

CHAPTER - 1

FOREX

Question 60

Following are the details of cash inflows and outflows in foreign currency denominations of MNP Co. an Indian export firm, which have no foreign subsidiaries:

Currency	Inflow	Outflow	Spot rate	Forward rate
US \$	4,00,00,000	2,00,00,000	48.01	48.82
French Franc (FFr)	2,00,00,000	80,00,000	7.45	8.12
U.K. £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese Yen	1,50,00,000	2,50,00,000	3.20	2.40

- Determine the net exposure of each foreign currency in terms of Rupees.
- Are any of the exposure positions offsetting to some extent?

Solution:

- Net exposure of each foreign currency in Rupees

	Inflow (Millions)	Outflow (Millions)	Net Inflow (Millions)	Spread	Net Exposure (Millions)
US\$	40	20	20	0.81	16.20
FFr	20	8	12	0.67	8.04
UK£	30	20	10	0.41	4.10
Japan Yen	15	25	-10	-0.80	8.00

- In Japanese Yen, the net exposure is payable, and the forward rate is quoted at a discount, effectively offsetting the position. Likewise, in the remaining currencies, the net exposures are in receivables, and the related currencies are at a premium, offsetting the positions in their respective currencies.

Question 19(RTP/MTP/PP)

PKR Ltd. has made purchases worth USD 8,00,000 on 1st May 2020 for which it has to make a payment on 1st November 2020. The present exchange rate is INR/USD 75. The company can purchase forward dollars at INR/USD 74. The company will have to make an upfront premium @ 1 per cent of the forward amount purchased.

The company can hedge its position with the following expected rate of USD in foreign exchange market on 1st May 2020:

PKR Ltd. has made purchases worth USD 8,00,000 on 1st May 2020 for which it has to make a payment on 1st November 2020. The present exchange rate is INR/USD 75. The company can purchase forward dollars at INR/USD 74. The company will have to make an upfront premium @ 1 per cent of the forward amount purchased.

The company can hedge its position with the following expected rate of USD in foreign exchange market on 1st May 2020:

Exchange Rate	Probability
(i) INR/USD 77	0.15
(ii) INR/USD 71	0.25
(iii) INR/USD 79	0.20
(iv) INR/USD 74	0.40

You are required to advise the company for a suitable cover for risk assuming that the cost of funds to PKR Ltd. is 10 per cent per annum.

Solution:

(i) If PKR Ltd. does not take forward cover (Unhedged Position):

$$\begin{aligned} \text{Expected Rate} &= ₹ 77 \times 0.15 + ₹ 71 \times 0.25 + ₹ 79 \times 0.20 + ₹ 74 \times 0.40 \\ &= ₹ 11.55 + ₹ 17.75 + ₹ 15.80 + ₹ 29.60 = ₹ 74.70 \end{aligned}$$

$$\text{Expected Amount Payable} = \text{USD } 8,00,000 \times ₹ 74.70 = ₹ 5,97,60,000$$

(ii) If the PKR Ltd. hedge its position in the forward market:

Particulars	Amount (₹)
If company purchases US\$ 8,00,000 forward premium is (800000 × 74 × 1%)	5,92,000
Interest on ₹5,92,000 for 6 months at 10%	29,600
Total hedging cost (a)	6,21,600
Amount to be paid for US\$ 8,00,000 @ ₹74.00 (b)	5,92,00,000
Total Cost (a) + (b)	5,98,21,600

Advice: Since cash outflow is lesser in case of unhedged position company should opt for the same.

Question 20(RTP/MTP/PP)

Export Ltd., an export oriented unit invoices in the currency of the importer. It is expecting a receipt of USD 2,40,000 on 1st August, 2022 for the goods exported on 1st May, 2022. The following information is available as on 1st May, 2022:

Exchange Rates		Currency Futures		Contract Size
USD/INR		USD/INR		
Spot	0.0125	May	0.0126	
1 Month Forward	0.0124	July	0.0125	
3 Months Forward	0.0123			
				₹ 6,40,000/-

Initial Margin		Interest Rates in India
May	₹ 15,000	9%
August	₹ 26,000	8.5%

On 1st August, 2022 the spot rate USD/INR is 0.0126 and currency future rate is 0.0125. Suggest a suitable approach to Export Ltd. that would be most advantageous out of the following methods.

- (i) Forward Contract
- (ii) Currency Futures
- (iii) No hedge

Assume that the variation in margin would be settled on the maturity of the futures contract.

Solution

Receipts using a forward contract USD 2,40,000/0.0123	= ₹ 1,95,12,195
Receipts using currency futures	

The number of contracts needed is (USD 2,40,000/0.0125)/6,40,000	= 30
Initial margin payable is 30 contracts × ₹ 26,000	= ₹ 7,80,000
On August 1, 2022 Close at 0.0125	
Receipts = USD 2,40,000/0.0126	= ₹ 1,90,47,619
Less: Interest Cost – (7,80,000 × 0.085 × 3/12)	= ₹ 16,575
Net Receipts	₹ 1,90,31,044

Question 22(RTP/MTP/PP)

An import customer booked a forward contract with the bank on 10th April for USD 20,000 due on 10th June at ₹ 49.4000. The bank covered its position in the market at ₹ 49.2800.

The exchange rate for dollar in the interbank market on 10th June and 20th June were:

	10 th June	20 th June
Spot	USD 1 = ₹ 48.8000/8200	48.6800/7200
Spot/ June	48.9200/9500	48.8000/8500
Spot/ July	49.0500/0900	48.9300/9900
Spot/ August	49.3000/3500	49.1800/2500
Spot/ September	49.6000/6600	49.4800/5600
Exchange margin is 0.10%		
Interest on outlay of funds 12%		

Calculate how the bank will react, if the customer requires on 20th June:

- To cancel the contract.
 - Exchange difference,
 - Swap loss,
 - Interest on outlay of funds and
 - Cancellation charges
- To Execute the contract.
- To Extend the contract with due date to fall on 10th August.

Solution

i. Cancellation of Contract

a. Exchange Difference:

The forward sale contract shall be cancelled at Spot TT Purchase for \$ prevailing on the date of cancellation as follows:

\$/ ₹ Market Buying Rate	₹ 48.6800
Less: Exchange Margin @ 0.10%	₹ 0.0487
	₹ 48.6313

Rounded off to ₹ 48.6325

Exchange Difference Payable

Bank sells \$ 20,000 @ ₹ 49.4000	₹ 9,88,000
Bank buys \$ 20,000 @ ₹ 48.6325	₹ 9,72,650
Amount payable by customer	₹ 15,350

b. Swap Loss

On 10th June the bank does a swap sale of \$ at market buying rate of ₹ 48.8000 and

forward purchase for June at market selling rate of ₹ 48.9500.

Bank buys at	₹ 48.9500
Bank sells at	₹ 48.8000
Amount payable by customer	₹ 0.1500

Swap Loss for \$ 20,000 is = ₹ 3,000

c. Interest on Outlay of Funds

On 10th June, the bank receives delivery under cover contract at ₹ 49.2800 and sell spot at 48.8000.

Bank buys at	₹ 49.2800
Bank sells at	₹ 48.8000
Amount payable by customer	₹ 0.4800

Outlay for \$ 20,000 is ₹ 9,600

Interest on ₹ 9,600 @ 12% for 10 days ₹ 31.56 or ₹ 32.00

d. Cancellation Charges

Particulars	Amount (₹)
Exchange Difference	15,350
Swap Loss	3,000
Interest on Outlay of Funds	32.00
Cancellation Charges payable by Customer	18,382

Or

Particulars	Amount (₹)
Exchange Difference	15,350
Swap Loss	3,000
Interest on Outlay of Funds	31.56
Cancellation Charges payable by Customer	18,381.56

ii. **Execution of Contract**

Cancellation charges of ₹ 18,382 or ₹ 18,381.56 as computed above will be recovered.

The contract will be executed at the spot TT selling rate calculated as follows:

Dollar/₹ interbank spot selling rate	₹ 48.7200
Add: exchange margin at 0.10%	+ 0.0487
	₹ 48.7687

iii. **Extension of Contract**

Cancellation charges of ₹ 18,382 or ₹ 18,381.56 as computed above will be recovered.

The contract will be extended at the current rate.

Dollar/₹ market forward selling rate for August	₹ 49.2500
Add: Exchange margin at 0.10%	+ 0.0492

	₹ 49.2992
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The exchange rate applied for the extended contract is ₹ 49.3000 or ₹ 49.2992.

Question 24 (RTP/MTP/PP)

XYZ Ltd. has imported goods to the extent of US\$ 8 Million. The payment terms are as under:

- 1% discount if full amount is paid immediately; or
- 60 days interest free credit. However, in case of a further delay up to 30 days, interest at the rate of 8% p.a. will be charged for additional days after 60 days. M/s XYZ Ltd. has ₹ 25 Lakh available and for remaining it has an offer from bank for a loan up to 90 days @ 9.0% p.a.

The quotes for foreign exchange are as follows:

Spot Rate INR/ US\$ (buying)	₹ 66.98
60 days Forward Rate INR/ US\$ (buying)	₹ 67.16
90 days Forward Rate INR/ US\$ (buying)	₹ 68.03

Advise which one of the following options would be better for XYZ Ltd.

- Pay immediately after utilizing cash available and for balance amount take 90 days loan from bank.
- Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.
- Avail supplier offer of 90 days credit and utilize cash available.

Further presume that the cash available with XYZ Ltd. will fetch a return of 4% p.a. in India till it is utilized.

Assume year has 360 days. Ignore Taxation.

Compute your working upto four decimals and cash flows in Crore.

Solution:

To evaluate which option would be better we shall compute the outflow under each option as follows:

- Pay Immediately availing discount

Particulars	
Spot Rate	₹ 66.98
Amount required in US\$	$\frac{[\text{US\$8 Million (1-0.01)}]}{[\text{₹ 66.98} \times \text{US\$ 7.92 Million}]}$
Amount required in ₹	₹ 53.0482 Crore
Cash Available	₹ 0.2500 Crore
Loan required	₹ 52.7982 Crore
Interest for 90 days @ 9%	₹ 1.1880 Crore
Total Outflow	₹ 53.9862 Crore

- Pay the supplier on 60th day and avail bank's loan (after utilizing cash) for 30 days.

Particulars	
Applicable Forward Rate	₹ 67.16
Amount required in	$[\text{₹ 67.16} \times \text{US\$ 8 Million}]$
Loan required	$[\text{₹ 53.7280 Crore} - \text{₹ 0.25 Crore}]$
Interest for 30 days @ 9%	₹ 0.4011 Crore

	₹ 53.8791 Crore
Interest earned on Cash for 60 days @ 4%	₹ 0.0017 Crore
Total Outflow	₹ 53.8774 Crore

(iii) Avail supplier offer of 90 days credit and utilize cash available

Particulars	
Amount Payable	US\$ 8 Million
Interest for 30 days @ 8%	US\$ 0.0533 Million
Amount required in ₹	US\$ 8.0533 Million
Applicable Forward Rate	₹ 68.03
Amount required in ₹ [₹ 68.03 × US\$ 8.0533 Million]	₹ 54.7866 Crore
Cash Available	₹ 0.2500 Crore
Interest earned on Cash for 90 days @ 4%	₹ 0.0025 Crore
Total Outflow	₹ 54.5341 Crore

Decision: Cash outflow is least in case of Option (ii) same should be opted for.

CHAPTER - 2A

Derivatives Analysis and Valuation

Question 22 (RTP/MTP/PP)

Hari is holding 100 equity shares of VCC Ltd. which is being quoted at ₹ 210 per share. He is interested in hedging downside risk of his holding as he is going to sell them after 2 month. A 2-month Call option is available at a premium of ₹ 6 per share and a 2-month put option is available at a premium of ₹ 5 per share. The strike price in both cases is ₹ 220. You are required to:

- Suggest the position Hari should take in the option market to hedge his holding in the VCC Ltd.
- Calculate his final position after 2 months if after 2 months i.e. on the day of exercise the actual market price of per share of VCC Ltd. happens to be ₹ 200, ₹ 210, ₹ 220, ₹ 230 and ₹ 240.

Solution

(i) Since Hari holds 100 equity shares, he should buy equal no. of Put option i.e. 100 put options in the same stock to hedge his position.

Total Premium amount to be paid = 5 × 100 Put = ₹ 500

(i) Net Position after 2-months

(₹)					
Share price on exerciseday	200	210	220	230	240
Option exercise	Yes	Yes	No	No	No
Inflow (strike price)	220	220	Nil	Nil	Nil
Inflow (in open market)	-	-	220	230	240
Less outflow (premium)	5	5	5	5	5
Position (per share) Total	215	215	215	225	235
Position	21500	21500	21500	22500	23500

Thus, from above table it can be observed in any case the value of holding of Hari in VCC Ltd. shall not go below ₹ 215 per share.

Question 24 (RTP/MTP/PP)

Shyam buys 10,000 shares of X Ltd., @ ₹ 25 per share and obtains a complete hedge of shorting 400 Nifty at ₹ 1,100 each. He closes out his position at the closing price of the next day when the share of X Ltd., has fallen by 4% and Nifty Future has dropped by 2.5%.

What is the overall profit or loss from this set of transaction?

Solution

Cash Outlay

$$= 10000 \times ₹ 25 - 400 \times ₹ 1,100$$

$$= ₹ 2,50,000 - ₹ 4,40,000 = - ₹ 1,90,000$$

Cash Inflow at Close Out

$$= 10000 \times ₹ 25 \times 0.96 - 400 \times ₹ 1,100 \times 0.975$$

$$= ₹ 2,40,000 - ₹ 4,29,000 = - ₹ 1,89,000$$

Gain/ Loss

$$= ₹ 1,90,000 - ₹ 1,89,000 = ₹ 1,000 \text{ (Gain)}$$

Question 25 (RTP/MTP/PP)

The price of ACC stock on 31 December 2022 was ₹ 220 and the Futures price on the same stock on the same date, i.e., 31 December 2022 for March 2023 was ₹ 222. Other features of the Futures contract and related information are as follows:

Time to expiration - 3 months (0.25 year)

Borrowing rate - 15% p.a.

Annual Dividend on the stock - 25% payable before 31.03. 2023

Face Value of the Stock - ₹ 10

Advise the investor the course of action to be followed by him so as to earn Risk free income if he can sell the stock short at spot price.

Solution

Based on the above information, the futures price for ACC stock on 31 December 2022 should be:

Spot price + Interest Portion - Dividend

$$= 220 + (220 \times 0.15 \times 0.25) - (0.25 \times 10) = 225.75$$

Thus, as per the 'cost of carry' criteria, the Futures price is ₹ 225.75, which is more than the actual price of ₹ 222 on 31 March 2023. This would give rise to earn riskless arbitrage opportunity of ₹ 3.75 i.e. (225.75 - 222)

Advise to the Arbitrager.

1. Short sell one unit of stock at spot price for ₹ 220.

2. Deposit ₹ 220 at 15% p.a. for 3 months.

3. Buy a 3-month Futures contract for one unit of stock of ACC at ₹ 222.

After 3 months

1. Take money out of the Bank.

2. Take delivery by paying ₹ 222 and return the unit of stock to the party whom short sell was made along.

3. Pay the Dividend amount to the buyer whom short sell was made.

Total Inflow = $220 + (220 \times 0.15 \times 0.25) = ₹ 228.25$

Total Outflow = $222 + 2.50 = ₹ 224.50$

Net Gain to the Arbitrager = Total Inflow - Total Outflow

= ₹ 228.25 - ₹ 224.50

= ₹ 3.75

Thus, the arbitrager earns ₹ 3.75 per share without involving any risk.

Question 26 (RTP/MTP/PP)

Mr. H is holding 100 equity shares of V Ltd. which is being quoted at ₹ 2,100 per share. He is interested in hedging downside risk of his holding as he is going to sell them after 2 months. A 2-month Call option is available at a premium of ₹ 60 per share and a 2-month put option is available at a premium of ₹ 50 per share. The strike price in both cases is ₹ 2,200. You are required to:

- Suggest the position Mr. H should take in the option market to hedge his holding in the V Ltd.
- Calculate his final position if after 2 months i.e., on the day of exercise the actual market price of per share of V Ltd. happens to be ₹ 2000, ₹ 2100, ₹ 2200, ₹ 2300 and ₹ 2400.

Solution

- Since Mr. H holds 100 equity shares, he should buy equal no. of Put option i.e. 100 put options in the same stock to hedge his position.

Total Premium amount to be paid = $50 \times 100 \text{ Put} = ₹ 5,000$

- Net Position after 2-months

(₹)					
Share price on exercise day	2,000	2,100	2,200	2,300	2,400
Option exercise	Yes	Yes	No	No	No
Inflow (strike price)	2,200	2,200	Nil	Nil	Nil
Inflow (in open market)	-	-	2,200	2,300	2,400
Less outflow (premium)	50	50	50	50	50
Position (per share)	2,150	2,150	2,150	2,250	2,350
Total Position	2,15,000	2,15,000	2,15,000	2,25,000	2,35,000

Thus, from above table it can be observed in any case the value of holding of Mr. H in V Ltd. shall not go below ₹ 2,150 per share.

Question 28 (RTP/MTP/PP)

Following is the information available pertaining to shares of Omni Ltd.:

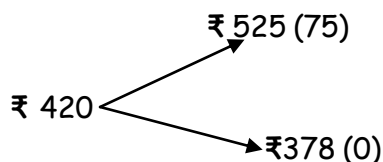
Current Market Price (₹)	₹ 420.00
Strike Price (₹)	₹ 450.00
Maximum Price (₹) expected in next 3 months' time	₹ 525.00
Minimum Price (₹) expected in next 3 months' time	₹ 378.00
Continuously Compounded Rate of Interest (p.a.) (%)	8.00%
ert	1.0202

From the above:

- (ii) Calculate the 3 months call option by using Binomial Method and Risk Neutral Method. Are the calculated values under both the models are same?
- (iii) State also clearly the basis of Valuation of options under these models.

Solution

(i) (1) Call Option value using Binomial Model



$$\Delta = \frac{₹ 525 - ₹ 378}{₹ 75 - 0} = 0.51$$

$$\text{Initial Investment} = 0.51 \times 420 = 214.20$$

$$\text{Value of Portfolio if Price goes down to ₹ 378}$$

$$\text{Value of holding } 0.51 \times ₹ 378 = 192.78$$

Accordingly Let 'P' be the option price, then

$$₹ 214.20 - P = ₹ 192.78 / 1.0202 = ₹ 188.96$$

$$P = ₹ 25.24$$

(2) Value of Call Option using Risk Neutral Method

Let 'P' be the probability of Price increase, then

$$p \times 525 + (1 - p) \times 378 = 420(1.0202)$$

$$147p = 50.48$$

$$p = 0.34$$

$$\text{Probability of Price increase} = 0.34$$

$$\text{Probability of Price decrease} = 0.66$$

$$\frac{0.34 \times 75 + 0.66 \times 0}{1.0202} = ₹ 25.24$$

Yes, the value of option under both Models is same.

(ii) Basis of valuation of options :

- Binomial model uses an approach called " Risk less Hedge Approach" to find the price of the option, by creating a portfolio which will have same value at expiration irrespective of any price. Hedge means to create an equal and opposite position for protecting the value of portfolio.
- In Risk Neutral Model, valuation of options is based on arbitrage and is therefore independent of risk preferences; one should be able to value options assuming any set of risk preferences and get the same answer.

Question 30 (RTP/MTP/PP)

The market received some information about ABC Ltd's tie up with a Multinational Company. This has induced the market price to move up. If the information is false, the ABC Ltd.'s stock price will probably fall dramatically. To protect from this, an investor has bought the call and

put options.

He purchased one 3 month's call with a striking price of ₹ 45 for ₹ 3 premium and paid ₹ 2 per share premium for a 3 month's put with a striking price of ₹ 42. Assume 100 shares for call and put option.

You are required:

- (i) To determine the investor's position if the tie up offer bids the price of ABC Ltd.'s stock up to ₹ 44 in 3 months.
- (ii) To determine the investor's position of the tie up offer program fails and the price of the stocks falls to ₹ 34 in 3 months.
- (iii) To determine the investor's position if the tie up offer program is successful and the price of the stocks rise up to ₹ 46 in 3 months.

Solution

Total premium paid on purchasing a call and put option

= (₹ 3 per share × 100) + (₹ 2 per share × 100).

= ₹ 300 + ₹ 200 = ₹ 500

- (i) In this case, investor exercises neither the call option nor the put option as both will result in a loss for him.

Ending value = - ₹ 500 + zero gain = - ₹ 500

i.e. Net loss = ₹ 500

- (ii) Since the price of the stock is below the exercise price of the call, the call will not be exercised. Only put is valuable and is exercised.

Total premium paid = ₹ 500

Ending value = - ₹ 500 + ₹ [(42 - 34) × 100] = - ₹ 500 + ₹ 800 = ₹ 300

i.e. Net gain = ₹ 300

- (iii) In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.

Total premium paid = ₹ 500

Ending value = - 500 + [(46 - 45) × 100] = - 500 + 100 = - ₹ 400

i.e. Net Loss = ₹ 400

CHAPTER - 4

Security Valuation: Bonds

Question 25(RTP/MTP/PP)

An investor has recently purchased substantial number of 7 year 6.75% ₹ 1,000 bond with 5% premium payable on maturity at a required Yield to Maturity (YTM) of 9%. However, due to a financial crunch he is looking to sell these bonds and has got a proposal from another investor, who is willing to purchase these bonds by shelling out a maximum amount of 897 per bond. Investors follow intrinsic value method for valuation of bonds.

- (i) You are required to determine

(1) The Market Price, Duration and Volatility of the bond and

(2) Required YTM of the new investor

- (ii) What is relationship bet on the price of the bond and YTM?

Period (t)	1	2	3	4	5	6	7
PVIF (9%, t)	0.917	0.842	0.772	0.708	0.650	0.596	0.547

Solution

(i) (A) Market price of Bond

$$\begin{aligned}
 &= 1,000 \times 6.75\% \times (\text{PVIAF } 9\%, 7) + 1,050 \times (\text{PVIF } 9\%, 7) \\
 &= 67.50 \times 5.032 + 1050 \times 0.547 \\
 &= 339.66 + 574.35 = ₹ 914.01
 \end{aligned}$$

(b) Duration of Bond

Year	Cash flow	P.V. @9%		Proportion of bond value	Proportion of bond value × time (years)
1	67.50	0.917	61.898	0.0677	0.0677
2	67.50	0.842	56.835	0.0622	0.1244
3	67.50	0.772	52.110	0.0570	0.1710
4	67.50	0.708	47.790	0.0523	0.2092
5	67.50	0.650	43.875	0.0480	0.2400
6	67.50	0.596	40.230	0.0440	0.2640
7	1117.50	0.547	611.273	0.6688	4.6816
914.011				5.7579	

Duration of the Bond is 5.758 years

Alternatively, as per Short Cut Method

$$D = \frac{1 + \text{YTM}}{\text{YTM}} - \frac{(1 + \text{YTM}) + t(c - \text{YTM})}{c[(1 + \text{YTM})^t - 1] + \text{YTM}}$$

Where YTM = Yield to Maturity

c = Coupon Rate

t = Years to Maturity

$$\begin{aligned}
 &= \frac{1.09 - 1.09 + 7(0.0675 - 0.09)}{0.09 \cdot 0.0675[(1.09)^7 - 1] + 0.09} = 5.72
 \end{aligned}$$

(C) Volatility of Bond-

$$\text{Volatility} = \text{Duration} / (1 + \text{YTM}) = 5.758 / (1 + 0.09) = 5.28$$

(2) Required yield of new Investor

$$= 67.50 \text{ PVIAF } (r, 7) + 1050 \times \text{PVIF } (r, 7)$$

Now, let us discount the cash flow by 9%

$$\text{PV@ } 9\% = 67.5 \times 5.032 + 1050 \times 0.547$$

$$= 339.66 + 574.35 = 914.01$$

$$\text{NPV @ } 9\% = 914.01 - 897 = ₹ 17.01$$

Since, NPV of bond is positive, We need to increase discount rate say 12%

$$= 67.50 \text{ PVIAF } (12\%, 7) + 1050 \times \text{PVIF } (12\%, 7)$$

$$= 67.5 \times [0.893 + 0.797 + 0.712 + 0.636 + 0.567 + 0.507 + 0.452] + 1050 \times 0.452$$

$$= 67.5 \times 4.564 + 474.60$$

$$= 308.07 + 474.6 = 782.67$$

$$\text{NPV @ } 12\% = 782.67 - 897 = - ₹ 114.33$$

Now we use interpolation formula

$$\begin{aligned}
 K_e &= LR + \frac{NPV \text{ at LR}}{NPV \text{ at LR} - NPV \text{ at HR}} \times \Delta r \\
 &= 9\% + \frac{17.01}{17.01 - 114.33} \times 3\% \\
 &= 9\% + \frac{17.01}{131.34} \times 3\% \\
 &= 9\% + 0.39\% = 9.39\%
 \end{aligned}$$

(ii) Relationship between the price of the bond & YTM is opposite or inverse

Question 26(RTP/MTP/PP)

Following information is related to the Convertible Bond of A Ltd. which is currently priced at ₹ 1060 per Bond:

- 1) Conversion Parity Price - ₹ 53
- 2) Conversion Premium - 10.41667%
- 3) Percentage of Downside Risk with respect to Straight Value of Bond - 12.766%

Calculate:

- (i) No. of shares on Conversion.
- (ii) Current Market Price Per Share of A Ltd.
- (iii) Straight Value of Bond

Solution:

(i) The No. of share on Conversion shall be computed as follows:

$$\begin{aligned}
 \text{Conversion Parity Price} &= \frac{\text{Bond Price}}{\text{No. of shares on Conversion}} \\
 ₹ 53 &= \frac{1060}{\text{No. of shares on Conversion}}
 \end{aligned}$$

Accordingly, No. of shares on Conversion = 20

(ii) To determine current Market Price Per Share of A Ltd. we shall use Conversion Premium as follows:

$$\begin{aligned}
 \text{Conversion Premium} &= \frac{\text{Market Price of Bond} - \text{Conversion Value of Bond}}{\text{Conversion Value of Bond}} \\
 0.1041667 &= \frac{1060 - \text{Conversion Value of Bond}}{\text{Conversion Value of Bond}}
 \end{aligned}$$

Conversion Value of Bond = ₹ 960

Since the No. of share on Conversion = 20

The current market price of share of A Ltd. shall be = ₹ 960 / 20 = ₹ 48 per share

(iii) To determine the Straight Value of Bond we shall use Percentage of Downside Risk as follows:

$$\begin{aligned}
 \text{Percentage of Downside Risk} &= \frac{\text{Market Price of Bond} - \text{Straight Value of Bond}}{\text{Straight Value of Bond}} \\
 0.12766 &= \frac{1060 - \text{Straight Value of Bond}}{\text{Straight Value of Bond}}
 \end{aligned}$$

Straight Value of Bond = ₹ 940 per Bond

Question 28(RTP/MTP/PP)

Mr. X wants to invest ₹ 1,00,000 in the 7 years 8% bonds in the market (Face Value ₹ 100) which were issued 2 years ago.

- (i) You are requested to advise him what is the maximum price for bonds to be paid in the

following scenarios:

- (1) If Mr. X is expecting minimum 9% return on the bonds
 - (2) If Mr. X is expecting minimum 7% return on the bonds
 - (3) If the present rate of similar bonds issued is 8.25%
 - (4) If the present rate of similar bonds issued is 7.75%
- (ii) If the bonds are available at par and 1% is the transaction cost, what is the effective yield?
- (iii) Find the number of days required to breakeven transaction cost if the bonds are available at par and 2% is the transaction cost.

Solution

a. The maximum price to be paid for Bond

1. To have a return of 9% return on Bond.

$$= ₹ 100 \times \frac{8}{9} = ₹ 88.89$$

Alternative Answer

$$= \frac{8}{1.09^1} + \frac{8}{1.09^2} + \frac{8}{1.09^3} + \frac{8}{1.09^4} + \frac{108}{1.09^5}$$

$$= ₹ 7.34 + ₹ 6.73 + ₹ 6.18 + ₹ 5.67 + ₹ 70.19 = ₹ 96.11$$

2. To have a return of 7% return on Bond.

$$= ₹ 100 \times \frac{8}{7} = ₹ 114.29$$

Alternative Answer

$$= \frac{8}{(1.07)^1} + \frac{8}{(1.07)^2} + \frac{8}{(1.07)^3} + \frac{8}{(1.07)^4} + \frac{108}{(1.07)^5}$$

$$= ₹ 7.48 + ₹ 6.99 + ₹ 6.53 + ₹ 6.10 + ₹ 77.00 = ₹ 104.10$$

3. If present rate of similar bond issued is 8.25%

$$= \frac{8}{(1.0825)^1} + \frac{8}{(1.0825)^2} + \frac{8}{(1.0825)^3} + \frac{8}{(1.0825)^4} + \frac{108}{(1.0825)^5}$$

$$= ₹ 7.39 + ₹ 6.83 + ₹ 6.31 + ₹ 5.83 + ₹ 72.66 = ₹ 99.02$$

Alternative Answer

$$= ₹ 100 \times \frac{8}{8.25} = ₹ 96.97$$

4. If present rate of similar bond issued is 7.75%

$$= \frac{8}{(1.0775)^1} + \frac{8}{(1.0775)^2} + \frac{8}{(1.0775)^3} + \frac{8}{(1.0775)^4} + \frac{108}{(1.0775)^5}$$

$$= ₹ 7.42 + ₹ 6.89 + ₹ 6.39 + ₹ 5.94 + ₹ 74.36$$

$$= ₹ 101.00$$

Alternative Answer

$$= ₹ 100 \times \frac{8}{7.75} = ₹ 103.23$$

b. Effective yield if transaction cost is 1% = $\frac{8}{101} \times 100 = 7.92$

c. No. of Days required for break even

$$= \frac{2\% \times 1,00,000}{1,00,000 \times \frac{8\%}{360}} = \frac{2,000}{22.22} = 90 \text{ days}$$

Alternatively, if 365 days used in Calculation then answer will be as follows:

$$= \frac{2\% \times 1,00,000}{1,00,000 \times \frac{8\%}{360}} = \frac{2,000}{21.92} = 91.24 \text{ days say 91 days}$$

CHAPTER - 5

Business Valuation

Question 3(RTP/MTP/PP)

Herbal Box is a small but profitable producer of beauty cosmetics using the plant, Aloe Vera. Though it is not a high-tech business, yet Herbal's earnings have averaged around ₹ 18.50 lakhs after tax, mainly on the strength of its patented beauty cream to remove the pimples.

The patent has nine years to run, and Herbal Box has been offered ₹ 50 lakhs for the patent rights. Herbal's assets include ₹ 50 lakhs of property, plant, and equipment, and ₹ 25 lakhs of working capital. However, the patent is not shown on the books of Herbal Box. Assuming Herbal's cost of capital being 14 percent, calculate its Economic Value Added (EVA).

Solution:

EVA = Income Earned — (Cost of Capital × Total Investment)

Total Investments

	Amount (₹ in Lakhs)
Working Capital	25.00
Property, Plant & Equipments	50.00
Patent Rights	50.00
Total	125.00

EVA = Profit Earned — WACC × Invested Capital
 = ₹ 18.5 Lakhs — 14% × ₹ 125 Lakhs
 = ₹ 1.00 Lakhs

CHAPTER - 6

Mergers, Acquisitions and Corporate Restructuring

Question 16(RTP/MTP/PP)

Following is the Balance Sheet of M/s. PK Ltd. as on 31-03-2015:

Particulars	₹ in Lacs
I. Equity & Liabilities	
Shareholders' Fund	
Equity Share Capital (₹ 10 each)	900.00
10% Preference Share Capital (₹ 100 each)	300.00
Reserves & Surplus	(500.00)
Non-Current Liabilities	
Term Loan	400.00
Current Liabilities	
Trade Payables	400.00
Total (I)	1500.00
II. Assets	
Non-Current Assets	1000.00
Current Assets :	
Inventory	300.00
Trade Receivables	100.00

Cash & Bank Balance	100.00
Total (II)	1500.00

M/s PK Ltd. did not perform well and has suffered sizeable losses during the last few years. However, it is now felt that the company can be nursed back to health by proper financial restructuring and consequently the following scheme of reconstruction have been designed :

- (i) Equity shares are to be reduced to ₹ 2 per share fully paid.
- (ii) Preference shares are to be reduced by ₹ 50 per share and rate of dividend on Preference shares is also reduced by 2%.
- (iii) Trade Payables have agreed to forego 40% of their existing claims and for the balance 50% they have agreed to convert their claims into equity shares of ₹ 2 each, fully paid.
- (iv) In order to make payment for Term Loan, the company issues 200 Lacs equity shares of ₹ 2 each at par. Entire sum is required to be paid on application.
- (v) Non-Current Assets is to be revalued at ₹ 500 Lacs.

You are required:

- (1) To show the impact of financial restructuring.
- (2) To prepare Balance Sheet assuming the scheme of restructuring is implemented.

Solution:

(1) Impact of Financial Restructuring

Particulars	₹ in Lac
Benefits to PK Ltd.	
1. Reduction in Equity Share capital (90×8)	720
2. Reduction in Preference Share Capital (3×50)	150
3. Waiver of Trade payables (400 @ 40%)	160
(A) Total (1+2+3)	1030
Amount of ₹ 1030 Lacs utilised to write off losses & overvalued assets	
1. Losses	500
2. Over valued Non Current Assets (1000-500)	500
(B) Total (1+2)	1000
Amount unutilized transfer to Capital Reserve (A-B)	30

(2) Balance Sheet of PK Ltd. as on 31.03.2015 (after reconstruction)

Particulars	₹ in Lac
I. EQUITY & LIABILITIES	
Shareholder's Fund	
Equity Share Capital (₹ 2 each)	700.00
8% Preference Share Capital (₹ 50 each)	150.00
Reserves & Surplus (Capital Reserve)	30.00
Current Liabilities	
Trade Payable	120.00
Total (I)	1000.00
II. ASSETS	
Non-Current Asset	500.00

Current Assets	
Inventory	300.00
Trade Receivables	100.00
Cash & Bank balance	100.00
Total (II)	1000.00

Calculation of Equity Share Capital

1. Equity share capital after reconstruction	180.00
2. Issued in Cash (200×2)	400.00
3. Issued to Trade payables [50% of (60% of ₹ 400 Lacs)]	120.00
Total (1+2+3)	700.00

Question 17(RTP/MTP/PP)

Big Ltd. (BL), a listed company, is enjoying a price earnings ratio (PER) of 15 on an Earnings Per Share (EPS) of ₹5. The Total number of outstanding shares are 2,00,000.

BL is proposing to acquire Small Pvt. Ltd. (SPL) an unlisted company by issuing shares in the ratio 4:5 i.e. for 5 shares of SPL 4 shares of BL will be issued. The outstanding shares of SPL are 50,000. SPL will be listed before the actual merger to discover its value. The EPS of the merged entity will be 5.5.

No other information is available for SPL.

You are required to calculate:

- Pre-merger EPS of SPL.
- Expected Market Price per Share of SPL at the time of listing, if it expects a PER of 10 and,
- Number of shares of BL to be issued to SPL if pre-merger EPS of BL is to be maintained

Solution:

(i) Pre Merger EPS

No. of shares to be issued by BL to SPL (50,000 × 4/5)	40,000
Existing number of shares of BL	2,00,000
Total no. of shares Post Merger	2,40,000
EPS (Post Merger)	₹ 5.50
Post-Merger (Total Earning)	₹ 13,20,000
Less: Pre-Merger Earning of BL (2,00,000 × 5)	₹ 10,00,000
Pre-Merger Earning of SPL	₹ 3,20,000
Number of shares of SPL (Existing)	50,000
EPS (₹ 3,20,000/50,000)	₹ 6.40

(ii) Expected Market Price of SPL share at the day of listing

$$\text{EPS} \times \text{PE Ratio} (6.40 \times 10) = ₹ 64.00$$

(iii) Number of shares to be issued to SPL to maintain Pre-Merger EPS

$$5.00 = 13,20,000 / (2,00,000 + X)$$

$$10,00,000 + 5X = 13,20,000$$

$$X = 64,000$$

Thus, 64,000 shares to be issued by BL to SPL to maintain pre-merger EPS.

Alternatively, it can also be computed as follows:

Swap Ratio if EPS before merger is maintained by BL

Then, Swap Ratio = $6.4 / 5 = 1.28$

Number of shares of BL is to be issued to SPL is 50000 shares $\times$ 1.28 = 64000 shares

Question 18(RTP/MTP/PP)

The following information is provided relating to the acquiring Company R Ltd. And the target Company K Ltd.:

Particulars	R Ltd.	K Ltd.
Promoter Holding	50%	60%
Share Capital (₹ in lakh)	100	50
Free Reserves & Surplus (₹ in lakh)	400	250
Paid up value per share (₹)	100	10
Free Float Market Capitalization (₹ in lakh)	200	64
P/E Ratio (times)	20	8

For deciding the swap ratio, weights are assigned to different parameters by the Board of Directors of both the companies as follows:

Book value 20%

EPS 60%

Market Price 20%

You are required to calculate:

- Swap ratio based on above weights.
- Book Value per share, EPS and expected market price of R Ltd. after acquisition of K Ltd. (Assuming PE multiple of K Ltd. remains unchanged and all assets and liabilities of K Ltd. are taken over at book value)
- Revised promoter's holding (%) in R Ltd. after acquisition.
- Post-acquisition Free Float Market Capitalization.

Solution:

(i) Swap Ratio

	R Ltd.	K Ltd.
Share Capital	100 Lakh	50 Lakh
Free Reserves	400 Lakh	250 Lakh
Total	500 Lakh	300 Lakh
No. of Shares	1 Lakh	5 Lakh
Book Value per share	₹ 500	₹ 60
Promoter's holding	50%	60%
Non promoter's holding	50%	40%
Free Float Market Cap. i.e. relating to Public's holding	200 Lakh	64 Lakh
Hence Total market Cap.	400 Lakh	160 Lakh

No. of Shares	1 Lakh		5 Lakh
Market Price	₹ 400		₹ 32
P/E Ratio	20		8
EPS	20		4
Profits (₹ 1 lakh X 20)	₹ 20 lakh		-
(₹ 4 lakh X 5)	-		₹ 20 lakh
Calculation of Swap Ratio			
Book Value	1 : 0.12 i.e.	0.12 x 20%	0.024
EPS	1 : 0.2	0.20 x 60%	0.120
Market Price	1 : 0.08	0.08 x 20%	0.016
		Total	0.160

Swap ratio is for every one share of K Ltd., to issue 0.16 shares of R Ltd. Hence, total no. of shares to be issued.

$$5 \text{ Lakh} \times 0.16 = 0.80 \text{ lakh shares}$$

(ii) Book Value, EPS & Market Price

Total No of Shares 1 Lakh + 0.80 Lakh = 1.80 Lakh

Total Capital ₹ 100 Lakh + ₹ 80 Lakh = ₹ 180 Lakh

Reserves ₹ 400 Lakh + ₹ 220 Lakh = ₹ 620 Lakh

Book Value $\frac{\text{₹ 180 Lakh} + \text{₹ 620 Lakh}}{1.80 \text{ Lakh}} = ₹ 444.44 \text{ per share}$

EPS $\frac{\text{Total Profit}}{\text{No. of Share}} = \frac{20 \text{ Lakh} + 20 \text{ Lakh}}{1.80 \text{ Lakh}} = ₹ 22.22$

Expected Market Price EPS (₹ 22.22) x P/E Ratio (8) = ₹ 177.76

(iii) Revised Promoter's holding

Promoter's Revised R Ltd. 50% i.e. 0.50 Lakh

Holding K Ltd. 60% i.e. 0.48 Lakh

Total 0.98 Lakh

Promoter's % = $0.98/1.80 \times 100 = 54.44\%$

(iv) Post Acquisition Free Float Market Capitalization

Free Float Market Capitalization = (1.80 Lakh - 0.98 Lakh) x ₹ 177.76 = ₹ 145.76 Lakh

Question 19(RTP/MTP/PP)

The following information of AB Ltd., is available below:

Market Value per share - ₹20 per share

Equity Share Capital - 12,00,000 shares @ the face value of ₹10 per share.

The company is planning to issue Rights Shares to the existing shareholders and raise ₹60,00,000 to finance a new project.

You are required:

- To calculate the ex-right price of shares and the value of right, if
 - The company offers one right share for every three shares held.
 - The company offers two right shares for every five shares held.
- To show the effect of the rights issue on the wealth of a Shareholder X, who has 1,500

shares, when the company offers one right share for every three shares held, assuming :

- (a) He subscribes to the Rights issue
- (b) He ignores the Rights issue

Solution:

(i) Ex-right price of share and the value of right

(a) Number of shares to be issued : 4,00,000

Subscription price ₹ 60,00,000 / 4,00,000 = ₹ 15

Ex-Right Price = $\frac{\text{₹ 240 Lakh} + \text{₹ 60 Lakh}}{16 \text{ Lakh}} = ₹ 18.75$

Value of a Right = ₹ 18.75 - ₹ 15 = ₹ 3.75

Value of a Right Per Share Basis = $\frac{\text{₹ 3.75}}{3} = ₹ 1.25$

(b) Number of shares to be issued : 4,80,000

Subscription price ₹ 60,00,000 / 4,80,000 = ₹ 12.50

Ex-Right Price = $\frac{\text{₹ 240 Lakh} + \text{₹ 60 Lakh}}{16.80 \text{ Lakh}} = ₹ 17.86$

Value of a Right = ₹ 17.86 - ₹ 12.50 = ₹ 5.36

Value of a Right Per Share Basis = $\frac{\text{₹ 5.36} \times 2}{5} = ₹ 2.14$ or $\frac{\text{₹ 5.36}}{5}$
= ₹ 1.07

(ii) (a) Shareholder's wealth that is holding 1500 shares when firm offers one share for three shares held and subscribes the offer.

Value of Shares after right issue (2000 X ₹ 18.75)	₹ 37,500
Less: Amount paid to acquire right shares (500 X ₹15)	₹ 7,500
	₹ 30,000

Wealth before Right Issue = 1500 x 20 = ₹ 30,000

Thus, there is no change in the wealth

(b) Shareholder's wealth that is holding 1500 shares when firm offers one share for three shares held and does not subscribe the offer.

Value of Shares after right issue (1500 X ₹ 18.75) ₹ 28,125

Thus, if shareholder does not subscribe right offer there will be loss of wealth of ₹ 1,875.

CHAPTER - 7

Portfolio Management

Question 15 (MTP'April'23)

Mr. A owns a portfolio with the following characteristics:

	Security X	Security Y	Risk Free security
Beta	1.60	1.80	0
Expected Return	15%	16%	7%

- If Mr. A has ₹ 2,00,000 to invest and sells short ₹ 1,00,000 of security B and purchases ₹ 3,00,000 of security A what is the sensitivity of Mr. A's portfolio ?
- If Mr. A borrows ₹ 2,00,000 at the risk free rate and invests the amount he borrows along with the original amount of ₹ 2,00,000 in security X and Y in the same proportion as described in part . what is sensitivity of the portfolio?
- What is the expected market risk premium?

Solution

- Mr. A's position in the two securities are +3 in security X and -1 in security Y. Hence the portfolio beta shall be calculated as follows:
Sensitivity = $1.60 \times 300000 / 200000 - 1.80 \times 100000 / 200000 = 1.50$ times
- Mr. A's current position: -
Security X ₹ 6,00,000 / ₹ 2,00,000 = 3
Security Y -₹ 2,00,000 / ₹ 2,00,000 = -1
Risk Free Asset -₹ 2,00,000 / ₹ 2,00,000 = -1 Sensitivity =
 $3 \times 1.60 + (-1 \times 1.80) + (-1 \times 0)$ times
- Expected Return = Risk Free Rate of Return + Risk Premium Let X be the market risk premium,
Accordingly,
Using Security X's Return
Total Return = 15% = 7% + 1.6X
Risk Premium (X) = 8% / 1.6 = 5%
Alternatively using Security Y's Return
Total Return = 16% = 7% + 1.8X
Risk Premium (X) = 9% / 1.8 = 5%

Question 17(RTP/MTP/PP)

Ramesh has identified stocks of two companies A and B having good investment potential:
Following data is available for these stocks:

Year	A (Market Price per Share in ₹)	B (Market Price per Share in ₹)
2013	19.60	8.70
2014	18.75	12.80
2015	33.42	16.20
2016	42.64	18.25
2017	43.25	15.60
2018	44.60	13.25
2019	34.75	18.60

You are required to calculate:

- The Risk and Return by investing in Stock A and B
- The Risk and Return by investing in a portfolio of these Stocks if he invests in Stock A and B in proportion of 6 : 4.
- The better opportunity for investment

Solution:

Year	A				B				(Return - A) × (Return - B)
	Market Price Per Share in ₹	Return (%)	Return - $\bar{A}$	Squared	Market Price Per Share in ₹	Return (%)	Return - $\bar{B}$	Squared	
2013	19.60				8.70				
2014	18.75	-4.34	-18.33	335.9889	12.80	47.13	30.94	957.2836	-567.1302
2015	33.42	78.24	64.25	4128.0625	16.20	26.56	10.37	107.5369	666.2725
2016	42.64	27.59	13.60	184.9600	18.25	12.65	-3.54	12.5316	-48.1440
2017	43.25	1.43	-12.56	157.7536	15.60	-14.52	-30.71	943.1041	385.7176
2018	44.60	3.12	-10.87	118.1569	13.25	-15.06	-31.25	976.5625	339.6875
2019	34.75	-22.09	-36.08	1301.7664	18.60	40.38	24.19	585.1561	-872.7752
Mean ($\bar{A}$)		83.95		6226.6883		97.14		3582.1748	-96.3718
		13.99	Variance 1037.7814		Mean ($\bar{B}$)	16.19	Variance 597.0291		Cov. = -16.0620

- Return A = 13.99% and Risk (SD) = $\sqrt{1037.7814}$ = 32.2146 and Return B = 16.19% and Risk (SD) = $\sqrt{597.0291}$ = 24.4342
- Return of Portfolio = $0.60 \times 13.99\% + 0.40 \times 16.19\% = 14.87\%$
 Risk (Standard Deviation) of Portfolio = $[0.60^2 \times 1037.7814 + 0.40^2 \times 597.0291 + 2 \times 0.60 \times 0.40 \times (-16.0620)]^{1/2}$
 = $[373.6013 + 95.5247 - 7.7098]^{1/2} = 21.4806$
- On the basis of Return 'B' is preferable and on the basis of Risk 'Portfolio Investment' is preferable over the individual stocks.

Question 18(RTP/MTP/PP)

Mr. Potential has made investments in two mutual funds. The following information is available:

Mutual Fund	Smart	Growth
Jensen Alpha	1.10%	1.50%
Treynor's Ratio	0.0714	0.0775
Actual Return	8.50%	9.10%
Risk Premium		4%

You are required to calculate:

- Beta (β) for both the funds
- Risk free Rate
- Security Market Line

Solution:

	Smart	Growth
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

Jensen Alpha = Actual Return - E(r)

Treynor's Ratio = $\frac{E(r) - R_f}{\beta}$

E(r) = Actual Return - Jensen Alpha

For Smart:

$$0.04\beta_S = 0.074 - R_f \quad (1)$$

$$0.0714\beta_S = 0.085 - R_f \quad (2)$$

On solving (1) and (2), we get $\beta_S = 0.35$ and $R_f = 0.06$

For Growth:

$$0.04\beta_G = 0.076 - R_f \quad (3)$$

$$0.0775\beta_G = 0.091 - R_f \quad (4)$$

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

(i) Beta of Smart Mutual Fund is 0.35 and Growth Mutual Fund is 0.40.

(ii) Risk free Rate = 6%

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

Security Market Line for Growth = $0.06 + 0.04\beta$

Alternative Solution:

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

Working Notes:

(i) **Smart**

Jensen Alpha = 0.011

Actual Return = 0.085

Thus, expected return (as per CAPM) = 0.074

Accordingly, Risk Free Rate of Return:

$$0.074 = R_f + 0.04$$

$$R_f = 0.034$$

Treynor's Ratio = 0.0714

$$0.0714 = \frac{0.085 - 0.034}{\beta_S}$$

$$\beta_S = 0.714$$

$$\text{Market Risk Premium} = \frac{0.04}{0.714} = 0.056$$

(ii) **Growth**

Jensen Alpha = 0.015

Actual Return = 0.091

Thus, expected return (as per CAPM) = 0.076

Accordingly, Risk Free Rate of Return:

$$0.076 = R_f + 0.04$$

$$R_f = 0.036$$

Treynor's Ratio = 0.0775

$$0.0775 = \frac{0.091 - 0.036}{\beta_G}$$

$$\beta_G = 0.710$$

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

$$\text{Security Market Line for Smart} = 0.034 + 0.056\beta_S$$

$$\text{Security Market Line for Growth} = 0.036 + 0.056\beta_G$$

Question 19(RTP/MTP/PP)

An Investor is proposing to invest ₹10,000/- in two Portfolios A and B in the ratio of 3 : 2. The Portfolios have three securities each with following weights :

	W _x	W _y	W _z
Portfolio A	0.30	0.25	0.45
Portfolio B	0.20	0.45	0.35

You are required to

- Calculate the weight of each stock.
- Calculate the amount allocated to Y and Z if half of the funds are allocated to security X.

Note: In question paper in sub part (ii) Y and Z mistakenly got typed as B and C.

Solution:

- Investment committed to each security would be:

	X	Y	Z	Total
	(₹)	(₹)	(₹)	(₹)
Portfolio A	1,800	1,500	2,700	6,000
Portfolio B	800	1,800	1,400	4,000
Combined Portfolio	2,600	3,300	4,100	10,000
Stock weights	0.26	0.33	0.41	

Alternatively, it can also be computed as follows:

$$\text{Weight of Security X} = 0.30 \times 3/5 + 0.20 \times 2/5 = 0.26$$

$$\text{Weight of Security Y} = 0.25 \times 3/5 + 0.45 \times 2/5 = 0.33$$

$$\text{Weight of Security Z} = 0.45 \times 3/5 + 0.35 \times 2/5 = 0.41$$

- The equation of critical line takes the following form:

$$WY = a + bWX$$

Substituting the values of WX & WY from portfolio A and B in above equation, we get

$$0.25 = a + 0.30b, \text{ and}$$

$$0.45 = a + 0.20b$$

Solving above equation we obtain the slope and intercept, $a = 0.85$ and $b = -2$ and thus, the critical line is

$$WY = 0.85 - 2WX$$

If half of the funds is invested in security X then,

$$WY = 0.85 - 1.00 = -0.15$$

$$\text{Since } WX + WY + WZ = 1$$

$$WZ = 1 - 0.50 + 0.15 = 0.65$$

∴ Allocation of funds to Security Y = $-0.15 \times 10,000 = -₹ 1,500$ and
Security Z = $0.65 \times 10,000 = ₹ 6,500$

Alternatively, it can also be solved as follows:

Amount to be allocated to Y & Z if half of the funds are allocated to X.

The balance fund of ₹ 5,000 shall be allocated in the ratio of 33:41.

Allocation of funds to - Security Y = $5,000 \times 33/74 = ₹ 2,230$

Security Z = $5,000 \times 41/74 = ₹ 2,770$

Question 20(RTP/MTP/PP)

An investor has categorized all the available stock in the market into the following types and the estimated weights of the categories of stocks in the market index are given below. Further, the sensitivity of returns of these categories of stocks to two factors Inflation and Stock market are also given below:

Category	Weight in Market Index	Factor 1 (Inflation)			Factor 2 (Stock Market)		
		Beta 1	Expected Value in %	Actual Value in %	Beta 2	Expected Value in %	Actual Value in %
Small Cap	20%	1.20	6.70	6.70	0.80	10.00	10.50
Medium Cap	30%	1.75	4.50	6.00	0.90	7.00	8.00
Large Cap	15%	1.30	6.75	8.00	1.165	9.00	10.00
Flexi Cap	35%	1.70	7.00	6.50	0.85	8.85	9.75

Risk Free Rate of Interest is 7.50%.

Round off to 2 decimal.

You are required to calculate:

- Expected return on the market index for both the factors.
- Expected return on the market index under Arbitrage Pricing Theory (Existing Scenario).
- Expected return on the market index under Arbitrage Pricing Theory if the composition of the Portfolio is changed to 25% equally in all four categories.
- Which alternative (Existing or Changed) will be more profitable?

Solution:

- (i) Expected Return on Market Index for Both factors

Factor 1

$$= 0.20 \times 6.70\% + 0.30 \times 4.50\% + 0.15 \times 6.75\% + 0.35 \times 7.00\%$$

$$= 1.34\% + 1.35\% + 1.01\% + 2.45\% = 6.15\%$$

Factor 2

$$= 0.20 \times 10\% + 0.30 \times 7\% + 0.15 \times 9\% + 0.35 \times 8.85\%$$

$$= 2\% + 2.10\% + 1.35\% + 3.10\%$$

$$= 8.55\%$$

- (ii) Calculation of expected Return on the Market index under Arbitrage Pricing Theory (Existing Scenario):

Category	Factor 1 (Inflation)				
	Beta	Actual value	Expected value	Difference	Beta x Diff.

	(a)	(b) (%)	(c) (%)	(b) - (c) = (d) (%)	(e)
Small Cap	1.20	6.70	6.70	0.00	0.00
Medium Cap	1.75	6.00	4.50	1.50	2.63
Large Cap	1.30	8.00	6.75	1.25	1.63
Flexi cap	1.70	6.50	7.00	(0.50)	(0.85)

	Factor 2 (Stock Market)					
Category	Beta	Actual value	Expected value	Difference	Beta x Diff.	Total
	(f)	(g) (%)	(h) (%)	(g) - (h) = (i) (%)	(j)	(e) + (j) = (k)
Small Cap	0.80	10.50	10.00	0.50	0.40	0.40
Medium Cap	0.90	8.00	7.00	1.00	0.90	3.53
Large Cap	1.165	10.00	9.00	1.00	1.17	2.80
Flexi cap	0.85	9.75	8.85	0.90	0.77	(0.08)

Category	Weight in market index (1)	Total Beta x Diff (2)	Expected Return (2 x 1 = 3)
Small Cap	20%	0.40	0.08
Medium Cap	30%	3.53	1.06
Large Cap	15%	2.80	0.42
Flexi cap	35%	(0.08)	(0.03)
Total			1.53
Add: Risk Free Rate of Interest			7.50
Expected Return (%)			9.03

- (iii) Expected Return on the Market Index under Arbitrage Pricing Theory under changed scenario

Category	Weight in market index (1)	Total Beta x Diff (2)	Expected Return (2 x 1 = 3)
Small Cap	25%	0.40	0.10
Medium Cap	25%	3.53	0.88
Large Cap	25%	2.80	0.70
Flexi cap	25%	(0.08)	(0.02)
Total			1.66
Add: Risk Free Rate of Interest			7.50
Expected Return (%)			9.16

- (iv) As per the above calculation, the investors by investing 25% equally in all four categories, is profitable compared to the existing composition. As the proposed composition gives rate of return of 9.16% per annum when compared to the existing return of the present portfolio which is 9.03%.

Question 22(RTP/MTP/PP)

M/s. Siri Ltd. Has a surplus amount of ₹ 3 crores to invest and has shortlisted the following equity shares:

Company	Beta
S Ltd.	1.6
K Ltd.	1
P Ltd.	-0.3
D Ltd.	2
C Ltd.	0.6

Required:

- If M/s. Siri Ltd. invests an equal amount in all securities, what is the beta of the portfolio?
- If M/s. Siri Ltd. invests 15% of its investment in S Ltd., 15% in P Ltd., 10% in C Ltd. and the balance in equal amount in the other two securities, what is the beta of the portfolio?
- If the expected return of market portfolio is 12% at a beta factor of 1.0, what will be the portfolios expected return in both the situations given above?
- If the Company changes its policy to invest in any 3 securities with a minimum of 20% in each of these 3 securities to diversify risk, you are requested to advise the company to have a right mix of securities to maximize the return in the following two scenarios and also calculate the expected return:
 - Bull Phase: Expected Market returns 10%
 - Bear Phase: Expected Market returns — 5%

Solution:

(i) Beta of the Portfolio

Investment	Beta (β)	Investment (₹ Lakhs)	Weighted Investment
S Ltd.	1.6	60	96
K Ltd.	1.0	60	60
P Ltd.	-0.3	60	-18
D Ltd.	2.0	60	120
C Ltd.	0.6	60	36
		300	294

$$\beta_P = \frac{294 \text{ lakh}}{300 \text{ lakh}} = 0.98$$

Alternatively, it can also be computed as follows:

$$1.6 \times \frac{1}{5} + 1.0 \times \frac{1}{5} + (-0.30) \times \frac{1}{5} + 2 \times \frac{1}{5} + 0.6 \times \frac{1}{5} = 0.98$$

(ii) With varied percentages of investments portfolio beta is calculated as follows:

Investment	Beta (β)	Investment (₹ Lakhs)	Weighted Investment
S Ltd.	1.6	45	72
K Ltd.	1.0	90	90
P Ltd.	-0.3	45	-13.50
D Ltd.	2.0	90	180

C Ltd.	0.6	30	18
		300	346.50

$$\text{Beta} = \frac{346.50}{300} = 1.155$$

- (iii) Expected return of the portfolio with pattern of investment as in case (i) = $12\% \times 0.98$ i.e. 11.76%

Expected Return with pattern of investment as in case (ii) = $12\% \times 1.155$ i.e., 13.86%.

- (iv) (1) Securities to be selected during Bull Phase Expected Market returns 10%

As it is bull Market Higher Beta stocks should be selected.

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	20	1.6	60,00,000	96,00,000
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	0	-0.3	-	-
D Ltd.	60	2	1,80,00,000	3,60,00,000
C Ltd.	0	0.6	-	-
	100		3,00,00,000	5,16,00,000

Portfolio or Weighted Beta (β) (5,16,00,000/ 3,00,00,000) 1.72
 Portfolio Beta (β) 1.72
 Market Return 10%
 Expected Return 17.20%

- (2) Securities to be selected During Bear Phase Expected Market returns - 5%

As it is bear market Lower Beta stocks should be selected

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	0	1.6	-	-
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	60	-0.3	1,80,00,000	-54,00,000
D Ltd.	0	2	-	-
C Ltd.	20	0.6	60,00,000	36,00,000
	100		3,00,00,000	42,00,000

Portfolio or Weighted Beta (β) (42,00,000/ 3,00,00,000) 0.14
 Portfolio Beta (β) 0.14
 Market Return -5%
 Expected Return -0.70%

Question 23(RTP/MTP/PP)

Following is the information related to return on shares of three different companies :

Years	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%

2019	6%	8%	7%
2020	13%	14%	15%
2021	7%	9%	11%

Required:

- Construct maximum number of portfolio and its return, if each portfolio consists of any two Company's shares in proportion of 65% and 35% and suggest which portfolio provides highest return.
- Calculate portfolio return and beta (β), if Mr. X invests ₹ 65,000 in A Ltd. having beta (β) of 0.45; ₹20,000 in B Ltd. having beta (β) of 1.15 and ₹ 15,000 in C Ltd. having beta (β) of 1.8.

Solution:

Calculation of Average Return

Year	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%
2019	6%	8%	7%
2020	13%	14%	15%
2021	7%	9%	11%
Sum	28%	34%	38%
Average	7%	8.50%	9.50%

- Combination 1 - 65% in A Ltd. & 35% B Ltd.
Return = $7\% \times 0.65 + 8.50\% \times 0.35 = 4.55\% + 2.975\% = 7.525\%$ or 7.53%
 - Combination 2 - 65% in B Ltd. & 35% in C Ltd.
Return = $8.50\% \times 0.65 + 9.50\% \times 0.35 = 5.525\% + 3.325\% = 8.85\%$
 - Combination 3 - 65% in C Ltd. & 35% in A Ltd.
Return = $0.65 \times 9.50\% + 0.35 \times 7.00\% = 6.175\% + 2.45\% = 8.625\%$ or 8.63%
 - Combination 4 - 65% in A Ltd. & 35% in C Ltd.
Return = $0.65 \times 7\% + 0.35 \times 9.50\% = 4.55\% + 3.325\% = 7.875\%$ or 7.88%
 - Combination 5 - 35% in A Ltd. & 65% in B Ltd.
Return = $0.35 \times 7\% + 0.65 \times 8.50\% = 2.45\% + 5.525\% = 7.975\%$ or 7.98%
 - Combination 6 - 35% in B Ltd. & 65% in C Ltd.
Return = $0.35 \times 8.50\% + 0.65 \times 9.50\% = 2.975\% + 6.175\% = 9.15\%$
Since maximum return is under Combination - 6 i.e. 65% investment in C Ltd. and 35% in B Ltd. hence it should be opted for.

(ii) Calculation of Return and Beta of Portfolio

$$\text{Return of Portfolio} = 7\% \times \frac{65,000}{1,00,000} + 8.50\% \times \frac{20,000}{1,00,000} + 9.50\% \times \frac{15,000}{1,00,000} = 7.675\%$$

$$\text{Beta of Portfolio} = 0.45 \times \frac{65,000}{1,00,000} + 1.15 \times \frac{20,000}{1,00,000} + 1.80 \times \frac{15,000}{1,00,000} = 0.7925 \text{ or } 0.79$$

CHAPTER - 8

Mutual Fund

Question 9(RTP/MTP/PP)

Mr. K has invested in three Mutual fund schemes as per details below:

	Scheme A	Scheme B	Scheme C
Date of Investment	01-12-2018	01-01-2019	01-03-2019
Amount of Investment	₹ 5,00,000	₹ 10,00,000	₹ 5,00,000
Net Asset Value at entry date	₹ 10.50	₹ 10.00	₹ 10.00
Dividend received up to 31-03-2019	₹ 9,500	₹ 15,000	₹ 5,000
NAV as at 31-3-2019	₹ 10.40	₹ 10.10	₹ 9.80

You are required to calculate the effective yield on per annum basis in respect of each of the three schemes to Mr. K upto 31-03-2019, taking the year consisting of 365 days.

Provide a brief comment on the course of action he should take for future period.

(Calculation should be upto three decimal places)

Solution:

- (i) Calculation of effective yield on per annum basis in respect of three mutual fund schemes to Mr. K up to 31-03-2019:

Particulars	Scheme A	Scheme B	Scheme C
(a) Investments	₹ 5,00,000	₹ 10,00,000	₹ 5,00,000
(b) Opening NAV	₹ 10.50	₹ 10.00	₹ 10.00
(c) No. of units(a/b)	47,619.048	1,00,000	50,000
(d) Unit NAV on 31-3-2019	₹ 10.40	₹ 10.10	₹ 9.80
(e) Total NAV on 31-3-2019 (c x d)	₹ 4,95,238.099	₹ 10,10,000	₹ 4,90,000
(f) Increase/ Decrease of NAV(e - a)	(₹ 4,761.901)	₹ 10,000	(₹ 10,000)
(g) Dividend Received	₹ 9,500	₹ 15,000	₹ 5,000
(h) Total yield (f+ g)	₹ 4,738.099	₹ 25,000	(₹ 5,000)
(i) Number of Days	121	90	31
j) Effective yield p.a. (h/a x 365/i x 100)	2.859%	10.139%	(-) 11.774%

Comments: Since the Effective Yield in Scheme C is negative and that of Scheme A is much lower than Scheme B, it is advised that Mr. K should redeem the investments in Scheme A and Scheme C and the proceeds should be invested in Scheme B in the next period.

Question 12(RTP/MTP/PP)

Mr. Potential has made investments in two mutual funds. The following information is available:

Mutual Fund	Smart	Growth
Jensen Alpha	1.10%	1.50%
Treynor's Ratio	0.0714	0.0775
Actual Return	8.50%	9.10%
Risk Premium		4%

You are required to calculate:

- i. Beta (β) for both the funds
- ii. Risk free Rate
- iii. Security Market Line

Solution

Mutual Fund	Smart	Growth
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

Jensen Alpha = Actual Return - $E(r)$

Treynor's Ratio = $\frac{E(r) - R_f}{\beta}$

$E(r)$ = Actual Return - Jensen Alpha

For Smart:

$$0.04\beta_s = 0.074 - R_f \quad (1)$$

$$0.0714\beta_s = 0.085 - R_f \quad (2)$$

On solving (1) and (2), we get $\beta_s = 0.35$ and $R_f = 0.06$

For Growth:

$$0.04\beta_g = 0.076 - R_f \quad (3)$$

$$0.0775\beta_g = 0.091 - R_f \quad (4)$$

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

i. Beta of Smart Mutual Fund is 0.35 and Growth Mutual Fund is 0.40.

ii. Risk free Rate = 6%

iii. Security Market Line for Smart = $0.06 + 0.04\beta$

Security Market Line for Growth = $0.06 + 0.04\beta$

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

Working Notes:

i. **Smart**

Jensen Alpha = 0.011

Actual Return = 0.085

Thus, expected return (as per CAPM) 0.074

Accordingly, Risk Free Rate of Return:

$$0.074 = R_f + 0.04$$

$$R_f = 0.034$$

Treynor's Ratio = 0.0714

$$0.0714 = \frac{0.085 - 0.034}{\beta_s}$$

$$\beta_s = 0.714$$

$$\text{Market Risk Premium} = \frac{0.04}{0.714} = 0.056$$

ii. **Growth**

Jensen Alpha = 0.015

Actual Return = 0.091

Thus, expected return (as per CAPM) = 0.076

Accordingly, Risk Free Rate of Return:

$0.076 = R_f + 0.04$

$R_f = 0.036$

Treynor's Ratio = 0.0775

$0.0775 = \frac{0.091 - 0.036}{\beta_G}$

$\beta_G = 0.710$

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

Security Market Line for Smart = $0.034 + 0.056\beta_S$

Security Market Line for Growth = $0.036 + 0.056\beta_G$

Question 13(RTP/MTP/PP)

Mr. S has invested in 3 different Mutual Fund Schemes. The following are the details of the same:

Particulars	Scheme A	Scheme B	Scheme C
Date of Investment	01-06-2022	01-07-2022	01-08-2022
Net Asset Value at Entry Date	₹ 11.00	₹ 10.50	₹ 12.00
Dividend received upto 31-03-23 (₹)	12,500.00	17,000.00	4,000.00
Unit NAV at 31-03-23 (₹)	11.25	11.48	10.80
Increase / (Decrease) in NAV (₹)	22,727.27	93,333.33	(50,000.00)
Effective Rate of Yield per annum	4.2296%	14.6978%	(-) 13.8190%

Ignore Entry/Exit load expenditure.

Assume 365 days in a year. Round off the investment to nearest ₹ 100.

You are required to calculate:

- The amount of investments made initially by Mr. S in these schemes.
- Number of units invested in the three schemes by Mr. S.

Advise also whether he can continue to hold this investment or can he redeem now.

Solution

- Calculation of amount of investment made initially by Mr. S:

Particulars	Scheme A	Scheme B	Scheme C
(a) Period of Investment	304 days	274 days	243 days
(b) Effective Yield p.a.	4.2296%	14.6978%	(-) 13.8190%
(c) Effective Yield for holding period	3.5227%	11.0334%	(-) 9.2000%
(d) Dividend Received	₹ 12,500	₹ 17,000	₹ 4000
(e) Increase / Decrease of NAV	₹ 22,727.27	₹ 93,333.33	(₹ 50,000)
(f) Total Yield (d + e)	₹ 35,227.27	₹ 1,10,333.33	(₹ 46,000)
(g) Initial Investment (f/c)	₹ 10,00,000	₹ 10,00,000	₹ 5,00,000
(h) NAV on date of Investment	₹ 11.00	₹ 10.50	₹ 12.00

ii. Units invested in three schemes by Mr. S

Particulars	Scheme A	Scheme B	Scheme C
Initial Investment	₹ 10,00,000	₹ 10,00,000	₹ 5,00,000
NAV on date of Investment	₹ 11.00	₹ 10.50	₹ 12.00
Units of Investment	90,909.09	95,238.10	41,666.67
Or	90,909	95,238	41,667

Advise: He should continue to investment in Scheme B and get redeemed both schemes A and C and invest their proceeds in Scheme B.

Question 14(RTP/MTP/PP)

Mr. Kar has invested in three mutual fund schemes as per details below:

	MFX	MFY	MFZ
Amount of investment (₹)	5,50,000	4,20,000	1,00,000
Dividend received up to 31.03.2023 (₹)	10,000	6,000	Nil
NAV as on 31.03.2023 (₹)	11.50	11.00	9.50
Effective yield p.a. as on 31.03.2023	19.345%	22.59%	-36.50%
Holding period	120 days	100 days	50 days

You are required to calculate Net Asset Value (NAV) at the time of purchase assuming 365 days in a year.

Solution

	MFX	MFY	MFZ
a. Amt. of Investment	550,000	420,000	1,00,000
b. Effective Yield p.a.	19.345%	22.59%	-36.50%
c. Period of Holding	120 Days	100 Days	50 days
d. Return for Holding Period	34,980	25,993.97	- 5000
e. Dividend Received	10,000	6,000	-
f. Total Gain in NAV(D - E)	24,980	19993.97	-5,000
g. Total NAV at End of Holding Period (A + F)	5,74,980	4,39,993.97	95,000
h. NAV (p.u.) as on 31.3.23	11.50	11.00	9.50
i. No. of Units (G/H)	49,998.26	39,999.45	10,000
j. NAV (p.u.) at the time of Purchase (A/I)	11.00	10.50	10.00

Alternative Solution

MFX

$$\frac{(11.00 - x) \times \frac{550000}{x} + 10000}{\frac{420000}{x}} = \frac{0.19345}{365} \times 120$$

$$\text{Or } \frac{6325000}{x} - 550000 + 10000 = 0.0636 \times 550000$$

$$\text{Or } \frac{6325000}{x} = 574980$$

$$\text{Or } x = \frac{6325000}{574980} = 11.00$$

MFY

$$\frac{(11.00 - Y) \times \frac{420000}{Y} + 6000}{\frac{420000}{Y}} = \frac{0.2259}{365} \times 100$$

$$\text{Or } \frac{4620000}{Y} - 420000 + 6000 = 0.062 \times 420000$$

$$\text{Or } \frac{4620000}{Y} = 440040$$

$$\text{Or } Y = \frac{4620000}{440040} = 10.50$$

MFZ

$$(9.50 - Z) \times \frac{100000}{Z} = \frac{-0.3650}{365} \times 50$$

$$\text{Or } \frac{950000}{Z} - 100000 = -0.05 \times 100000$$

$$\text{Or } \frac{950000}{Z} = 95000$$

$$\text{Or } Z = \frac{950000}{95000} = 10.00$$

Question 15(RTP/MTP/PP)

Mr. A, has invested in the Growrich Mutual Fund's Scheme. The details of the Mutual Fund Scheme are given below:

Asset Value at the beginning of the month	₹ 78.50
Annualized Return	16%
Distribution made in the nature of Income and Capital Gain (per unit respectively)	₹ 0.40 & ₹ 0.30

You are required to:

- Calculate the month end Net Asset Value of the Growrich Mutual Fund Scheme (Round off to 2 decimals)
- Comment briefly on the Month end NAV.

Solution

(i) Calculation of NAV at the end of month:

Given Annual Return = 16%

Hence Monthly Return = 1.33% (r)

$$r = \frac{(\text{NAV}_t - \text{NAV}_{t-1}) + I_t + G_t}{\text{NAV}_{t-1}}$$

$$0.0133 = \frac{(\text{NAV}_t - ₹ 78.50) + ₹ 0.40 + ₹ 0.30}{78.50}$$

$$1.04405 = \text{NAV}_t - ₹ 77.80$$

$$\text{NAV}_t = ₹ 78.84$$

(ii) COMMENT- Closing NAV is increased by ₹ 0.34 i.e. (₹ 78.84 - ₹ 78.50).

So, there is slight change in NAV.

Question 16(RTP/MTP/PP)

The following particulars relating to S Fund Schemes:

Particulars	Value ₹ in Crores
1. Investment in Shares (at cost)	
a. Pharmaceuticals companies	158
b. Construction Industries	62

c. Service Sector Companies	112
d. IT Companies	68
e. Real Estate Companies	20
2. Investment in Bonds (Fixed Income)	
a. Listed Bonds (8000, 14% Bonds of ₹ 15,000 each)	24
b. Unlisted Bonds	14
3. No. of Units outstanding (crores)	8.4
4. Expenses Payable	7
5. Cash and Cash equivalents	3
6. Market expectations on listed bonds	8.842%

The fund has incurred the following expenses:

Consultancy and Management fees	₹ 520 Lakhs
Office Expenses	₹ 180 Lakhs
Advertisement Expenses	₹ 48 Lakhs

Particulars relating to each sector are as follows:

Sector	Index on Purchase date	Index on Valuation date
Pharmaceutical companies	300	500
Construction Industries	275	490
Service Sector Companies	285	500
IT Companies	270	515
Real Estate Companies	265	440

Required:

- Calculate the Net Asset Value of the fund
 - Calculate the Net Asset Value per unit
 - Determine the Net return (Annualized), if the period of consideration is 4 years, and the fund has distributed ₹ 2 per unit per year as cash dividend during the same period.
- Note: Calculate figure in ₹ Crore upto 3 decimal points.

Solution:

(i) **Calculation of NAV of the Fund**

			(in ₹ Crore)
1.	Value of Shares		
	a. Pharmaceutical Companies	$158 \times \frac{500}{300}$	263.333
	b. Construction Companies	$62 \times \frac{490}{275}$	110.473
	c. Service Sector Companies	$112 \times \frac{500}{285}$	196.491
	d. IT Companies	$68 \times \frac{515}{270}$	129.704
	e. Real Estate Companies	$20 \times \frac{440}{265}$	33.208
2.	Investment in Bonds		
	a. Listed Bonds	$\frac{14}{8.842} \times 24$	38.00
	b. Unlisted Bonds		14.000
3.	Cash and Cash Equivalents		3.00

			788.209
	Less: Expense Payable		7.000
	NAV of the Fund		781.209

(ii) NAV of the Fund per Unit

NAV of the Fund	₹ 781.209 crore
Number of Units	8.40 crore
NAV Per Unit (₹ 781.209 crore/ 8.40 crore)	₹ 93.00

(iii) Net Return

Initial Cost Per Unit		
Investment in Shares	₹ 420 crore	
Bonds	₹ 38 crore	₹ 458 crore
Number of Units		8.40 crore
Cost Per Unit		₹ 54.52
Return		
Capital Gain	(₹ 93.00 - ₹ 54.52)	₹ 38.48
Dividend	₹ 4x 2	₹ 8.00
		₹ 46.48
Annualised Return	$\frac{46.48}{54.52} \times \frac{1}{4}$	21.31%

Question 18(RTP/MTP/PP)

Following is the information related to three mutual funds:

Year	MF-A	MF-B	MF-C
2020	10%	5%	14%
2021	8%	10%	10%
2022	12%	8%	18%

Correlation between market and mutual fund:

	MF-A	MF-B	MF-C
Correlation with market	0.45	0.25	0.65

Variance of the market is 9% and rate of return of government bond is 7%.

You are required to Rank the Mutual fund using Sharpe's ratio and Treynor's ratio.

Solution

i. Calculation of Standard Deviation of Funds

Year	MF-A (%)	Dev .	Dev. ²	MFB (%)	Dev.	Dev. ²	MF-C (%)	Dev.	Dev. 2
2020	10	-	-	5	-2.67	7.13	14	-	-
2021	8	-2	4	10	2.33	5.43	10	-4	16
2022	12	2	4	8	0.33	0.11	18	4	16
	30		8	23		12.67	42		32

	Avg. = 30/3 = 10		Var. = 8/3 = 2.67 $\sigma_A = 1.63$		Avg. = 23/3 = 7.67		Var. 12.67/3 = 4.22 $\sigma_B = 2.05$		Avg. = 42/3 = 14		Var. 32/3 = 10.67 $\sigma_C = 3.27$
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ii. Calculation of Beta of MFs

	r	σ_M	σ_i	Var. of Market	β_i
MF-A	0.45	3	1.63	9	0.244
MF-B	0.25	3	2.05	9	0.171
MF-C	0.65	3	3.27	9	0.709

Reward to Variability (Sharpe Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	σ_p	Reward to Variability	Ranking
MF-A	10.00	7.00	3.00	1.63	1.84	2
MF-B	7.67	7.00	0.67	2.05	0.33	3
MF-C	14.00	7.00	7.00	3.27	2.14	1

Reward to Volatility (Treynor Ratio)

Mutual Fund	R_p	R_f	$R_p - R_f$	β_p	Reward to Volatility	Ranking
MF-A	10.00	7.00	3.00	0.244	12.30	1
MF-B	7.67	7.00	0.67	0.171	3.92	3
MF-C	14.00	7.00	7.00	0.709	9.87	2

CHAPTER - 9

International Financial Management

Question 13(RTP/MTP/PP)

XY Ltd., is interested in expanding its operation and planning to install a unit at US. For the proposed project, it requires a fund of \$ 15 million (net of issue expenses/floating cost). The estimated floating cost is 3%. To finance the project it proposes to issue GDRs.

You as a financial consultant is required to compute the number of GDRs, to be issued and cost of the GDR with the help of following additional information.

(i) Expected market price of share at the time of issue of GDR is ₹350 (Face Value ₹100).

(ii) 3 shares shall underly each GDR and shall be priced at 6% discount to market price.

(iii) Expected Exchange Rate ₹84/\$.

(iv) Dividend expected to be paid is 10% with growth rate of 8%.

Solution:

Net Issue Size = \$15 million

Gross Issue = $\frac{\$15 \text{ Million}}{0.97} = \15.464 million

Issue Price per GDR in ₹ (350 × 3 × 94%)

₹ 987

Issue Price per GDR in \$ (₹ 987/ ₹ 84)

\$ 11.75

Dividend Per GDR (D_1) (₹ 10 × 3)

₹ 30

Net Proceeds Per GDR (₹ 987 × 0.97)

₹ 957.39

(i) Number of GDR to be issued $\frac{\$15.464 \text{ million}}{\$11.75} = 1.316085 \text{ million}$

(ii) Cost of GDR to XY Ltd. $K_e = \frac{30.00}{957.39} + 0.08 = 11.13\%$

CHAPTER - 14

Financial Policy and Corporate Strategy

Question 12

Excellent Ltd., reported a profit of ₹ 154 lakhs after 30% tax for the financial year 2019-20. An analysis of the accounts revealed that there is an extraordinary loss of ₹ 20 lakhs and the income included extraordinary items of ₹ 16 lakhs. The existing operations, except for the extraordinary items, are expected to continue in the future. In addition, the results of the launch of a new product are expected to be as follows:

	₹ in lakhs
Sales	140
Material costs	40
Labour costs	24
Fixed costs	20

You are required to:

- Calculate the value of the business, given that the capitalization rate is 14%.
- Determine the market price per equity share, with Excellent Ltd.'s share capital being comprised of 2,00,000 at 13% preference shares of ₹ 100 each and 100,00,000 equity shares of ₹ 10 each and the P/E ratio being 12 times. (Ignoring Corporate Dividend Tax).

Solution:

(i) **Computation of Business Value**

	(₹ Lakhs)
Profit before tax $\frac{154}{1-0.30}$	220
Less: Extraordinary income	(16)
Add: Extraordinary losses	<u>20</u>
Profit from new product (₹ Lakhs)	224
Sales	140
Less: Material costs 40	
Labour costs 24	
Fixed costs <u>20</u>	<u>(84)</u>
	280.00
Less: Taxes @30%	<u>84.00</u>
Future Maintainable Profit after taxes	<u>196.00</u>
Relevant Capitalisation Factor	0.14
Value of Business (₹ 196/0.14)	1400

(ii) **Determination of Market Price of Equity Share**

Future maintainable profits (After Tax)	₹ 1,96,00,000
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Less: Preference share dividends 2,00,000 shares of ₹ 100 @ 13%	<u>₹ 26,00,000</u>
Earnings available for Equity Shareholders	<u>₹ 1,70,00,000</u>
No. of Equity Shares	1,00,00,000
Earning per share = $\frac{₹ 1,70,00,000}{1,00,00,000} =$	₹ 1.70
PE ratio	12
Market price per share	₹ 20.40

Question 15

Sun Ltd. recently made a profit of ₹ 200 crore and paid out ₹ 80 crore (slightly higher than the average paid in the industry to which it pertains). The average PE ratio of this industry is 9. The estimated beta of Sun Ltd. is 1.2. As per Balance Sheet of Sun Ltd., the shareholder's fund is ₹ 450 crore and number of shares is 10 crore. In case the company is liquidated, building would fetch ₹ 200 crore more than book value and stock would realize ₹ 50 crore less. The other data for the industry is as follows:

Projected Dividend Growth	4%
Risk Free Rate of Return	6%
Market Rate of Return	11%

Calculate the valuation of Sun Ltd. using

- P/E Ratio
- Dividend Growth Model
- Book Value
- Net Realizable Value

Solution:

- ₹ 200 crore × 9 = ₹ 1800 crore
- $K_e = 6\% + 1.2 (11\% - 6\%) = 12\%$
 $= \frac{80 \text{ crore} \times 1.04}{0.12 - 0.04} = ₹ 1040 \text{ crore}$
- ₹ 450 crore
- ₹ 450 crore + ₹ 200 crore - ₹ 50 crore = ₹ 600 crore

Question 20

M/s. Raghu Ltd. is interested in expanding its operation and planning to install manufacturing plant at US. It requires 8.82 million USD (net of issue expenses/ floatation cost) to fund the proposed project. GDRs are proposed to be issued to finance this project. The estimated floatation cost of GDRs is 2%.

Additional information:

- Expected market price of share at the time of issue of GDR is ₹ 360 (Face Value ₹ 100)
- Each GDR will represent two underlying Shares.
- The issue shall be priced at 10% discount to the market price.
- Expected exchange rate is INR/USD 72.
- Dividend is expected to be paid at the rate of 20% with growth rate of 12%.

Required:

- (i) **CALCULATE** the number of GDRs to be issued.
(ii) **ADVISE** company for making GDR issue if the company receives an offer from a US Bank willing to provide an equivalent loan with an interest rate of 12%?

Solution:

Working Notes:

Net Issue Size = \$ 8.82 million

Gross Issue = $\frac{8.82}{0.98}$ = \$9.00 million

Issue Price per GDR in ₹ (360 × 2 × 90%) ₹ 648

Issue Price per GDR in \$ (₹ 648/ ₹ 72) \$ 9.00

Dividend Per GDR (D1) = ₹ 20 × 2 = ₹ 40

Net Proceeds Per GDR = ₹ 648 × 0.98 = ₹ 635.04

(i) Number of GDR to be issued

$$\frac{\$ 9.00 \text{ million}}{\$ 9} = 1.00 \text{ million}$$

(ii) To advise the company about the cheapest option first we shall compute the Cost of GDR as follows:

$$K_e = \frac{40.00}{635.04} + 0.12 = 18.30\%$$

If the company receives an offer from US Bank willing to provide an equivalent amount of loan with interest rate of 12%, it should accept the offer because there will be net saving of 6.30%.

Question 21

MNO Ltd., a company based in India, manufactures very high quality modern furniture and sells them to a small number of retail outlets in India and Nepal. It is facing tough competition. Recent studies on marketability of product have clearly indicated that the customers are now more interested in variety and choice rather than exclusivity and exceptional quality. Since the cost of quality wood in India is very high, the company is reviewing the proposal for import of wood in bulk from Nepalese supplier.

The estimate of net India (₹) and Nepalese Currency (NC) cash flow in nominal terms for this proposal is shown below:

Years	Net cash flow (in Millions)	
	NC	India (₹)
0	-38	0
1	1.8	1.9
2	3.2	3.5
3	4.1	4.4
4	5.4	5.8
5	6.5	6.9

The following information is relevant :

- MNO Ltd. evaluates all investment by using a discount rate of 11% p.a. All Nepalese customers are invoiced in NC. NC cash flows are converted to Indian ₹ at the forward rate and discounted at the Indian rate.
- Inflation rate in Nepal and India are expected to be 11% and 10% p.a. respectively.
- The current exchange rate is ₹ 1 = NC 1.65

You are required to calculate Net Present value of the proposal.

Solution

Working Notes:

i. Computation of Forward Rates

End of year	NC	NC/₹
1	$NC\ 1.65 \times \left[\frac{(1+0.11)}{(1+0.10)} \right]$	1.665
2	$NC\ 1.665 \times \left[\frac{(1+0.11)}{(1+0.10)} \right]$	1.680
3	$NC\ 1.680 \times \left[\frac{(1+0.11)}{(1+0.10)} \right]$	1.695
4	$NC\ 1.695 \times \left[\frac{(1+0.11)}{(1+0.10)} \right]$	1.710
5	$NC\ 1.710 \times \left[\frac{(1+0.11)}{(1+0.10)} \right]$	1.726

ii. NC Cash Flows converted in Indian Rupees

Year	NC (Million)	Conversion Rate	₹ (Million)
0	-38.00	1.650	-23.03
1	1.80	1.665	1.081
2	3.20	1.680	1.905
3	4.10	1.695	2.419
4	5.40	1.710	3.158
5	6.50	1.726	3.766

Net Present Value

Year	Cash Flow in India	Cash Flow in Nepal	Total Cash Flow	PVF @ 11%	PV
0	---	-23.030	-23.030	1.000	-23.030
1	1.900	1.081	2.981	0.901	2.686
2	3.500	1.905	5.405	0.812	4.389
3	4.400	2.419	6.819	0.731	4.985
4	5.800	3.158	8.958	0.659	5.903
5	6.900	3.766	10.666	0.593	6.325
					1.258

Question 22

- What is sustainable growth rate?
- What makes an Organization Sustainable?
- Mr. X has submitted the following data:

Particulars	(₹) in Lakhs
Total Assets	250
Total Liabilities	220
Net Income	12
Dividend Paid	4.5
Sales	100

Mr. X wants to know to what extent sales can be increased without going for additional borrowings by using Sustainable Growth Rate (SGR) concept?

Solution

- i. The sustainable growth rate is a measure of how much a firm can grow without borrowing more money. After the firm has passed this rate, it must borrow funds from another source to facilitate growth.
- ii. In order to be sustainable, an organisation must:
 - have a clear strategic direction;
 - be able to scan its environment or context to identify opportunities for its work;
 - be able to attract, manage and retain competent staff;
 - have an adequate administrative and financial infrastructure;
 - be able to demonstrate its effectiveness and impact in order to leverage further resources; and
 - get community support for, and involvement in its work.

SI. No	Particulars	Amount in ₹ Lakhs
1.	Total Assets	250.00
2.	Total Liabilities	220.00
3.	Net Income	12.00
4.	Dividend Paid	4.50
5.	Sales	100.00
6.	Equity (a) - (b)	30.00
7.	Return on Equity (ROE) (c) /(f)	40.00%
8.	Dividend pay-out Ratio (d) /(c)	37.50%
9.	SGR [g × (1-h)]	25.00%*
10.	Additional Sales can be achieved without further borrowings (e) × (i)	25.00
11.	Maximum sales can be achieved without further borrowings (e) + (j)	125.00

* Alternatively, it can also be computed as follows:

$$SGR = \frac{g(1-h)}{1-[g(1-h)]} = 33.33\%$$
 and then Additional Sales shall be ₹ 33.33 Lakhs and Maximum Sales can be achieved without further borrowings shall be ₹ 133.33 Lakhs

CHAPTER - 15

Advanced Capital Budgeting Decisions

Question 2(MTP/RTP/PP)

VK Ltd. is an Indian company which is planning to set up a manufacturing plant through its subsidiary in the small country Farland, (where hitherto it was exporting) in view of growing demand for its product and competition from other MNCs. The currency of Farland is the Farroh (Fr.).

An initial investment of Fr. 80 million in plant and machinery would be required. In addition to that the initial investment in working capital of Fr. 6 million would be also required which shall

be financed through a loan from a local bank of Farland, at interest rate of 10% p.a. The working capital shall also be subject to inflation. At the end of 5 years, the subsidiary would be taken over by the Govt. of Farland for a price of Fr. 2 million. The part of the proceeds would be used to pay off the bank loan.

It is expected that subsidiary shall produce Net Cash Flows from Operations of Fr. 30 million per year at current price level over the five-year period, before allowing for Farland inflation of 8% per year. Depreciation on Plant and Machinery shall be charged at 20% per year on straight line basis. As a result of setting up the subsidiary, VK Ltd. expects to lose after-tax export income from Farland of INR 8,00,000 per year in current price terms, before allowing for India inflation of 3%. Profits in Farland are taxed at a rate of 20% after allowing deduction for interest and depreciation. All after-tax cash profits are remitted to the India at the end of each year. Indian tax @ 30% is charged on profit earned, but due to tax treaty between Farland and the India the tax paid in Farland is allowed to be set off against any India Tax liability. Taxation is paid in the year in which the liability arises. VK Ltd. requires foreign investments to be discounted at 12%. The current exchange rate is Fr.2.5/INR and the Farroh is expected to depreciate against INR by 5% per year.

Advise should VK Ltd. undertake the investment in Farland or not.

- Note:- 1. Present Figures in thousands multiple.
2. Round off all calculations.
3. PVF @12%

Year	1	2	3	4	5
PVF	0.893	0.797	0.712	0.636	0.567

Solution:

Working Notes:

1. Calculation of the project cash flows for VK Ltd.'s subsidiary in Farland

Fr.'000						
Year	0	1	2	3	4	5
Cash flows from operations		32400	34992	37791	40815	44080
Depreciation		16000	16000	16000	16000	16000
Interest		600	600	600	600	600
Profit before Tax		15800	18392	21191	24215	27480
Farland Tax		3160	3678	4238	4843	5496
Profit after Tax		12640	14714	16953	19372	21984
Add back Depreciation		16000	16000	16000	16000	16000
Initial Investment	-80000	28640	30714	32953	35372	37984
Working Capital	-6000	---	---	---	---	---
Change in W.C.		-480	-518	-560	-605	-653
Loan Capital						-6000
Sale of Subsidiary	---	---	---	---	---	2000
	-80000	28160	30196	32393	34767	33331

2. Expected Exchange Rates

Year	Rate
------	------

0	2.50
1	$2.50 \times 1.05 = 2.63$
2	$2.50 \times (1.05)^2 = 2.76$
3	$2.50 \times (1.05)^3 = 2.89$
4	$2.50 \times (1.05)^4 = 3.04$
5	$2.50 \times (1.05)^5 = 3.19$

3. Calculation of Tax paid in India

Year	1	2	3	4	5
PBT (Fr)	15800	18392	21191	24215	27480
Tax @ 10%	1580	1839	2119	2422	2748
Exchange rate	2.63	2.76	2.89	3.04	3.19
Tax in India (INR '000)	601	666	733	797	861

Calculation Net Present Value (NPV) for VK Ltd.'s subsidiary at parent company level

Year	0	1	2	3	4	5
Project Cash Flows (Fr. '000)	-80000	28160	30196	32393	34767	33331
Exchange Rate (Fr./INR)	2.50	2.63	2.76	2.89	3.04	3.19
Cash Invested from India (INR '000)	-32000	--	--	--	--	--
Cash Received in India (INR '000)	--	10707	10941	11209	11437	10449
Tax in India (INR '000)		601	666	733	797	861
	-32000	10106	10275	10476	10640	9588
Lost export after tax (INR '000)		824	849	874	900	927
Parent Cash Flow	-32000	9282	9426	9602	9740	8661
PVF	1	0.893	0.797	0.712	0.636	0.567
	-32000	8289	7513	6837	6195	4911
NPV						1745

Decision: Since NPV of the project is positive it should be accepted.

Question 3(MTP/RTP/PP)

The ABC Startup has the following expected profits under different scenarios along respective probabilities:

Year	Best Case		Base Case		Worst Case	
	Revenue	Expenses	Revenue	Expenses	Revenue	Expenses
1	₹ 100,00,000	₹ 80,00,000	₹ 100,00,000	₹ 90,00,000	₹ 100,00,000	₹ 95,00,000
2	₹ 120,00,000	₹ 92,40,000	₹ 110,00,000	₹ 95,70,000	₹ 102,00,000	₹ 98,94,000
3	₹ 144,00,000	₹ 108,00,000	₹ 121,00,000	₹ 102,85,000	₹ 104,04,000	₹ 101,95,920
Probability	30%		60%		10%	

You are required to suggest the value of ABC Startup using First Chicago Method assuming that:

- Applicable discounting rate is 20%.
- Startup is located in Tax-free Zone.
- The multiple for Terminal is 10.

(iv) No depreciable assets are held by the ABC Startup.

Note: 1. Present Value Factor (PVF)

Year	1	2	3
PVF@20%	0.8333	0.6944	0.5787

2. Round off the calculation to whole numbers.

Solution:

Valuation of Startup under different scenarios:

(i) Best Case Scenario

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 120,00,000	₹ 144,00,000	
Expenses	₹ 80,00,000	₹ 92,40,000	₹ 108,00,000	
Cash Flow/ Earnings	₹ 20,00,000	₹ 27,60,000	₹ 36,00,000	
Terminal Value				₹ 3,60,00,000
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 16,66,600	₹ 19,16,544	₹ 20,83,320	₹ 2,08,33,200
Value of Startup				
				₹ 2,64,99,664

(ii) Base Case Scenario

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 110,00,000	₹ 121,00,000	
Expenses	₹ 90,00,000	₹ 95,70,000	₹ 102,85,000	
Cash Flow/ Earnings	₹ 10,00,000	₹ 14,30,000	₹ 18,15,000	
Terminal Value				₹ 181,50,000
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 8,33,300	₹ 9,92,992	₹ 10,50,341	₹ 105,03,405
Value of Startup				₹ 133,80,038

(iii) Worst Case Scenario

	Year 1	Year 2	Year 3	
Revenue	₹ 100,00,000	₹ 102,00,000	₹ 104,04,000	
Expenses	₹ 95,00,000	₹ 98,94,000	₹ 101,95,920	
Cash Flow/ Earnings	₹ 5,00,000	₹ 3,06,000	₹ 2,08,080	
Terminal Value				₹ 20,80,800
PVF @ 20%	0.8333	0.6944	0.5787	0.5787
PV	₹ 4,16,650	₹ 2,12,486	₹ 1,20,416	₹ 12,04,159
Value of Startup				₹ 19,53,711

Value of ABC Startup as per First Chicago Method

$$= 0.30 \times ₹ 2,64,99,664 + 0.60 \times ₹ 133,80,038 + 0.10 \times ₹ 19,53,711$$

$$= ₹ 79,49,899 + ₹ 80,28,023 + ₹ 1,95,371$$

$$= ₹ 1,61,73,293$$

Question 4(MTP/RTP/PP)

JB Consultancy Group has determined relative utilities of cash flows of two forthcoming projects of its client company as follows

Cash Flow in ₹	-150000	-100000	-40000	150000	100000	50000	10000
Utilities	-100	-60	-3	40	30	20	10

The distribution of cash flows of project X and Project Y are as follows

Project X

Cash Flow (₹)	-150000	-100000	150000	100000	50000
Probability	0.10	0.20	0.40	0.20	0.10

Project Y

Cash Flow (₹)	-100000	-40000	150000	50000	100000
Probability	0.10	0.15	0.40	0.25	0.10

Which project should be selected and why?

Solution:

Evaluation of project utilizes of Project X and Project Y

Cash flow (in ₹)	Project X		
	Probability	Utility	Utility value
-1,50,000	0.10	-100	-10
-1,00,000	0.20	-60	-12
1,50,000	0.40	40	16
1,00,000	0.20	30	6
50,000	0.10	20	2
			2
Cash flow (in ₹)	Project Y		
	Probability	Utility	Utility value
-1,00,000	0.10	-60	-6
-40,000	0.15	-3	-0.45
1,50,000	0.40	40	16
50,000	0.25	20	5
1,00,000	0.10	30	13
			17.55

Project Y should be selected as its expected utility is more.