



Suggested Solution

Test-4

Mission 80+ for N/D24



Case Scenario-I		
(i)	(a)	Gain of 16,170.75
(ii)	(c)	Loss of 3,335.50
(iii)	(c)	Gain of 12,835.25
(iv)	(b)	Out of the money

Hint:

Position of Investor:

Long position in Reliance Nov Future @ 642

Short Position in Reliance Nov 680-Call @ 6

Square off trade [On 20- Nov]:

Sale Reliance Nov Future @ 675

Purchase Reliance Nov 680-Call @ 12

(i) **P/L from Future:**

	₹
Sale Value (675 × 500)	3,37,500
Purchase Value (642 × 500)	(3,21,000)
Brokerage on sale (337500 × .05%)	(168.75)
Brokerage on purchase (321000 × .05%)	(160.50)
Net Profit	16,170.75

(ii) **P/L from 680 Call:**

	₹
Sale Value (6 × 500)	3000
Purchase Value (12 × 500)	(6000)
Brokerage on sale [(680 - 6) × 500] × .05%	(168.50)
Brokerage on purchase [(680 - 12) × 500] × .05%	(167)
Net Loss	(3,335.50)

(iii) **Net P/L of Investor: 16,170.75 - 3,335.50 = 12,835.25**



- (iv) A call option is considered "out of the money" (OTM) when the strike price of the option is above the current market price of the underlying asset. The call option gives the investor, right to buy the stock @ strike rate. This means that it would not be profitable to exercise the option at that moment because buying the asset at the strike price would be more expensive than buying it at the current market price.
On 20th November, Call option's strike price is 680 (i.e. above spot price of 650). Hence "out of the money".

Case Scenario-II

(i)	(d)	A, C & E
(ii)	(c)	6.6%
(iii)	(a)	Invest 100% in E

Hint:

- (i) A, B & F provide the same return, but A undertakes lower risk. So, select A and reject B & F.
A & D undertake the same risk, but A provides higher return. So, reject D. Hence, security A dominates security B, D & F.
Securities C & E provide more return with high risk. So, select A, C & E.
- (ii) $\sigma_p^2 = (0.8 \times 5)^2 + (0.2 \times 13)^2 + 2 \times 0.8 \times 0.2 \times 1 \times 5 \times 13$
 $= 43.56$
 $\sigma_p = \sqrt{43.56} = 6.6$
- (iii) E gives higher return with same risk as compared to Security-B. Hence, Security E dominates security B.
Option (a) is better among options (a), (b) & (d).
Now analysing option (c):
80% in security A and 20% in security C:
Return = $10 \times 80\% + 15 \times 20\% = 11$
Risk = 6.6% as calculated above in (ii)
option (a) provides same return of 11 % with lessor risk of 6%.
Hence, option (a) is better.



Part II (Descriptive Questions)

Question-1 Solution:

(i) Proportion of investment:

$$W_{ABC} = \frac{\sigma_{XYZ}^2 - \text{Covariance}(ABC, XYZ)}{\sigma_{XYZ}^2 + \sigma_{ABC}^2 - 2\text{Covariance}(ABC, XYZ)}$$

$$= \frac{(15)^2 - (10 \times 15 \times 0.6)}{(15)^2 + (10)^2 - (2 \times 10 \times 15 \times 0.60)}$$

$$= \frac{225 - 90}{225 + 100 - 180} = \frac{135}{145} = 0.931$$

$$W_{XYZ} = (1 - 0.931) = 0.069$$

Investment in ABC = (20,00,000 × 0.931) = 18,62,000

Investment in XYZ = (20,00,000 × 0.069) = 1,38,000

Minimum Variance:

$$\sigma_{\text{port}}^2 = (\sigma_{ABC} W_{ABC})^2 + (\sigma_{XYZ} W_{XYZ})^2 + 2\sigma_{ABC} W_{ABC} \sigma_{XYZ} W_{XYZ} \cdot r_{ABC, XYZ}$$

$$= (10 \times 0.931)^2 + (15 \times 0.069)^2 + 2 \times 10 \times 0.931 \times 15 \times 0.069 \times 0.60$$

$$= 99.31$$

(ii) Variance in revised situation:

$$\sigma_{\text{port}}^2 = (10 \times 0.50)^2 + (15 \times 0.50)^2 + 2 \times 10 \times 0.50 \times 15 \times 0.50 \times 0.60$$

$$= 126.25$$

(iii) No portfolio is not sufficiently diversified as correlation is high at 0.60. When one stock does well individually then both do well and if one fall, another will also fall.



Question -2 Solution:

	Mid cap	Small cap
Jensen Alpha	0.011	0.015
Treynor's Ratio	0.0714	0.0775
Actual Return	0.085	0.091
Risk Premium	0.04	0.04

$$\text{Jensen Alpha} = \text{Actual Return} - E(r)$$

$$E(r) = \text{Actual Return} - \text{Jensen Alpha}$$

As per CAPM,

$$E(r) = R_F + \beta_S \times \text{Market Risk premium}$$

$$\text{Or, } \beta \times \text{Risk premium} = E(r) - R_F \quad \text{_____ (i)}$$

$$\text{Treynor's Ratio} = \frac{R_{\text{actual}} - R_f}{\beta}$$

$$\text{Or, Treynor ratio} \times \beta = R_{\text{actual}} - R_F \quad \text{_____ (ii)}$$

For Mid cap:

$$E(r) = 0.085 - 0.011 = 0.074$$

$$0.04\beta_M = 0.074 - R_f \quad \text{_____ (i)}$$

$$0.0714\beta_M = 0.085 - R_f \quad \text{_____ (ii)}$$

$$[\text{Equation (i)} \times 1.785] - [\text{Equation (ii)}]$$

$$0.0714\beta_M = 0.1321 - 1.785 R_f$$

$$0.0714\beta_M = 0.085 - R_f$$

$$- \quad - \quad -$$

$$0 = 0.0471 - 0.785 R_f$$

$$\therefore R_f = \frac{0.0471}{0.785} = 0.06$$

On solving (i) and (ii), we get $R_f = 0.06$ and $\beta_M = 0.35$



For Small cap:

$$E(r) = 0.091 - 0.015 = 0.076$$

$$0.04\beta_S = 0.076 - R_f \text{ (iii)}$$

$$0.0775\beta_S = 0.091 - R_f \text{ (iv)}$$

On solving (3) and (4), we get $\beta_G = 0.40$ and $R_f = 0.06$

(i) Beta of Mid cap Mutual Fund is 0.35 and Small cap Mutual Fund is 0.40.

(ii) Risk free Rate = 6%

(iii) Security Market Line for Mid cap = $0.06 + 0.04\beta$

Security Market Line for Small cap = $0.06 + 0.04\beta$

Alternative Solution:

In case students have assumed Risk Premium as Equity Risk Premium of respective securities.

Expected return:

$$ER_S = R_F + \text{Equity Risk Premium}$$

Where,

$$\begin{aligned} \text{Equity Risk premium} &= \text{Beta of stock} \times \text{market Risk Premium} \\ &= \text{Beta of stock} \times (R_M - R_F) \end{aligned}$$

Thus;

$$ER_S = R_F + \text{Beta of stock} \times (R_M - R_F)$$

Working notes:

(i) Mid cap:

$$\text{Jensen Alpha} = 0.011$$

$$\text{Actual Return} = 0.085$$

$$\text{Thus, expected return (as per CAPM)} = 0.074$$

Accordingly,

$$\text{Equity Risk premium} = \text{Expected Return} - \text{Risk free return}$$

$$\begin{aligned} \text{Or, Risk Free Return} &= \text{Expected Return} - \text{equity risk premium} \\ &= 0.074 - 0.04 = 0.034 \end{aligned}$$



$$\text{Treynor's Ratio} = \frac{R_{\text{actual}} - R_f}{\beta}$$

$$\text{Or, } 0.0714 = \frac{0.085 - 0.034}{\beta_M}$$

$$\beta_M = 0.714$$

Equity Risk premium = Beta of stock × Market Risk Premium

$$\text{Or, Market Risk premium} = \frac{\text{Equity Risk premium}}{\beta} = \frac{0.04}{0.714} = 0.056$$

(ii) Small cap:

Jensen Alpha = 0.015

Actual Return = 0.091

Thus, expected return (as per CAPM) = 0.076

Accordingly,

$$0.076 = R_f + 0.04$$

$$R_f = 0.036$$

$$\text{Treynor's Ratio} = \frac{\text{return} - R_f}{\beta}$$

$$\text{Or, } 0.0775 = \frac{0.091 - 0.036}{\beta_S}$$

$$\beta_S = 0.710$$

$$\text{Market Risk Premium} = \frac{0.04}{0.710} = 0.056$$

Security Market Line for Mid cap = $0.034 + 0.056\beta_M$

Security Market Line for Small cap = $0.036 + 0.056\beta_S$



QUESTION -3 Solution:

(i) **Beta of portfolio:**

Security	Investment	Weight	Beta	Average
ABC Ltd.	1,000 X 50 = 50,000	(5/12)	0.9	0.375
DEF Ltd.	500 X 20 = 10,000	(1/12)	1.0	0.083
GHI Ltd.	800 X 25 = 20,000	(2/12)	1.5	0.25
JKL Ltd.	200 X 200 = 40,000	(4/12)	1.2	0.4
Total	120,000	1		1.108

(ii) **Risk free investment and New portfolio:**

Assume, Risk free investment = x

Equity investment = 1,20,000

Total investment = $(1,20,000 + x)$

$$W_{RF} = \frac{x}{(1,20,000+x)}$$

$$W_{EP} = \frac{1,20,000}{(1,20,000+x)}$$

$$\beta_{port} = \beta_{RF}W_{RF} + \beta_{EP}W_{EP}$$

$$\text{or, } 0.80 = \left[0 \times \frac{x}{(1,20,000+x)} \right] + \left[1.108 \times \frac{1,20,000}{(1,20,000+x)} \right]$$

$$\text{or, } \frac{0.80}{1.108} = \frac{1,20,000}{(1,20,000 + x)}$$

$$\therefore (1,20,000 + x) = 1,20,000 \times \frac{1.108}{0.80}$$

$$\therefore x = 1,66,200 - 1,20,000 = 46,200$$

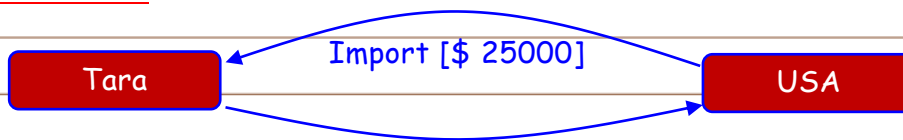
Hence, Risk free investment = 46,200 (approx.)

New portfolio:

Equity	1,20,000
Risk free	46,200
Total	1,66,200



QUESTION -4 Solution:



(i) pay today by taking Loan
Or, (ii) 180 days credit under LC

(i) Decision on offer from foreign branch:

(a) pay today by taking Loan:

Equivalent ₹ @ SR = $(25,000 \times 85) = ₹ 21,25,000$

Borrow ₹ 21,25,000 @ 15% p.a. for 180 days

Payment = $21,25,000 \times \left(1 + 0.15 \times \frac{90}{360}\right)^2$

Hence, Outflow = ₹ 22,87,363

(b) Pay at 180 days under LC:

- Opening Charges = $[21,25,000 \times 2\%] \times \frac{180}{360}$
= ₹ 21,250 (payable Today)

- Borrow ₹ 21,250 @ 15% p.a. for 180 days.

Repayment = $21,250 \times \left(1 + 0.15 \times \frac{90}{360}\right)^2$
= ₹ 22,874

Equivalent ₹ @ 180 days FR.

= $(25,000 \times 87) = 21,75,000$

- Commission payable at 180 days

= $(21,75,000 \times 2\% \times \frac{180}{360}) = ₹ 21,750$

- Total outflow under Lc

= $22,874 + 21,75,000 + 21,750$
= 22,19,624

Advise: AS outflow under LC agreement is lower, it is beneficial to accept foreign branch offer.



(ii) Advice of hedging:

Interprtation (Not for Exam)

- This point is not linked with first point because there is no risk in both options used in point - (i)
- Hedging cost = 40,000, it means ₹85 rate will be applicable for conversion of currency and in addition pay ₹ 40,000 as hedging cost.
- Another alternative is to do forward cover at ₹87

- Hedging cost in forward contract = $(87 - 85) \times 25000 = ₹50,000$
- As in proposed option, additional expense is ₹ 40,000 which is lower than cost under forward contract, company should hedge with an additional expense of ₹40,000.