta_{scv} + \omega_{lcq}\beta_{lcq} + \omega_{lcv}\beta_{lcv}$$

$$= \omega_{scq}\beta_{scq} + \omega_{scv}\beta_{scv} + \omega_{lcq}\beta_{lcq} + \omega_{lcv}\beta_{lcv}$$

ii) $R_p = R_f + \beta_p(R_m - R_f)$

$= 4.5 + 1 \times 6.85$

$= 11.35\%$

iii) $\beta_p = \sum w_i \beta_i$

$= w_{scu}\beta_{scu} + w_{ccy}\beta_{ccy}$

$1 = w_{scu} \times 0.90 + (1 - w_{scu}) \times 1.165$

$1 = 0.90 w_{scu} + 1.165 - 1.165 w_{scu}$

$-0.165 = -0.265 w_{scu}$

$w_{scu} = \frac{0.165}{0.265} = 62.26\%$

$w_{ccy} = 37.74\%$

SHAPPE'S

INDEX

MODEL

Return

$R_i = \alpha_i + \beta_i R_m + \epsilon_i$

company Specific → Core Competency

Market Specific

Uncertain Event / Rare → CEO Death Resign → project

Risk

Total Risk = Systematic Risk + Unsystematic Risk

$\sigma_i^2 = (\beta_i \sigma_m)^2 + \epsilon_i^2$

$\sigma_p^2 = (\beta_p \sigma_m)^2 + \Sigma(\epsilon_i w_i)^2$

$\beta_p = \Sigma w_i \beta_i$

product sum square

product square sum

$R_m = 10\% \uparrow$ $\quad\sigma_m = 10\%$

$\beta = 1.2$ $\quad\beta = 1.2$

$R_i = 12\% \uparrow$ $\quad\sigma_i = 12\%$

$\beta_i R_m$ $\quad\beta_i \sigma_m$

1 $(\epsilon_i w_i)^2$

2 $(\epsilon_i w_i)^2$

3 $(\epsilon_i w_i)^2$

4 $(\epsilon_i w_i)^2$

Cov_{ij}

$\sum (R_i - \bar{R}_i)(R_j - \bar{R}_j)\ prob$

$r_{ij} = \dfrac{Cov_{ij}}{\sigma_i \sigma_j}$

$\sigma_i^2 = \beta_i^2 \sigma_m^2$

$\sigma_i \sigma_i = \beta_i \beta_i \sigma_m^2$

$\sigma_i \sigma_j = \beta_i \beta_j \sigma_m^2$

$Cov_{ij} = \beta_i \beta_j \sigma_m^2$

$$r_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B}$$

$$= \frac{205.20}{20 \times 18}$$

$$= \frac{205.20}{360}$$

$$= 0.57$$

0.57 — 1

iii) σ_p
- 2 Asset ✗
- 3 Asset ✓ $(a+b+c)^2$
- SIM ✗

$$\sigma_p^2 = (w_A \sigma_A)^2 + (w_B \sigma_B)^2 + (w_C \sigma_C)^2$$
$$+ 2\, w_A w_B \underline{\sigma_A \sigma_B r_{AB}}\ Cov_{AB}$$
$$+ 2\, w_B w_C\, Cov_{BC}$$
$$+ 2\, w_C w_A\, Cov_{AC}$$
$$= \left(\tfrac{1}{3} \times 20\right)^2 + \left(\tfrac{1}{3} \times 18\right)^2 + \left(\tfrac{1}{3} \times 12\right)^2$$
$$+ 2 \times \tfrac{1}{3} \times \tfrac{1}{3} \times 205.20$$

$2 \times \tfrac{1}{3} \times \tfrac{1}{3} = \tfrac{2}{9}$

$+2 \times 1/3 \times 1/3 \times 153.90$

$+2 \times 1/3 \times 1/3 \times 108$

$= 44.44 + 36 + 16 + 45.6 + 34.2 + 24$

$\sigma_p^2 = 200.24$

$\sigma_p = 14.15\%$

Q.72

σ_p — 3 Asset $= (a+b+c)^2$

$\omega_A \; \omega_B \; \omega_C$ ✓

$\sigma_A \; \sigma_B \; \sigma_C$ ✓

$\beta_i = \frac{Cov_{im}}{\sigma_m^2}$ ✓

✓ Cov_{AB} ✗

✓ γ_{AB} ✗

$Cov_{AB} = \beta_A \beta_B \sigma_m^2$ ✓ ✓ ✓

SIM

According to SIM

$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \Sigma(\epsilon_i w_i)^2$

$= 0.68^2 \times 25^2 + 400.56$

$= 289 + 400.56$

$\sigma_p^2 = 689.56$

$\sigma_p = 26.26\%$

$\beta_p = \Sigma w_i \beta_i$

$= w_A \beta_A + w_B \beta_B + w_{Rf} \beta_{Rf}$

$= 0.25 \times 0.8 + 0.40 \times 1.2 + 0$

$= 0.68$

$\Sigma \epsilon_i w_i^2 = (\epsilon_A w_A)^2 + (\epsilon_B w_B)^2 + 0$

$= (35 \times 0.25)^2 + (45 \times 0.40)^2$

$= 76.56 + 324$

$= 400.56$

$Cov_{AB} = \beta_A \beta_B \sigma_m^2 = 0.8 \times 1.2 \times 25^2 = 600$

$Cov_{BRf} = 0$

$Cov_{RfA} = 0$

$\sigma_p^2 = (w_A \sigma_A)^2 + (w_B \sigma_B)^2 + \underline{(w_{Rf} \sigma_{Rf})^2}$ 0

$+ 2 w_A w_B Cov_{AB}$

$+ 2 w_B w_{Rf} \underline{Cov_{BRf}}$ 0

$+ 2 w_{Rf} w_A \underline{Cov_{RfA}}$ 0

$= (0.25 \times 40.31)^2 + (0.40 \times 54.08)^2 +$

$+ 2 \times 0.25 \times 0.40 \times 600$

$= 101.56 + 467.94 + 120$

$\sigma_p^2 = 689.50$

$\sigma_p = 26.26\%$

MARKET LINES

Equation of Line $y = mX + b$ | $y = 3X + 0.5$

Unknown variable

constant

known variable

1. Capital Market Line $R_i = R_f + \frac{\sigma_i}{\sigma_m}(R_m - R_f)$ | $R_i = 7 + \frac{12}{10}(R_m - 7)$

2. Security Market line (CAPM) $R_i = R_f + \beta_i(R_m - R_f)$ | $R_i = 7 + 1.2(R_m - 7)$

   $R_i = 7 + \beta_i 9 \leftarrow R_m - R_f$

3. Security characteristic line (SCL) $R_i = \alpha_i + \beta_i R_m$ | $R_i = 2.5 + 1.2 R_m$

   $R_i = \alpha_i + 7$

   $R_i = 2.5 + \beta R_m$

Portfolio Evaluation Measures

Sharpe Ratio | Treynor's Ratio | Jensen's Alpha

Sharpe Ratio

$$\frac{R_i - R_f}{\sigma_i}$$

SR

UR

control

diversification

UR Reduce

$\frac{19-4}{5}$	$\frac{18-4}{4}$
$= \frac{15}{5}$	$\frac{14}{4}$
$R_i = 3\%$	3.5%
σ_i 1%	1%

Reward to volatility Ratio

Treynor's Ratio

$$\frac{R_i - R_f}{\beta_i}$$

Jensen's Alpha

α = Actual Return (Expected) − Required Return

Required Return: CAPM, APT, SFM

+ve = good

−ve = Bad

Sharpe, Treynor, Jensen: Higher Ratio good; Lower Ratio Bad.

Q86

ii) $R_p = \sum w_i R_i$

$= w_x R_x + w_y R_y$

$= 0.60 \times 15 + 0.40 \times 14$

$= 9 + 5.60$

$R_p = 14.60$

$\beta_p = \sum w_i \beta_i$

$= w_x \beta_x + w_y \beta_y$

$= 0.60 \times 1.087 + 0.40 \times 0.903$

$= 0.65 + 0.36$

$\beta_p = 1.01$

$\beta_x = \dfrac{Cov_{xm}}{\sigma_m^2} = \dfrac{3.37}{3.1} = 1.087$

$\beta_y = \dfrac{Cov_{ym}}{\sigma_m^2} = \dfrac{2.80}{3.1} = 0.903$

$\sigma_p^2 = w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2 w_x w_y Cov_{xy}$

$= 0.60^2 \times 4.8 + 0.40^2 \times 4.25 + 2 \times 0.60 \times 0.4 \times 4.3$

$= 1.728 + 0.68 + 2.064$

$\sigma_p^2 = 4.472$

$\sigma_p = 2.115$

iii) Required Return $R_i = R_f + \beta_i(R_m - R_f)$

X $R_x = 10 + 1.087(12 - 10) = 12.174$

Y $R_y = 10 + 0.903(12 - 10) = 11.806$

Pxy $R_p = 10 + 1.013(12 - 10) = 12.026$

Systematic Risk $= \beta_i^2 \sigma_m^2$

X $= 1.087^2 \times 3.1 = 3.663$

Y $= 0.903^2 \times 3.1 = 2.528$

P $= 1.013^2 \times 3.1 = 3.181$

Unsystematic Risk = Total Risk − Systematic Risk

X $= \sigma_x^2 - \beta_x^2 \sigma_m^2 = 4.8 - 3.663 = 1.137$

Y $= \sigma_y^2 - \beta_y^2 \sigma_m^2 = 4.25 - 2.528 = 1.722$

Pxy $= \sigma_p^2 - \beta_p^2 \sigma_m^2 = 4.472 - 3.181 = 1.291$

iv] Sharpe Ratio = $\frac{R_i - R_f}{\sigma_i}$

$$x = \frac{15-10}{\sqrt{4.8}} = 2.28$$

$$y = \frac{14-10}{\sqrt{4.25}} = 1.94$$

$$\text{portfolio} = \frac{14.60-10}{2.115} = 2.17$$

Treynor Ratio = $\frac{R_i - R_f}{\beta_i}$

$$x = \frac{15-10}{1.087} = 4.60$$

$$y = \frac{14-10}{0.903} = 4.43$$

$$\text{portfolio} = \frac{14.60-10}{1.013} = 4.54$$

Jensen's Alpha = Actual Return − Required Return

$$\alpha x = 15 - 12.174 = 2.826$$
$$\alpha y = 14 - 11.806 = 2.194$$
$$\alpha z = 14.60 - 12.026 = 2.574$$

Q87

1) $R_p = \Sigma w_i R_i$

$R_p = w_D R_D + w_A R_A$

$10.5 = w_D \times 10 + w_A \times 15$

$10.5 = (1 - w_A) \times 10 + w_A \times 15$

$10.5 = 10 - 10 w_A + 15 w_A$

$0.5 = 5 w_A$

$w_A = 10\%$
$w_D = 90\%$

ii) $\sigma_p^2 = (w_A\sigma_A)^2 + (w_D\sigma_D)^2 + 2\,w_A w_D \underbrace{\sigma_A\sigma_D r_{AD}}_{Cov_{AD}}$

$= (0.10\times30)^2 + (0.90\times16)^2 + 2\times0.10\times0.90\times30\times16\times0.30$

$= 9 + 207.36 + 25.92$

$\sigma_p^2 = 242.28$

$\sigma_p = 15.57\%$

	Before	After
R	10%	10.50%
σ	16%	15.57%

SR

$\frac{R_i - R_f}{\sigma_i}$	$\frac{10-3}{16}$	$\frac{10.50-3}{15.57}$	
	$= 0.4375$	$= 0.4817$	$= 0.044$

2. Constant Ratio Plan / Mix policy

Bearish

E = 1	Bullish	1.20	1.10	Sell Equity: 0.10	0.70	0.90	Buy Equity: 0.20
B = 1		1.00	1.10	Buy Bond: 0.10	1.10	0.90	Sell Bonds: 0.20
2		2.20	2.20		1.80	1.80	

Before Rebalancing — After Rebalancing

BR

3. CPPI - Constant Proportion Portfolio Insurance Policy

$\hookrightarrow EV = m\,[CPV - FV]$

m → Risk Multiplier

CPV → Current portfolio value

FV → Floor value

$= 2\,[220000 - 170000]$

$= 100000$

Q89

Nifty	5326	5122.96	5539.04	4793.4 10%
Equity	60000	57713 55426		
Rf	240000	240000 242287		
		297713 297713		

Floor value = 300000 (1 − 0.10) = 270000

1] Immediately to start with

Equity	= m [CPV − FV] = 2 [300000 − 270000]	60000
Rf. securities (Bal. fig.)		240000
		300000

2] 10 days later

Before Rebalancing

Equity	$\frac{60000}{5326} \times 5122.96$	57713
Rf. securities		240000
		297713

After Rebalancing

Equity	m [CPV − FV] = 2 [297713 − 270000]	55426
Rf securities	[240000 + (57713 − 55426)]	242287
		297713

Sell equity worth ₹2287 & invest the same in Rf. securities iii] 10 days further

Before Rebalancing

Equity	$\frac{55426}{5122.96} \times 5539.04$	59928
Rf. securities		242287
		302215

After Rebalancing

Equity = m [CPU - FV]
= 2 [302215 - 270000] 64430

Rf. securities = 242287 - [64430 - 59928] 237785

302215

Dispose off Rf. securities worth ₹4502 & invest the same in Equity.

1. Buy & Hold policy - ✓ passive policy
2. Constant Ratio -
3. CPPI -] Active policy

Q30

NAV	% Δ	BR	Equity	Bond	Total	Closing units	Action
40	—		100000	100000	200000	2500	—
25	37.5%	BR	62500	100000	162500	3250	Buy 750
		AR	81250	81250	162500	[81250/25]	units
36	44%	BR	117000	81250	198250	2753.47	Sell 496.53
		AR	99125	99125	198250	[99125/36]	units
32	11.11%		88111	99125	187236	2753.47	—
38	18.75%	BR	104632	99125	203757	2681.03	Sell 72.44
		AR	101879	101878	203757	[101879/38]	units

MINIMUM RISK PORTFOLIO

Derivation

$$= W_A^2 \sigma_A^2 + W_x^2 \sigma_x^2 + 2 W_A W_x \, Cov_{Ax}$$

$$= W_A^2 \sigma_A^2 + (1-W_A)^2 \sigma_x^2 + 2 W_A (1-W_A) Cov_{Ax}$$

$$= W_A^2 \sigma_A^2 + (1^2 + W_A^2 - 2W_A) \sigma_x^2 + 2W_A Cov_{Ax} - 2 W_A^2 Cov_{Ax}$$

$$= W_A^2 \sigma_A^2 + \sigma_x^2 + W_A^2 \sigma_x^2 - 2 W_A \sigma_x^2 + 2W_A Cov_{Ax} - 2W_A^2 Cov_{Ax}$$

First order function of above equation will be replaced under derivative as.

$A^2 = 2A$	$W_A^2 = 2W_A$
$A = 1$	$W_A = 1$
$4 = 0$	$\sigma_x^2 = 0$ ... constant

$$0 = 2W_A\sigma_A^2 + 0 + 2W_A\sigma_x^2 - 2\sigma_x^2 + 2Cov_{Ax} - 4 W_A Cov_{Ax}$$

$$2\sigma_x^2 - 2Cov_{Ax} = 2W_A\sigma_A^2 + 2W_A\sigma_x^2 - 4W_A Cov_{Ax}$$

$$\cancel{2}[\sigma_x^2 - Cov_{Ax}] = \cancel{2}W_A[\sigma_A^2 + \sigma_x^2 - 2\,Cov_{Ax}]$$

$$W_A = \frac{\sigma_x^2 - Cov_{Ax}}{\sigma_A^2 + \sigma_x^2 - 2Cov_{Ax}}$$

Derivatives

$y = x^5$

$\frac{dy}{dx} = 5x^4 \times \underbrace{\frac{dx}{dx}}$

$y = x^3 \quad \frac{dy}{dx} = 3x^2$

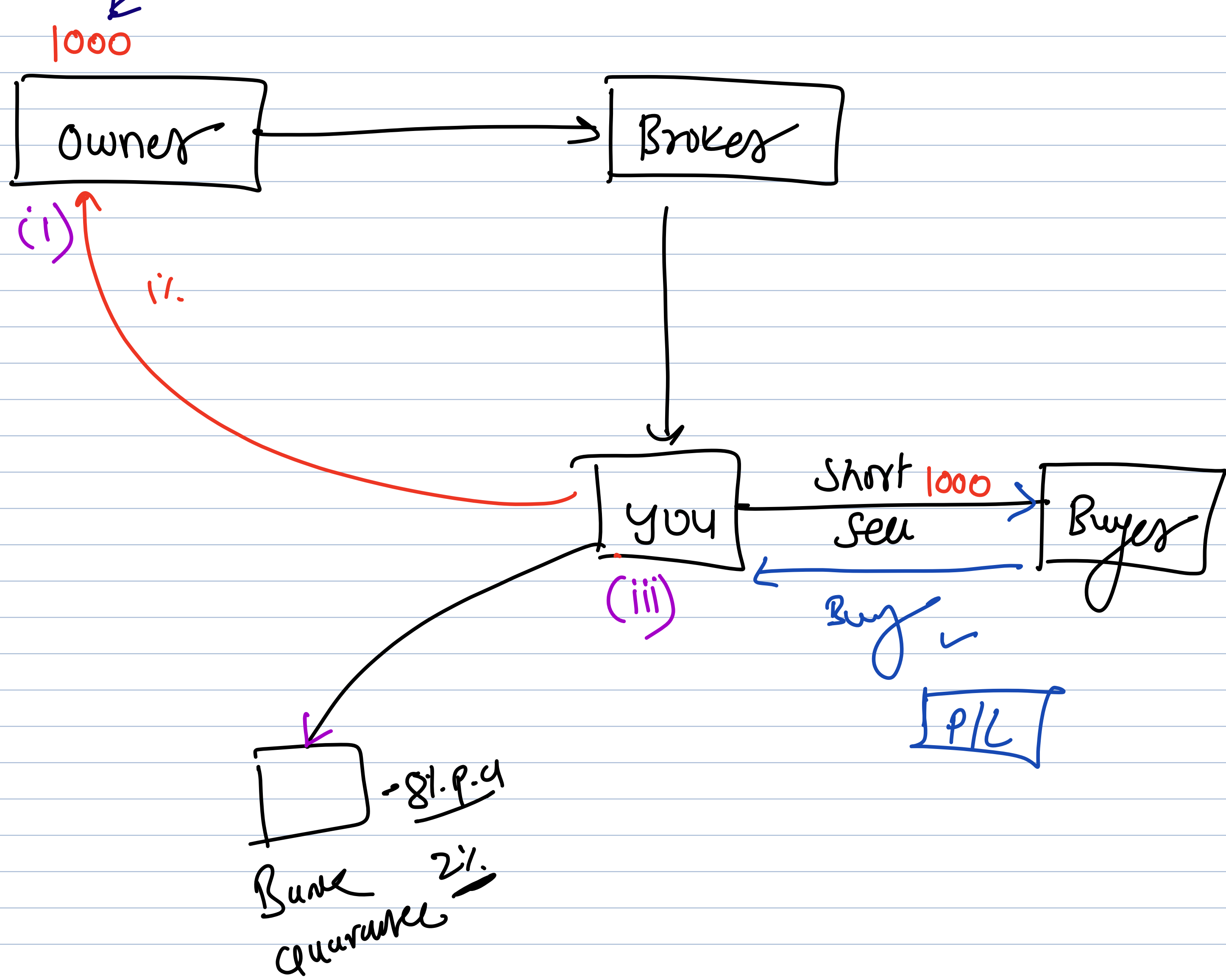
$$\boxed{\begin{array}{ll} y = x^2 & \frac{dy}{dx} = 2x \\ y = x & \frac{dy}{dx} = 1 \times x^0 \\ & = 1 \times 1 \\ & = 1 \\ y = 4 & \frac{dy}{dx} = 0 \end{array}}$$

Dividend 25% 100 FV = 25

DQ4 + SCS

(ii)

29.02.20 Company


1000
Owner
Broker
(i)
1%
You
Short 1000
Sell
Buyer
Buy
(iii)
P/L
-8% p.a
2%
Bank
Guarantee

+ 100

− 80

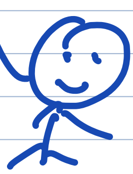
= 20

Q61

MUTUAL FUNDS

		Risk	Return	Inflation
Savings	4%	Low	Low	4-5%
	✓			✓
FD	7%	Low	Moderate	
Gold				
Real Estate				
Stocks		High	High 20%	
Mutual Funds			16%	

SIP



Equity

Shares

MP_0

Return — Dividend, $MP_1 - MP_0$

$\frac{\text{Market value}}{\text{No. of shares}} = MP$

Mutual funds

units

NAV

Dividend, $NAV_1 - NAV_0$, capital gain

Net Asset value

Total Assets − Total liabilities

Market value

$\frac{\text{Net Assets}}{\text{No. of units}} = NAV$

Q2

NAV_0	D	CG	NAV_1
8.75	0.75	0.60	9.45

N_0 = 300

$(NAV_0 \times N_0) = 2625$

$0.75 + 0.60 = 1.35$

$1.35 \times 300 = 405$

$\frac{405}{8.65} = 46.82$

$N_1 = 346.82$

$3277\ (NAV_1 \times N_1)$

i) $HPR = \frac{(NAV_1 - NAV_0) + Div + CG}{NAV_0}$

$= \frac{(9.45 - 8.75) + 0.75 + 0.60}{8.75}$

$= \frac{0.70 + 0.75 + 0.60}{8.75}$

$= 23.43\%$ p.a.

2] HPR (Reinvestment Div f CG) $= \dfrac{3277-2625}{2625} = 24.84\%$ p.a.

$= \dfrac{(NAV_1 \times N_1) - (NAV_0 \times N_0)}{(NAV_0 \times N_0)}$

NAV + EL = POP

NAV − E = RP

		POP				
Invest	10000	10.204	980			
− Entry load	200	0.204				
	9800	10	980	10	9800	
		NAV	units	0.20	− 196	Back End Load
			980	9.80	9604	Redemption value
				RP		

$\frac{10000}{980}$

9604/980

POP − NAV = FEL(₹)

10.204 − 10 = 0.204

$\boxed{\dfrac{POP - NAV}{POP} = FEL(\%)}$ 2%

$\frac{0.204}{10.204}$

$\dfrac{POP}{POP} - \dfrac{NAV}{POP} = FEL$

$1 - \dfrac{NAV}{POP} = FEL$

$1 - FEL = \dfrac{NAV}{POP}$

$\boxed{POP = \dfrac{NAV}{1-FEL}}$

NAV − RP = BEL(₹)

10 − 9.80 = 0.20

$\boxed{\dfrac{NAV - RP}{RP} = BEL(\%)}$ $\dfrac{0.20}{9.80} = 2.04\%$

$\dfrac{NAV}{RP} - \dfrac{RP}{RP} = BEL(\%)$

$\dfrac{NAV}{RP} - 1 = BEL$

$\dfrac{NAV}{RP} = 1 + BEL$

$\boxed{RP = \dfrac{NAV}{1+BEL}}$

Q7. i) closing NAV = opening NAV $(1+0.1875)$

$23.75 = NAV_0 \times 1.1875$

$NAV_0 = 20$

2) Closing units = Opening units (x) + Additional units

$= x + \dfrac{\text{Dividend for Reinvest}}{NAV}$

$26750 = x + \dfrac{3x}{23.75}$

$26750 \times 23.75 = 26.75x$

$x = \dfrac{635312.50}{26.75}$

$x = 23750$

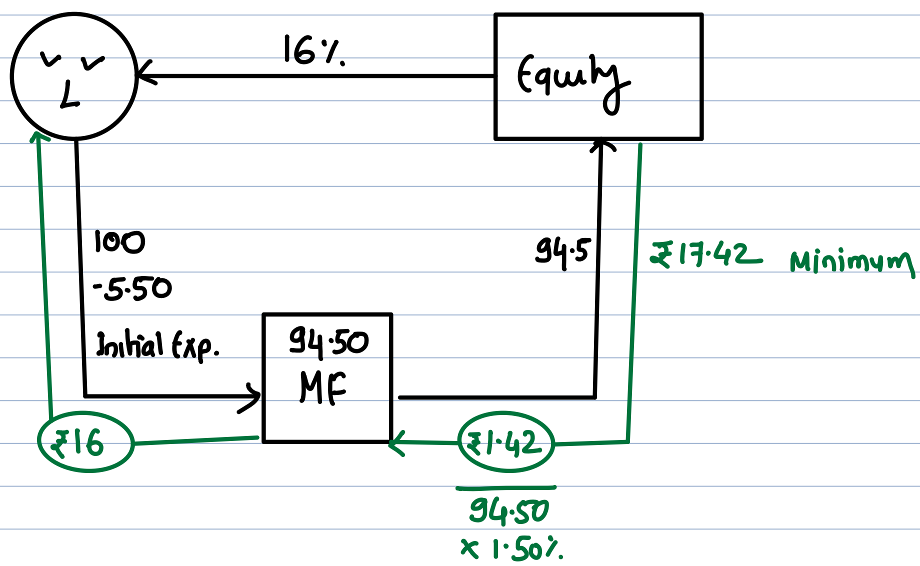
iii) POP = NAV_0 + entry load

$= 20 + 0.05$

$= 20.05$

units = 23750

Investment = 476187.50



Return Required by MF $= \dfrac{17.42}{94.50} = 18.43\%$

$$\text{Return Required by MF} = \text{Investors Return} + \text{Recurring Exp.}$$

$$= \frac{16}{94.50} + \frac{1.42}{94.50}$$

$$= \frac{16}{100-5.5} + 0.0150$$

$$= \frac{\frac{16}{100}}{\frac{100-5.5}{100}} + 0.0150$$

$$= \frac{0.16}{\frac{100}{100} - \frac{5.5}{100}} + 0.0150$$

$$0.1843 = \frac{0.16}{1-0.055} + 0.0150$$

$$= \frac{0.16}{1-\text{Initial Exp.}} + 0.0150$$

$$18.43\% = \frac{16\%}{1-\text{Initial Exp}} + 1.50\%$$

$$\boxed{\text{MF Required Return} = \frac{\text{Investors Return}}{1-\text{Initial Expense}} + \text{Recurring Expense}}$$

Q11

$$\text{HPR} = \frac{(NAV_1 \times N_1) - (NAV_0 \times N_0) + DIV + CG}{(NAV_0 \times N_0)}$$

$$=$$

Q14

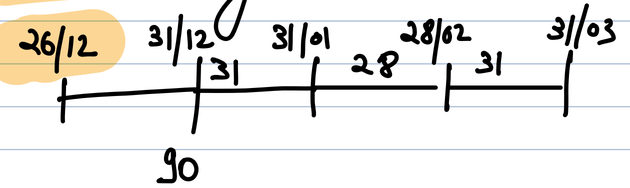
	x
Amt of investment	200000
NAV_0	10.30
① No of units	19417.48
NAV_1	× 10.25
② Total Net Assets	199029
Capital Appreciation	−971
Dividend	6000
③ Total yield	5029

$$\text{Annual yield} = \underbrace{\frac{\left(\overset{(NAV_1 \times N_1)}{\text{Closing Assets}} - \overset{(NAV_0 \times N_0)}{\text{Opening Assets}}\right) + \text{Dividend}}{\text{Opening Assets}}}_{HPR} \times \underbrace{\frac{365}{HPD} \times 100}$$

$$9.66 = \frac{5029}{200000} \times \frac{365}{HPD} \times 100$$

$$9.66 = \frac{917.7925}{HPD}$$

HPD = 95 days



Q17 — Plan A – Mr. Arun

Date	Dividend (Rate) %	₹	NAV	Additional Units	Closing Units
1.4.09	–	–	10		20000
31.07.13	10%	10×10%×20000 = 20000	30.70	651.47	20651.47
31.03.14	35%	10×35%×20651.47 = 72280	58.42	1237.25	21888.72
30.10.17	20%	10×20%×21888.72 = 43777	42.18	1037.86	22926.58
15.03.18	12.50%	10×12.5%×22926.58 = 28658	46.45	616.96	23543.54
25.03.19	20%	10×20%×23543.54 = 47087	48.10	978.94	24522.48

Q18

OP. units	Div Reix.	Amount		
x	15%	$\frac{10 \times 15\% \times x}{45}$ =	✓	= 21607

1]

Closing units = opening units + Additional units

$$21607 = x + \frac{\text{Dividend Reinvested}}{\text{NAV}}$$

$$21607 = x + \frac{10 \times 15\% \times x}{45}$$

$$21607 = \frac{45x + FV \times DR \times x}{45}$$

$$\text{Cl. units} \times \text{NAV} = x\left[\text{NAV} + FV \times DR\right]$$

$$x = \frac{\text{Cl. units} \times \text{NAV}}{\left[\text{NAV} + FV \times DR\right]}$$

$$= \frac{21607 \times 45}{45 + 1.5}$$

$$= 20910$$

$$x = \frac{\text{Cl. units} \times \text{NAV}}{\left[\text{NAV} + FV \times DR\right]}$$

$$= \frac{20910 \times 50}{50 + 1}$$

$$= 20500$$

$$x = \frac{\text{Cl. units} \times \text{NAV}}{\left[\text{NAV} + FV \times DR\right]}$$

$$= \frac{20500 \times 48}{48 + 1.20}$$

$$= 20000$$

$\frac{92000}{2000}$

$= 46$

1:2 $\frac{10}{}$ $\frac{10}{2} \times 12$

2) Cl. units = Opening units + Additional units

$30000 = x + x \times \text{Ratio}$

$= x(1 + \text{Ratio})$

$x = \frac{\text{Cl. units}}{(1+\text{Ratio})}$

$1 + \frac{1}{2}$

1.5

$1 + \frac{4}{5}$

Q21

Cash A/C

Fund Raise	150	Invest	140
Securities sold	47	Initial Exp.	8
Dividends	1.50	Securities purchased	41.60
		Fund mgt. Exp.	5.50
		Distribution of income	
		Dividend 1.50×80%	1.20
		Capital gain 2.25×80%	1.80
		Cl. Balance	0.40
	198.50		

B/S

O/S liability	Investment
	Cash

Investors Earning p.a. = $\dfrac{(NAV_1 - NAV_0) + Div + CG}{NAV_0} \times \dfrac{12}{1} \times 100$

$$= \frac{NAV_1 - 10 + \frac{1.20}{15} + \frac{1.80}{15}}{10} \times 12 \times 100$$

$$= \frac{9.85 - 10 + 0.08 + 0.12}{10} \times 12 \times 100$$

$$= 6\% \text{ p.a.}$$

Closing NAV = $\dfrac{\text{Net Assets}}{\text{No. of units}}$

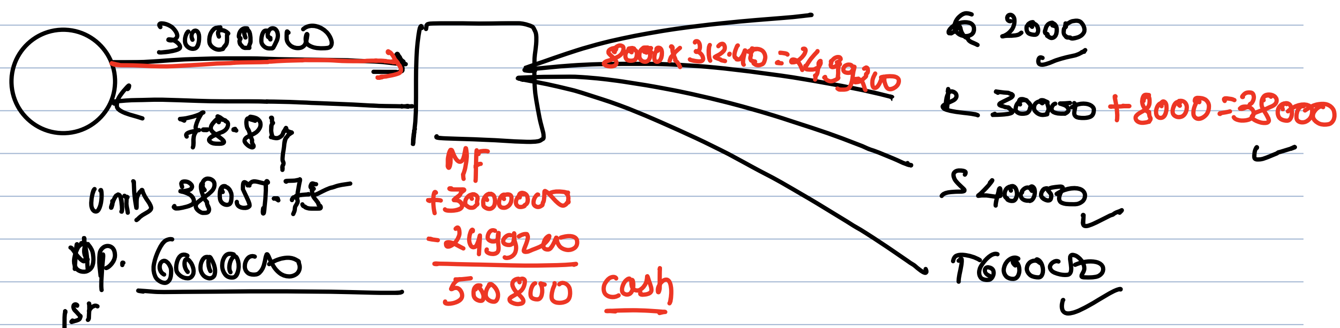
$$= \frac{\text{Total Assets} - \text{Total liabilities}}{\text{No. of units}}$$

$$= \frac{\text{MV of investment} + \text{cl. bal. of cash} - \text{o/s liabilities}}{15}$$

$$= \frac{147.85 + 0.40 - 0.50}{15}$$

$NAV_1 = 9.85$

Q24



Units 38051.75

Op. 600000

1st Aug Cl. units 638051.75

1st Aug			
Q	2000	200	✓
R	38000	312.40	
S	40000	180.60	✓
T	60000	505.10	✓

$$y = \frac{Int}{MY}$$

$$0.08842 = \frac{CR \times FV}{MP} = \frac{14\% \times 15000}{MP}$$

$$y = \frac{Int}{MV}$$

$$0.08842 = \frac{14\% \times 12}{MV}$$

$$= \frac{15000 \times 8000}{12000}$$

$$MP = \frac{2100}{0.08842} = 23750.28$$

$$MV = \frac{14\% \times 12}{0.08842} = 19$$

No. of Bonds $\frac{8000}{19 \text{ crore}}$

Equity Bond

Net Assets

Units

3 3 Div = 6

NAV_0 54.52

NAV_1 98.97

$$\text{Annual Return} = \frac{(NAV_1 - NAV_0) + Div}{NAV_0} \times \frac{1}{2} \times 100$$

Inv. shares

Inv. Bonds

19 + exp

Cash cl.

- Exp payable

Exp. Dr. 6.68

cash 3.18

o/s exp. 3.5

$$= \frac{(98.97 - 54.52) + 6}{54.52} \times \frac{1}{2} \times 100$$

Opening cash bal − exp. paid = cl. cash bal.

− 3.5 = 1.5

= 46.27% p.a.

op. cash = 5 cr

NAV = Net Assets ÷ No. of units

Total Assets − Total liabilities

Investment + Cash + Accrued Int. − O/S Liability

MV

Accrued Int. → FV × CR × No. × $\frac{3}{12}$

1. $100 \times 10.71 \times 100000 \times \frac{3}{12} = 267750$

2. $100 \times 10\% \times 50000 \times \frac{3}{12} = 125000$

Accrued Interest 392750

MV → YTM = ↑ 0.75%

ΔMV = ↓ Volatility × ΔYTM

Volatility → $\frac{MACD}{1 + \frac{ytm}{n}}$ $1 + \frac{0.10}{2}$

Annual yield	17.5
	× 5
	87.5%
Investment	1600000
Sales	3000000
NAV	100
Cl. units	30000

Cl. units = op. units + Additional

Cl. units = $x + x \times$ Ratio

$30000 = x + x \times \frac{1}{4}$

$120000 = 5x$

$\boxed{x = 24000}$

$24000 = x + x \times \frac{1}{5}$

$120000 = 6x$

$\boxed{x = 20000}$

Q34

9m | NAV | 12m | 12m = 33m

01/07/16 — 31/03/17 — 31/03/18 — 31/03/19

Investm	50000				
NAV_0	10	18	13.80		NAV_3
No.	5000	277.78 = 5277.78	994.20	6271.98	N_3
Dividend		$10 \times 10\% \times 5000$ = 5000	$10 \times 20\% \times 5277.78$ = 10555.56		
Capital gain			5277.78×0.60 = 3166.67 = 13722.23		

$$\text{Annual Return} = \frac{(NAV_1 - NAV_0) + DM + CG}{NAV_0} \times \frac{12}{HPM} \times 100$$

$$120 = \frac{[NAV_1 - 10] + 1 + 0}{10} \times \frac{12}{9} \times 100$$

$$120 = \frac{NAV_1 - 9}{10} \times 133.33$$

$$\frac{120 \times 10}{133.33} = NAV_1 - 9$$

$$9 = NAV_1 - 9$$

$$\boxed{NAV_1 = 18}$$

ii] NAV on 31/03/18 = $\frac{\text{Dividend Reinvested}}{\text{Additional units}}$

$$= \frac{13722.23}{994.20}$$

$$\boxed{= 13.80}$$

iii) HPR $= \dfrac{(NAV_3 \times M_3) - (NAV_0 \times N_0)}{(NAV_0 \times N_0)} \times 100$

$71.50 \times \frac{33}{12} =$

$196.625 = \dfrac{(NAV_3 \times 6271.98) - 50000}{50000} \times 100$

$98312.50 = (NAV_3 \times 6271.98) - 50000$

$\dfrac{148312.50}{6271.98} = NAV_3$

$NAV_3 = 23.65$

Q35

NAV = Equity 70 $\xrightarrow{-7.5\%}$? 64.75

Cash 0.71 ——— 0.25 = 0.46

NAV 65.21

Δ Equity

ΔMarket $\times$ Beta

5% $\downarrow \times 1.5 = 7.5\%$

Treynor Ratio $= \dfrac{R_i - R_f}{\beta_i}$

$15 = \dfrac{22.50}{\beta_i}$

$\beta = 1.5$

Sharpe Ratio $= \dfrac{R_i - R_f}{\sigma_i}$

$2 = \dfrac{R_i - R_f}{11.25}$

$R_i - R_f = 22.50$

Q38

$$\text{Duration} = \frac{1+ytm}{ytm} - \frac{(1+ytm) + t(c - ytm)}{c\left[(1+ytm)^{t} - 1\right] + ytm}$$

$$5.5 = \frac{1.08}{0.08} - \frac{1.08 + 7\left[c - 0.08\right]}{c\left[1.08^{7} - 1\right] + 0.08}$$

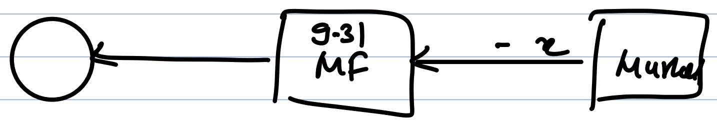
$$5.5 = 13.50 - \frac{1.08 + 7c - 0.56}{0.7138c + 0.08}$$

$$8 = \frac{7c + 0.52}{0.7138c + 0.08}$$

$$5.7104c + 0.64 = 7c + 0.52$$

$$0.12 = 1.2896c$$

$$c = 9.31\%$$



$$\begin{array}{r} 100 \\ -\ 10 \\ \hline 90 \end{array} \rightarrow 9.31$$

Q39

24.40   36 = 60.40

	01 JAN	31 JAN	29 FEB	31 MAR
No	300	+5 305	-2.5	
NAVo	20.25			
Net Assets	6075			6535

\+ Opening NAV
\+ + Entry Load
\+ + DER

① Issue price

20.25
\+ 0.405
\+ 0.08

20.485

Opening NAV —
\- Exit Load +
\+ DER —

② Repurchase price

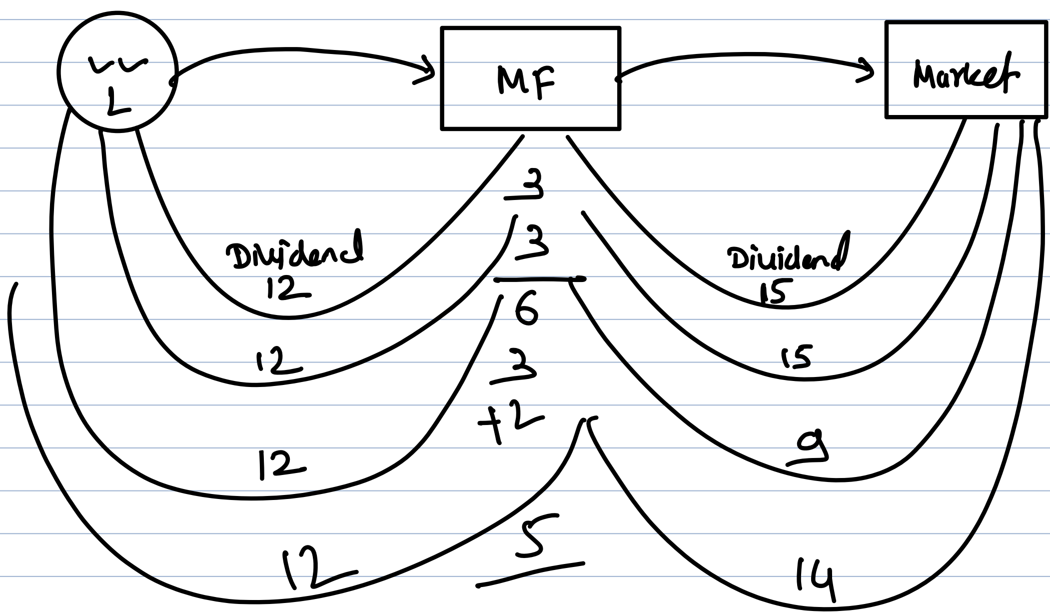
20.25
\- 0.405
\+ 0.19870

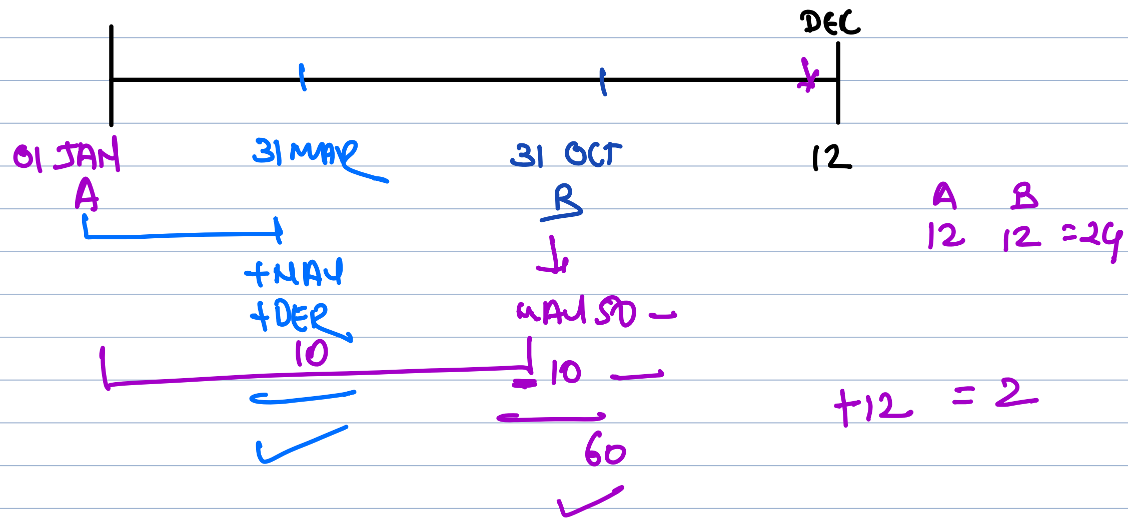
20.043

\+ cash

24 / 300 = 0.08

24.40 / 305 = ~~0.0787~~ 0.08





QUO

No x 20000

MAV₀ 19.96 × 1.25 = → N₁ = 20800, MAV₁ = 24.95

+ EL 0.04

POP = 20

Investment 400000

① $NAV_1 = NAV_0 \times 1.25$

$24.95 = NAV_0 \times 1.25$

$NAV_0 = 19.96$

② Closing units = Opening units + Additional units

$= x + \dfrac{\text{Dividend Reinvest}}{NAV}$

$20800 = x + \dfrac{10 \times 9.98\% \times x}{24.95}$

$20800 = \dfrac{24.95x + 0.998x}{24.95}$

$518960 = 25.948x$

$x = \dfrac{518960}{25.948}$

$x = 20000$

Derivatives

Analysis & Valuation

A Contract between two parties to buy / sell certain asset in certain quantity on certain future date at a certain price.

Derivatives

lot size

Forward / Futures Buyer

Forward / Futures seller

₹500

Expiry Date

Forward Contract
- Default
- X OTC
- X
- Free to choose Assets

Futures Contract
- X
- Exchange ETC
- Initial Margin
- X

Options contract

Swaps
- Dream chapter

Equity
- TCS
- Reliance
- TATA MOTORS
- ICICI BANK

Index
- Nifty
- Bank Nifty

Commodity
- Gold
- Silver
- Bajra
- Rice

Currency
- USD
- EUR
- YEN
- CAD
- Forex

SPOT/CASH MARKET — DERIVATIVES MARKET

Spot/Cash Market

Buy 100 — Sell 120

COF 100 — CIF 120

Return $\frac{120-100}{100} = 20\%$

-3
$+3.30$
0.30
10%

Derivatives Market

Buy 100 — Sell 120 80

COF — CIF

COF ↓ Initial Margin ↓ 25% → 25

CIF ↓ Margin + profit/(loss)

$= 25 + [120-100]$

$= 25 + 20$

$= 45$

Return $\frac{45-25}{25} = 80\%$

-0.50
$+3.00$
2.50
$\frac{2.50}{0.50}$
$= 500\%$

F
U
F

Forward Contract

Adani Spot: 100

Exp. = 150 110

Forward = Asset: Adani
price: 130
Date: 3month
Qty: 1000

B 150 — S 110

Buyer	Buy 130	Sell 150	= +20		−20
Seller	Sell 130	Buy 150	= −20		+20

Cash Settlement

Buyer

	①	②
Spot	−150	—
Forward	+20	+20
	−130	+20
	Ownership	gain

Hedging Speculation

Users of Derivatives

Hedger

Really wanted to Buy / sell the Asset

purpose was to reduce the risk of loss

No Risk
No Loss
No profit

Speculator

Never wanted to Buy or sell the Asset

purpose was just to earn money on the assets volatile prices

High Risk
High profit
High Loss

Arbitrageur

finds an opportunity where the assets prices are mismatched in different markets.

purpose is to Buy cheap Sell High

No risk
Little profit
No Loss