Final
Group III
Paper 14: Strategic Financial Management
(SYLLABUS – 2016)

PART-I – MCQ QUESTIONS

1. Multiple Choice Questions (MCQ)

(1 marks for correct choice, 1 mark for justification.)

(i) Which of the following securities is most liquid?

(A) Money Market instruments
(B) Capital Market instruments
(C) Gilt –edged securities
(D) Index futures

(ii) A Ltd. has an EPS of ₹ 3 last year and it paid out 60% of its earnings as dividends that year. This growth rate in earnings and dividends in the long term is expected to be 6%. If the required rate of return on equity for Ashrin Ltd. is 14%. Calculate the P/E ratio of A Ltd.

(A) 7.50
(B) 7.65
(C) 7.85
(D) 7.95

(iii) The current spot rate for the US$ is ₹ 50. The expected inflation rate is 6 per cent in India and 2.5 per cent in the US. What will be the expected spot rate of the US$ a year hence?

(A) ₹51.71
(B) ₹50.71
(C) ₹57.01
(d) ₹52.71

(iv) DEF Ltd. placed ₹52 Crores in overnight call with a foreign bank for a day in overnight call. The call ruled at 5.65% p.a. What is the amount it would receive from the foreign bank the next day?

(A) ₹52,00,70,493
(B) ₹52,00,80,493
(C) ₹52,00,80,593
(D) ₹52,00,80,693

(v) The rates available in the Kolkata market are:

₹/$ Spot	46.75/78
£/$	0.5285/86

If an Indian Importer requires pounds, calculate the rate quoted to him.

(A) ₹88.51/£
(B) ₹85.51/£
(C) ₹86.51/£
(D) ₹87.51/£

(vi) While plotting a graph with risk on X –axis and expected return on Y –axis , a line drawn with co-ordinates (0, r_f) and (β, r_m) is called:

(A) Security market Line
(B) Characteristic Line
(C) Capital Market Line
(D) CAPM Line

(vii) If the RBI intends to reduce the supply of money as part of anti inflation policy , it might

(A) Lower bank rate
(B) Increase Cash Reserve Ratio
(C) Decrease SLR
(D) Buy Government securities in open market.

(viii) A Ltd., an export customer who relied on the interbank rate of `/$ 46.50/10 requested his banker to purchase a bill for USD 80,000. Calculate the rate to be quoted to A Ltd., if the banker wants a margin of 0.08%.

(A) ₹45.45
(B) ₹44.44
(C) ₹46.46
(D) ₹47.47

(ix) _____ estimate the difference between the required rate of return and the growth rate.

(A) Retention ratio
(B) Leverage ratio
(C) Payout Ratio
(D) Dividend yield ratio.

(x) Two Firms P Ltd and M Ltd. are similar in all respects expect that M Ltd. uses ₹ 10,00,000 debt in its capital structure. If the corporate tax rate for these firms is 40%. Calculate the value of M Ltd. exceeds that of P Ltd.

(A) ₹4,00,000
(B) ₹4,40,000
(C) ₹4,04,000
(D) ₹4,00,400

Answer:

(i) (C) Gilt –edged securities. Of all securities given, gilt edged securities are considered as most liquid because they are Government bonds and have active secondary market.

(ii) (D) 7.95

P/E Ratio=Payout Ratio/(r-gn)

=0.6(1.06)/(0.14-0.06)=0.636/0.08=7.95

(iii)(A) ₹51.71

(Expected spot rate a year from now)/ Current spot rate= (1+ Expected inflation on home country)/ (1+ Expected Inflation in foreign country

or Expected spot rate of US$ a year hence = (₹ 50 * 1.06)/1.025 = ₹ 51.71

(iv) (B) ₹52, 00, 80, 493

Amount placed in call = ₹52 crores

Interest = 5.65% p.a.

Amount receivable next day = Principal + Interest for a day

= ₹52 Crores + 52 crores *(1 /365)*(5.65 /100) = ₹52,00,80,493

(v) (A) ₹88.51/£

The rate to be quoted to the importer is the Ask rate

= $(₹/\$)_{Ask} * (\$/N)_{Ask} = (₹/\$)_{Ask} * (1/(£/\$)_{Bid}$ = 46.78 x 1/0.5285 = ₹88.51/£

(vi) (A) Security market Line

Security market Line simply represents the average or normal trade-off between risk and return for a group of securities where risk is measured typically in terms of the securities betas.

(vii) (B) Increase Cash Reserve Ratio

If the RBI intends to reduce the supply of money as part of anti inflation policy, it might increase bank rate, increase Cash Reserve Ratio, increase SLR, sell Government securities in open market.

(viii) (C) ₹46.46

Profit margin of 0.08% is to be deducted from the bid rate.

That is 46.50 x 0.0008 = ₹ 0.04

Spot bid rate = 46.50 – 0.04 = ₹ 46.46

(ix) (D) Dividend yield ratio.

As per constant dividend discount model, $P=D_1/(k-g)$, so $k-g=D_1/P$ is dividend yield.

(x) (A) ₹4,00,000

When Corporate taxes are considered, the value of the firm that is levered would be equal to the value of the unlevered firm increased by the tax shield associated with debt i.e. Value of Levered Firm = Value of unlevered firm + Debt (Tax rate)

Therefore, Value of M Ltd. would exceed the value of P Ltd. by only Debt (Tax rate)

i.e., 0.4 × 10,00,000 = ₹ 4,00,000.

PART II: SUBJECTIVE QUESTIONS

2) ANKIT Ltd. a manufacturing company produces 25,000 litres of special lubricants in its plant. The existing plant is not fully depreciated for tax purposes and has a book value of ₹3 lakhs (it was bought for ₹6 lakh six years ago). The cost of the product is as under:

Particulars	Cost/Litre (₹)
Variable costs	60.00
Fixed Overheads	15.00
	75.00

It is expected that the old machine can be used for further period of 10 Years by carrying out suitable repairs at a cost of ₹2 lakh annually.

A manufacturer of machinery is offering a new machine with the latest technology at ₹10 lakhs after trading off the old plant (machine) for ₹1 lakh. The projected cost of the product will then be:

Particulars	Cost/Litre (₹)
Variable costs	45.00
Fixed Overheads	20.00
	65.00

The fixed overheads are allocations from other department plus the depreciation of plant and machinery. The old machine can be sold for ₹2 lakh in the open market. The new machine is expected to last for 10 years at the end of which, its salvage value will be ₹1 lakhs. Rate of corporate taxation is 50%. For tax purposes, the cost of the new machine and that of the old one may be depreciated in 10 years. The minimum rate of return expected is 10%

It is also anticipated that in future the demand for the demand for the product will remain at 25,000 litres.

Advice whether the new machine can be purchased ignores capital gain taxes.

[Given: PVIFA (10%, 10 years) = 6.145, PVIF (10%, 10 years) = 0.386]

Answer:

ANKIT LTD

Comparative Analysis:

	Old Machine	New Machine	Differential Cash Flow on new machine (₹) Saving/(Extra Cost)₹
Production Ltrs	25,000	25,000	
Variable Cost per Ltr (₹)	60	45	
Total Variable Cost (₹)	15,00,000	11,25,000	3,75,000
Annual Cost of Repair (₹)	2,00,000	-----	2,00,000
Depreciation (₹)	30,000	1,00,000	(70,000)
(10.00 + 1.00 – 1.00) / 10			
Total Saving			5,05,000
Less: Tax Saving (50%)			(2,52,500)
Add: depreciation (not being cast outflow)			70,000
			3,22,500

Present Value of Cash flow if new machine is taken:

Year		Cash Flow (₹)	PV Factor (At 10%)	Present Value (₹)
0	Outflow on new Machine (₹10 Lakhs)	10,00,000	1.000	(10,00,000)
1-10	Annual Saving (as above)	3,22,500	6.145 (Cum)	19,81,762
10	Salvage value of new machine	1,00,000	0.386	38,600
				10,20,362

Recommendation: Since NPV is positive, the new plant is to be acquired.
Note: Fixed overhead are allocations from other department and therefore, not relevant for the replacement decision.

3) A company is considering a proposal of installing drying equipment. The equipment would involve a cash outlay of ₹6,00,000 and net working capital of ₹80,000. The expected life of the project is 5 years without any salvage value. Assume that the company is allowed to charge depreciation on straight line basis for income tax purpose. The estimated before-tax cash inflows (₹' 000) are given below:

Year-end	1	2	3	4	5
Before-tax cash inflows	240	275	210	180	160

The applicable income-tax rate of the company is 35%. If the company's cost of capital is 12%, calculate the equipment's discounted payback period, and net present value.

Answer:

Statement showing the calculation of present value of CFAT:

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
A Cash flows before tax B Less: Tax@35%	240 (84)	275 (96.25)	210 (73.5)	180 (63)	160 (56)
C After tax cash flows D Add: tax saving on depreciation	156 42				
E Net cash flow after tax F release of working capital	198 -				
G CFAT for last year H PVF at 12% I PV J NPV = ₹709.10 – ₹680 = ₹29.10 thousands	- 0.8929 176.79	- 0.7972 175.98	- 0.7118 127.06	- 0.6355 101.04	
Cumulative discounted cash flows					
Discounted payback period					

4) A firm has an investment proposal requiring an outlay of ₹1,92,000. The Investment proposal is expected to have two years economic life with no salvage value. In year-end 1, there is a 0.4 probability that cash inflow after tax will be ₹1,20,000 and 0.6 probability that cash inflow after tax will be ₹1,44,000. The probability assigned to cash in flows after tax for the 2nd year-end are as follows:

The cash inflow year –end 1		**₹1,20,000**		**₹1,44,000**
The cash inflow year –end 2		**Probability**		**Probability**
	₹57,600	**0.2**	**96,000**	**0.4**
	₹76,800	**0.3**	**1,20,000**	**0.5**
	₹1,05,600	**0.5**	**1,44,000**	**0.10**

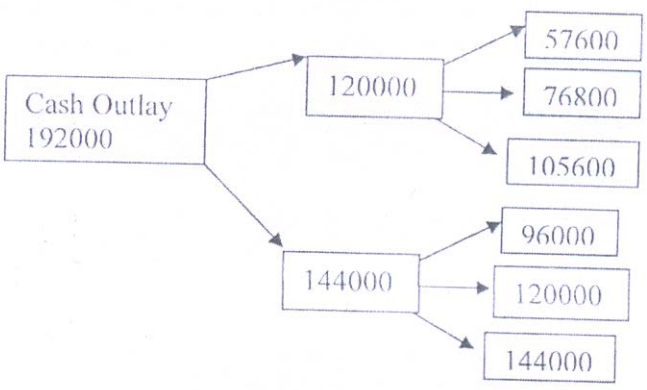
The firm uses 8% discount rate for this type of investment.

(i) Construct a decision tree for the proposed Investment project and calculate the expected Net Present Value.

(ii) What is the most likely NPV of the project and what is the corresponding probability? What is the probability of the project having a negative NPV?

Answer:

(i) The decision tree diagram is presented in chart identifying various paths and outcomes and computation of various paths/outcomes and NPV are presented in the following table.



Path No.	Joint Probability
1	0.08
2	012
3	0.20
4	0.24
5	0.30
6	0.06
	1.00

The Net Present value (NPV) of each path at 8% discount rate is given below:

Path	Year 1 Cash flow	Year 2 Cash flows	Total ("ash in Flow (PV) ₹	Cash Outflow ₹	NPV
1	120000 × 0.9259 = 111108	57600 × .8573 = 49380	160488	192000	-31512
2	111108	76800 × .8573 = 65841	176949	192000	-15051
3	111108	105600 × .8573 = 90531	201639	192000	9639
4	144000 × 0.9259 = 133330	96000 × .8573 = 82301	215631	192000	23631
5	133330	120000 × .8573 = 102876	236206	192000	44206
6	133330	144000 × .8573 = 123451	256781	192000	64781

Statement Showing Expected Net Present value

Path	NPV (₹)	Joint probability	Expected NPV
1	-31512	0.08	-2521
2	-15051	0.12	-1806
3	9639	0.20	1928
4	23631	0.24	5671
5	44206	0.30	13262
6	64781	0.06	3887
			20421

(ii) The most likely NPV = 44206; Probability = 0.3 or 30%

(iii) The Probability of NPV = paths (c) and (2) = 0.08 + 0.12 = 0.20 = 20%

5) A publishing house has bought out a new monthly magazine which sells at ₹ 25 per copy. The cost of purchasing it by newsstand is ₹ 20 per copy. A newsstand estimates the sales pattern of the magazine as under:

Demand copies	Probability
0 < 200	**0.18**
200 < 400	**0.32**
400 < 600	**0.25**
600 < 800	**0.15**
800 < 1000	**0.06**
1000 <1200	**0.04**

The newsstand has contracted for 500 copies of the magazine per month from the publisher. The unsold copies are returnable to the publisher who will take them back at cost less ₹ 2 per copy for handling charges.

The newsstand manager wants to simulate the pattern of demand and profitability.

The following random number may be used for simulation of sales pattern of each month.

26	**14**	**55**	**17**	**97**	**70**
51	**33**	**60**	**82**	**96**	**68**

You are required to:

(i) Allocate random numbers to the demand pattern forecast by the newsstand.

(ii) Simulate twelve months sales and calculate the monthly and annual profit/loss.

(iii) Calculate the loss on lost sales.

Answer:

Profit per copy of magazine = ₹ 25 – 20 = 5. If unsold copy is returned, loss per copy = ₹ 2.

(i) Allocation of random numbers:

Demand	Probability	Cumulative Probability	Random Nos. allocated
0 < 200	0.18	0.18	00 -17
200 < 400	0.32	0.50	18 – 49
400 < 600	0.25	0.75	50 – 74
600 < 800	0.15	0.90	75 – 89
800 < 1000	0.06	0.96	90 – 95
1000 <1200	0.04	1.00	96 - 99

(ii) Simulation of monthly pattern of demand and profitability:

Month	Random Number	Demand	Sales Copies	Returned Copies	Profit on sales ₹	Loss on return ₹	Net Profit (loss) ₹	Lost sale Copies
1	26	300	300	200	1,500	400	1,100	--
2	14	100	100	400	500	800	(300)	--
3	55	500	500	--	2,500	--	2,500	--
4	17	100	100	400	500	800	(300)	--
5	97	1,100	500	--	2,500	--	2,500	600
6	70	500	500	--	2,500	--	2,500	--
7	51	500	500	--	2,500	--	2,500	--
8	33	300	300	200	1,500	400	1,100	--
9	60	500	500	--	2,500	--	2,500	--
10	82	700	500	--	2,500	--	2,500	200
11	96	1,100	500	--	2,500	--	2,500	600
12	68	500	500	--	2,500	--	2,500	--
					24,000	2,400	21,600	1,400

(iii) Loss due to lost sales 1,400 copies × ₹ 5 = ₹ 7,000

6) A mutual Fund having 300 units has shown its NAV of ₹ 8.75 and ₹9.45 at the beginning and at the end of the year respectively. The Mutual Fund has given two options:

(i) Pay ₹0.75 per unit as dividend and ₹0.60per unit as a capital gain, or

(ii) These distributions are to be reinvested at an average NAV of ₹8.65 per unit.

What difference it would make in terms of returns available and which Option is preferable?

Answer:

(i) Returns for the year:

(All changes on a Per -Unit Basis)

Change in Price:	₹ 9.45 – ₹ 8.75 = ₹ 0.70
Dividends received:	₹ 0.75
Capital gains distribution	₹ 0.60
Total reward	₹ 2.05
Holding period reward:	$\frac{₹2.05}{₹8.75} = 23.43\%$

(ii) When all dividends and capital gains distributions are re-invested into additional units of the fund @ (₹ 8.65/unit)

Dividend + Capital Gains per unit

= ₹ 0.75 + ₹ 0.60 = ₹ 1.35

Total received from 300 units = ₹ 1.35 × 300 = ₹ 405/-.

Additional Units Acquired

= ₹ 405/ ₹ 8.65 = 46.82 Units.

Total No. of Units = 300 units + 46.82 units

= 346.82 units.

Value of 346.82 units held at the end of the year

= 346.82 units × ₹ 9.45 = ₹ 3277.45

Price Paid for 300 Units at the beginning of the year

= 300 units × ₹ 8.75 = ₹ 2,625.00

Holding Period Reward

₹ (3277.45 – 2625.00) = ₹ 652.45

% of Holding Period Reward

$\frac{₹\ 652.45}{₹\ 2625.00} = 24.85\%$

Conclusion: Since the holding period reward is more in terms of percentage in option-two i.e., reinvestment of distributions at an average NAV of ₹8.65 per unit, this option is preferable.

7) The following information is available regarding three Mutual Funds:

Mutual Fund	Average Return	Standard Deviation	Correlation with market
A	**24%**	**8%**	**0.30**
B	**16%**	**4%**	**0.70**
C	**12%**	**3%**	**0.50**

If the risk free return is 6%, return on market portfolio is 15% with a standard deviation of 4% ascertain:

(i) Total gain and the Net Gain under Fama's Net Selectivity.
(ii) Systematic risk and Unsystematic Risk.

Answer:

(a) Working Note:

Risk Free return (R_F) = 6%
Market Return (RM) = 15%
Market standard deviation (σ_M) = 4%
Market Risk Premium ($R_M - R_F$) = 15 % - 6% = 9%

Particulars	A	B	C
Average Return (R_P)	24%	16%	12%
Standard Deviation σ_P (Total Risk)	8%	4%	3%
Correlation with market (P_{PM})	0.30	0.70	0.50
Portfolio Beta (B_P) = $P_{pm} \times \sigma_P \div \sigma_m$	0.30 × 8 ÷4 = 0.60	0.70×4÷4 = 0.70	0.50 × 3 =4= .375
Actual Risk Premium	24-6 = 18%	16-6 = 10%	12-6 = 6%
(R_P - R_F) (A)			
Computation of Net gain			
Desired Risk Premium [($R_M - R_F$) × $\sigma_P \div \sigma_m$] (B)	[9% × 8% ÷ 4%] 18%	[9% × 4% ÷ 4%] 9%	[9% × 3% ÷ 4%] 6.75%
Fama's Net Selectivity (Net gain) =A - B	0	1%	(0.75%)
Computation of total gain Desired Risk Premium ($R_M - R_F$) × $P_{Pm} \times \sigma_p \div \sigma_m$ (C)			
OR Risk Premium in (B) × P_{pm}	18% × 0.30 = 5.4%	9% × 0.7 = 6.3%	6.75% × 0.5 = 3.375%
Total Gain A - C	(18% -5.4%) = 12.6%	(10%-6.3%) = 3.7%	(6% -3.375%) = 2.625%
(ii) Systematic Risk ($\sigma_P \times B_P$)	8% × 0.6 = 4.8%	4% ×.70 = 2.8%	3% ×.375 = 1.125%
Unsystematic Risk (Total Risk- Systematic Risk)	3.2%	1.2%	1.875%

8) Mr. G, on 01.07.2014, during the initial offer of some mutual fund invested in 20,000 units having face value of ₹ 20 per unit.

On 31.03.2015, the dividend operated by the Mutual Fund was 10% and Mr. G found that his annualised yield was 153.33%.

On 31.03.2016, 20% dividend was given.

On 31.03.2017, Mr. G redeemed all his balance of 22,600 units when his annualised yield was 73.52%.

What is the Net Asset Value (NAV) as on 31.03.2017?

Answer:

Yield for 9 months = 153.33 × 9/12 =115%.

Market value of investments as on 31.03.2015 = ₹ 4,00,000 + (₹4,00,000 × 115%) =₹8,60,000.

Therefore, NAV as on 31.03.2015 =(₹ 8,60,000 – ₹40,000)/ 20,000 = ₹41.

NAV would stand reduced to the extent of dividend payout, being ₹ 20,000 × ₹20 × 10% =₹40,000.

Since dividend was reinvested, additional units acquired = ₹ 40,000 /₹41 = 975.61 units.

Therefore, units as on 31.03.2015 = 20,000+ 975.61 = 20,975.61 units.

Alternatively, units as on 31.03.2015 = ₹ 8,60,000 /₹41 = 20,975.61 units.

Dividend as on 31.03.2016 = 20,975.61 × ₹20 × 0.2 = ₹ 83,902.44.

Let × be the NAV as on 31.03.2016, then no. of new units reinvested will be ₹83,902/ x. Accordingly, 22,600 units shall consist of reinvested units and 20,976 units (as on 31.03.2015). Thus by way of equation: 22,600 units = [₹ 83,902 / x] + 20,976 units.
Therefore, NAV as on 31.03.2016 = x = ₹ 83,902 / 1,624 units = ₹ 51.66.
NAV as on 31.03.2017 =[₹ 4,00,000 (1 + 0.7352 x {33 / 12})]/ 22,600 units = ₹53.48.

9) An investor purchased 300 units of a mutual fund at ₹12.25 per unit on 31st December, 2016. As on 31st December, 2017 he has received ₹1.25 as dividend and ₹1.00 as capital gains distribution per unit,

Required:

(i) The return on investment if the NAV as on 31st December, 2017 is ₹13.00.

(ii) The return on investment as on 31st December, 2017, if all dividends and capital gains distributions are reinvested into additional units of the fund at ₹12.50 per unit.

Answer: (i) Return for the year (all charges on a per year basis)

Particulars	₹/Unit
Changes in price [13.00 -12.25]	0.75
Dividend received	1.25
Capital gain distribution	1.00
Total return	3.00

Return on investment = [3.00 / 12.25] × 100 = 24.49 %

(ii) If all dividends and capital gains are reinvested into additional units at ₹ 12.50 per unit, the position would be:

Total amount reinvested = ₹ 2.25 × 300	= ₹675
Additional units added = ₹ 675 / 12.50	= 54 units
Value of 354 units as on 31.12. 2013	= ₹4,602
Price paid for 300 units on 31.12. 2012 = 300 × ₹ 12.25	= ₹3,675
Return = [4,602 - 3,675] / 3,675 =927/3,675	= 25.22%

10) Equi – stable is a portfolio model wherein 20% of Fund value is invested in Fixed Income Bearing Instruments. The balance of 80% is divided among old industry stock (iron and steel), Automotive Industry stock, Information Technology stocks, Infrastructure Company stocks and Financial Services Sector in the ratio of 4:2:6:3:5.

Three mutual funds X, Y and Z offer a fund scheme based on the Equi-stable portfolio model. The actual return on Equi-Stable portfolios of each of the three funds for the past 3 years is as follows:

	1	2	3
Portfolio X	**17.35%**	**18.70%**	**21.60%**
Portfolio Y	**17.20%**	**18.25%**	**22.15%**
Portfolio Z	**17.10%**	**18.60%**	**22.00%**

Beta factor of the Equi-Stable portfolio is measured at 1.35. Return on market portfolio indicates that ₹1,000 invested will fetch ₹153 in a year (including capital appreciation and dividend yield). RBI bonds, guaranteed by the Central Government yields 4.50%.

Rate the fund managers of X, Y and Z.

Answer: Computation of expected rate of return under CAPM:

$E(R_x) = R_F + \text{Beta} \times [R_M - R_F]$; Risk free return = R_f = 4.50 %

Return on market portfolio = R_M = 15.30 % [153 /1000]

Beta of Equi-stable = 1.35

So, Expected return of Equi-stable = 4.50 % + [1.35 × (15.30 % - 4.50 %] = 19.08 %

Computation of Alpha factor of 3 Funds						
Year	Mutual Funds X		Mutual Funds Y		Mutual Funds Z	
	Actual return	Abnormal return	Actual return	Abnormal return	Actual return	Abnormal return
1	17.35%	17.35 – 19.08 = (1.73)	17.20%	17.20 – 19.08 = (1.88)	17.10%	17.10- 19.08 = (1.98)
2	18.70%	18.70 – 19.08 = (0.38)	18.25%	18.25-19.08 = (0.83)	18.60%	18.60 – 19.80 = (0.48)
3	21.60%	21.60-19.08 = 2.52	22.15%	22.15-19.08 = 3.07	22.00%	22.00 – 19.08 = 2.92

Alpha factor:

Fund X = 0.41 / 3years = 0.137 %; Fund Y = 0.36 /3 years = 0.120 %; Fund Z = 0.46 / 3years = 0.153 %

Evaluation: Equitable scheme of mutual fund Z has the highest alpha 0.153 % return more than the market expectations when compared to 0.137 % and 0.120 % of fund X and Y. Therefore, fund manager of Mutual fund Z has performed better.

Ranking: Fund manager Z = 1; Fund manager X = 2 and Fund manager Y= 3.

11) A portfolio Manager has the following four stocks in his portfolio:

Security	No. of shares	Market price (₹) per Share	P = Beta
VL	12,000	40	0.9
CL	6,000	20	1.0
SL	10,000	25	1.5
AL	2,000	225	1.2

Compute the following:

(i) Portfolio Beta (β)

(ii) If the Portfolio Manager seeks to reduce the Beta to 0.8, how much risk-free investment should he bring in? Verify the result.

Answer:

(i)

Security	No. of shares	Market price Per share	Value Amount	% of total (w)	Beta	Weighted Beta
VL	12000	40	4,80,000	0.3692	0.9	0.3323
CL	6000	20	1,20,000	0.0923	1.0	0.0923
SL	10000	25	2,50,000	0.1923	1.5	0.2885
AL	2000	225	4,50,000	0.3462	1.2	0.4154
			13,00,000	1.000		1.129

Hence Portfolio Beta =1.129

(ii) Required Beta = 0.8

It should become 0.8/1.129 = 70.86% of the present portfolio

If ₹13,00,000 is 70.86%

Total Portfolio should be $\frac{13,00,000 \times 100}{70.86\%}$ = ₹18,34,603

Additional investment in zero risk should be = 18,34,603 – 13,00,000 = 5,34,600

Revised Portfolio will be

Security	No. of shares	Market price Per share	Value Amount	% of total (w)	Beta	Weighted Beta
VL	12000	40	4,80,000	0.2616	0.9	0.2354
CL	6000	20	1,20,000	0.0654	1.0	0.0654
SL	10000	25	2,50,000	0.1363	1.5	0.2045
AL	2000	225	4,50,000	0.2453	1.2	0.2944
Risk Free Asset	53460	10	5,34,600	0.2914	0	0
			18,34,600	1,000		0.80

12) Mr. QURESHI owns a portfolio with the following characteristics:

	Security A	**Security B**	**Risk-free Security**
Factor 1 Sensitivity	**0.80**	**1.50**	**0**
Factor 2 Sensitivity	**0.60**	**1.20**	**0**
Expected Return	**20%**	**25%**	**15%**

It is assumed that security returns are generated by a two-factor model:

(i) If Mr. QURESHI has ₹ 1,00,000 to invest and sells short ₹50,000 of Security B and purchases ₹1,50,000 of Security A, what is the sensitivity of Mr. QURESHI portfolio of the two factors?

(ii) If Mr. QURESHI borrows ₹1,00,000 at the risk-free rate and invests the amount he borrows along with the original amount of ₹ 1,00,000 in Security A and B in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?

(iii) What is the expected return premium of Factor 2?

Answer: Sale of Security B and investment in Security A

Security	Portfolio Value (Weights)	Sensitivity (Factor 1)	Product (Factor 1)	Sensitivity (Factor 2)	Product (Factor 2)
A (Invested)	1,50,000	0.80	1,20,000	0.60	90,000
B (Sold)	(50,000)	1.50	(75,000)	1.20	(60,000)
Total	1,00,000		45,000		30,000

Portfolio Sensitivity (Product ÷ Weights) for:

(i) Factor 1 = 45,000 ÷ 1,00,000 = 0.45

(ii) Factor 2 = 30,000 ÷ 1,00,000 = 0.30

Borrowing at Risk free Return, Investment in Security A and B

Security	Portfolio Value (Weights)	Sensitivity (Factor 1)	Product (Factor 1)	Sensitivity (Factor 2)	Product (Factor 2)
A (Invested)	3,00,000	0.80	2,40,000	0.60	1,80,000
B (Invested)	(1,00,000)	1.50	(1,50,000)	1.20	(1,20,000)
Risk free (sold)	(1,00,000)	0.00	Nil	0.00	Nil
Total	1,00,000		90,000		60,000

Portfolio Sensitivity (Product ÷ Weights) for:

(i) Factor 1 = 90,000 ÷ 1,00,000 = 0.90

(ii) Factor 2 = 60,000 ÷ 1,00,000 = 0.60

[It is assumed that portfolio Sensitivity = Weighted Average Sensitivity of individual Security comprising the portfolio]

Return Premium of Factor 2

Since the security returns are generated by a two factor model, it is assumed that the model is linear equation of two variables.

Where,

$\mathbf{R_s = R_F + B_{F1}\,(X) + B_{F2}\,(Y)}$

Where, R_s = Return of the Security S

R_F = Risk free Return

B_{F1} = Factor 1 Sensitivity

B_{F2} = Factor 2 Sensitivity

X = Return Premium for Factor 1

Y = Return Premium for Factor 2

Therefore,

$R_A = 20\% = 15\% + 0.8X + 0.6Y \Longrightarrow 0.8\,X + 0.6\,Y = 5$

$R_B = 25\% = 15\% + 1.5\,X + 1.2\,Y \Longrightarrow 1.5\,X + 1.2\,Y = 10$

Expected premium for Factor 2 is to be determined, which corresponds to value of Y.

Substituting value for X in the second equation, we get------

Y= 0.625 ÷ 0.075 = 8.3333;

Therefore, Expected Return Premium for factor 2 is 8.33%

ALTERNATIVE SOLUTION

(i) Mr. Qureshi's position in the two securities are + 1.50 9n Security A and (-) 0.50 in Security B. Hence, the portfolio sensitivities to the two factors are ---

Factor 1 = [1.50 × 0.80] + [(-) 0.50 × 1.50] = 1.2 + (-)0.75 = 0.45
Factor 2 = [1.50 × 0.60] + [[(-)0.50 × 1.20] = 0.90 + (-)0.60 = 0.30

(ii) Mr. Qureshi's current position—

Security A : ₹3,00,000 / ₹ 1,00,000 = 3

Security B : (-) ₹ 1,00,000 / ₹ 1,00,000 = (-) 1

Risk-Free Asset : (-) 1,00,000 / ₹ 1,00,000 = (-) 1

Factor 1 =[3.00 × 0.80] + [(-) 1×1.50] + [(-) 1 x 0] = 2.40 -1.50 = 0.90

Factor 2 =[3.00 × 0.60] + [(-)1 × 1.20] + [(-)1 × 0] = 1.80 - 1.20 = 0.60

(iii) The portfolio created in part (ii) is a pure Factor 2 portfolio.

Expected Return on the Portfolio in part (ii) is :

R_P = [3 × 0.20] + [(-)1 x 0.25] + [(-) × 0.15] = 0.60 - 0.25 - 0.15 = 0.20 or 20 %

Therefore, Expected Return Premium = 20 % - 15 % = 5 %

13) As an investment manager, you are given the following information:

Investment	Initial Price (₹)	Dividend (₹)	Market Price (₹)	Beta
Equity Shares of				
A Ltd.	**70**	**5**	**140**	**0.8**
B Ltd.	**80**	**5**	**150**	**0.7**
C Ltd.	**90**	**5**	**270**	**0.5**
Govt. of India bonds	**1,000**	**160**	**1,010**	**0.95**

Risk-free return may be taken at 16%.

Required:

(i)Expected rate of return of Portfolio using CAPM.
(ii)Average return of Portfolio

Answer: Calculation of expected rate of returns of Portfolios:

Investment	Amount (₹)	Market price (₹)	Capital gain (₹)	Dividend (₹)	Total (₹)
Equity shares of					
A	70	140	70	5	75
B	80	150	70	5	75
C	90	270	180	5	185
Govt. of India bonds	1,000	1,010	10	160	170
Total	1240	1570	330	175	505

Expected rate of return on portfolio = [505/1240] × 100 = 40.73 %.

CAPM Model

$E[RP] = R_F + B \times [R_M - R_F]$

A Ltd = 16 + 0.8 [40.73 -16] = 35.78 %

B Ltd = 16 + 0.7 [40.73 - 16] = 33.31 %

C Ltd = 16 + 0.5 [40.73 - 16] = 28.37 %

G of I Bonds = 16 + 0.95 [40.73 - 16] = 39.49 %

(ii) Simple average return of portfolio = [35.78 + 33.31 + 28.37 + 39.49] / 4 = 136.95 / 4 = 34.24 %

Average of Beta = [0.80 + 0.70 + 0.50 + 0.95] /4 = 0.7375.

ALTERNATIVE APPROACH for Average return:

Weighted average return:

Securities	Cost	Proportion	Expected return	Weighted return %
A	70	0.056	35.78	2.004
B	80	0.065	33.31	2.132
C	90	0.073	28.37	2.043
G. Bonds	1,000	0.806	39.49	31.829
	1,240	1.000		37.008

14) Given the following information—

BSE Index	**50,000**
Value of Portfolio	**1,01,00,000**
Risk Free Interest Rate	**9% p.a.**
Dividend Yield on Index	**6% p.a.**
Beta of Portfolio	**2.0**

We assume that a futures contract on the BSE index with 4 months maturity is used to hedge the value of portfolio over next 3 months. One future contract is for delivery of times the index. Based on the information, Calculate — (i) Price of future contract, (ii) The gain on short futures position if index turns out to be 45,000 in 3 months.

Answer:

(i) Computation of Price of Futures Contract

Securities of	R Ltd.
Spot Price [S_X]	₹50,000
Dividend Yield Expected [y]	6% or 0.06
Tenor / Time Period [t] in Years	4 Months or 0.3333 Year
Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP_X] $TFP_X = S_X \times e^{(r-y)\times t}$	$= ₹ 50,000 \times e^{(0.09 - 0.06)\times 0.3333}$ $= ₹ 50,000 \times e^{0.03 \times 0.3333}$ $= ₹ 50,000 \times e^{0.01} = ₹ 50,000 \times 1.0101$ $= ₹ 50,505$

Therefore, price of the Futures Contract is ₹ 50,505 or ₹ 50,500 (Approx)

(ii) Gain on Short Futures Position

(a) Computation of No. of Contracts to be entered into:

Particulars	Value
Portfolio Value	₹ 101,00,000
4-Month's Futures Price per Unit of BSE Index	₹ 50,500
No. of Units per BSE Index Futures Contract	50
Value per BSE Index Futures Contract [50 Units X ₹50,500 per Unit]	₹ 25,25,000
No. of Contract to be entered [Portfolio Value X Beta of Portfolio w.r.t Index ÷ Value per BSE Index Futures Contract] = [₹101,00,000 X 2.0 ÷ ₹25,25,000]	8 Contracts

(b) Computation of Gain on Short Futures Position

Particulars	Value
Position	SELL
Contracted Sale Price per Unit of BSE Index	₹ 50,500
Less: Index Position in 3-Months	₹ 45,000
Gain per Unit of BSE Index Future	₹ 5,500
No. of Units per Contract	50
Gain per Contract [₹5,500 X 50 Units]	₹ 2,75,000
No. of Contract entered into	8
Total Gain [8 Contracts X ₹2,75,000 per Contract]	22,00,000

Total Gain on Short Futures Position in 3 Months is ₹ 22,00,000.

15) A share is currently priced at ₹600. It is known that at the end of one month, it will be either ₹570 or ₹630. The risk-free interest rate is 8% per annum with continuous compounding. Find the value of a 1-month European call option with a strike price of ₹ 592, with the help of a Binomial Model.

Answer:

Computation of Option Delta [Binomial Model]:

	FP_1	FP_2
Future spot price	630	570
Position on expiry date [compared to Exercise price]	In the money exercise	Out of money lapse
Action on Expiry date		
Value of Option on expiry		
[Future spot price-Exercise price]	[630 – 592] = 38	0

Option Delta = Change in value of option /Change in Future spot price

= [₹ 38-0] / [₹ 630 – ₹570]= 0.633

Computation of amount to be invested in Risk Free Rate:

= Present value of Lower band of Future spot price i. e, FP_2

= Present value of ₹570 discounted at 8 % continuous compounding for a 1- month period

= ₹ 570 × $e^{(-)rt}$ = ₹570 × $e^{-0.08 \times 1/12}$ = ₹570/ $e^{0.007}$ = ₹570/ 1.00702 = ₹566.

Value of call = Option Delta × [Current stock price - Amount to be invested at Risk free rate]

= 0.633 × [₹ 600 – ₹ 566] = ₹ 21.522.

16) An Indian exporter has sold handicraft items to an American business house. The exporter will be receiving US dollar 1 lakh in 90 days. Premium for a dollar put option with a strike price of ₹58.00 and a 90 days settlement is ₹ 1. The exporter anticipates the spot rate after days to be ₹56.50.

(i) Should the exporter hedge its account receivable in the option market?

(ii) If the exporter is anticipating a spot rate to be ₹57.50 or ₹58.50 after 90 days, how would it effect the exporter's decision?

Answer:

Option	Put
Strike price	₹ 58 per US $
Premium	₹ 1 per US $
Settlement (expiration) rate	₹ 56.50

Benefit from Put option = Max[(Strike rate - Expiration rate), 0] - Premium

= Max[(₹ 58 per US $ - ₹ 56.50 per US $), 0] – ₹ 1 per US $

= ₹(1.50 – ₹ 1) per US $ = ₹ 0.50 per US $.

As there is benefit in owning the Put, so the Exporter should hedge using the Put Option. Here, if the exporter remains un-hedged, it will receive

= [₹ 56.50 per US $ x US $ 1,00,000] = ₹ **56,50,000**

But with hedging using Put Option, the exporter receives at the end of 90 days

= [(₹ 58 × US $ 1,00,000) - (₹ 1 × US $ 1,00,000)] = ₹**57,00,000**

For Settlement price of ₹ 57.50 per US $, BENEFIT FROM Put Option

= Max[(₹ 58 per US $ - ₹ 57.50 per US $), 0] – ₹ 1 per US $ = (-) ₹0.50 per US $.

For Settlement price of ₹ 58.50 per US S, BENEFIT FROM Put Option

= Max[(₹ 58 per US $ - ₹ 58.50 per US $), 0] – ₹ 1 per US $

= 0 – ₹ 1 per US $

= (-) ₹. 1 per US S

So, for anticipated price of ₹ 57.50 per US $ or ₹ 58.50 per US $), the exporter will not be hedging through a Put Option as he does not have positive benefit.

17) The following information is available for Call option on the stock of MACON LTD:

Current market price	**₹415**
Strike price	**₹400**
Time to expiration (1 year = 360 days)	**90 days**
Standard deviation of return	**22%**
Risk-free rate of interest	**5 %**

You are required to compute the value of call option, using Black- Scholes model.

[Given: $N(d_1) = N (0.5033) = 0.7019$;

$N(d_2) = N (0.3933) = 0.6628$;

Ln (1.0375) = 0.03681; and

E = 2.71828].

Answer: $d_1 = [L_n (S / x) + (r + 0.5 \sigma^2]/\sigma\sqrt{t}$

$=[L_n (415 /400) + (0.05 + 0.5 \times 0.22^2) \times 0.25] / [0.22 \times\sqrt{0.25}]$

$= [L_n (1.0375) + 0.01855]/ 0.11 = [L_n (0.03681) + 0.01855] / 0.11$

$= 0.05536 / 0.11= 0.5033$

$d_2 = d_1: - \sigma\sqrt{t} = 0.5033-[0.22 \times/o.25] =0.5033 - 0.1100 = 0.3933$

So, $N(d_1) = N (0.5033) = 0.7019$; AND $N(d_2) = N (0.3933) =0.6628$

Hence, value of call option $= S \times N(d_1)] - [X \times e^{-rt} \times N(d_2)]$

$= [415 \times 0.7019] - [400/(2.71828)^{0.05 \times 0.25} \times 0.6628]$

$= [291.2885] - [400/1.01258 \times 0.6628] = [291.2885] - [261.8266] = 29.46$

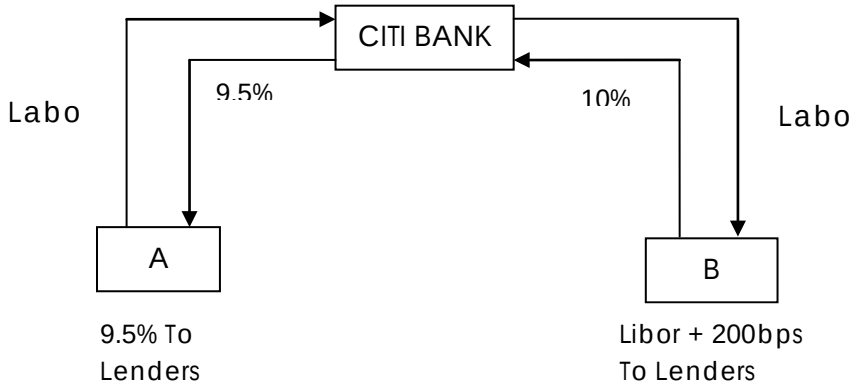
18) Company A has outstanding debt on which it currently pays fixed rate of interest at 9.5%. The company intends to refinance the debt with a floating rate interest. The best floating rate it can obtain is LIBOR + 2%. However, it does not want to pay more than LIBOR. Another company B is looking for a loan at a fixed rate of interest to finance its exports. The best rate it can obtain is 13.5%, but it cannot afford to pay more than 12%. However, one bank has agreed to offer finance at a floating rate of LIBOR + 2%. Citibank is in the process of arranging an interest rate swap between these two companies.

(i) With a schematic diagram, show how the swap deal can be structured,

(ii) What are the interest savings by each company?
How much would Citi bank receive?

Answer: First let us tabulate the details to find the quality spread differential:

		Cost of Funds to Company A and B	
	Objective	**Fixed rate**	**Floating rate**
Company A	Floating	9.50% p.a.	Libor + 200bp
Company B	Fixed	13.50% p.a.	Libor + 200bp
Differential		400 bps	0bps



The differential between the two markets = 400 bps - 0 = 400 bps. A total of 400 bps needs to be shared between A, B and Citi bank. Since A cannot afford to pay more than Libor, it needs 200 bps benefits out of the total 400 bps (Libor +2% - Libor). Similarly B cannot pay more than 12% as against the existing available fixed rate funding of 13.5%, it requires 150 bps benefits out of 400 bps. The balance 50 bps would be shared / charged by the Citi bank. The swap can therefore be structured as follows:

Firm	Paid to Bank	Received from Bank	Paid to market	Net Cost	Savings
A	Libor	9.5%	9.5%	Libor	(Libor+2%)-(Libor)=200bps
B	10%	Libor	Libor +200bps	12%	(13.5-12.0)= 150bps

Company A gets floating rate funds at Libor as against Libor + 2%, thereby getting an advantage of 200 bps, Company B gets fixed rate funds at 12% as against 13.5%, thereby getting an advantage of 150 bps and finally Citi bank gets 50 bps commission.

19) Company PQR and DEF have been offered the following rate per annum on a $ 200 million five year loan:

Company	Fixed Rate	Floating Rate
PQR	12.0	LIBOR+0.1%
DEF	13.4	LIBOR + 0.6%

Company PQR requires a floating - rate loan; Company DEF requires a fixed rate loan. Design a swap that will net a bank acting as intermediary at 0.5 percent per annum and be equally attractive to both the companies.

Answer:

Particulars	₹
(a) Difference in Floating Rates [(LIBOR + 0.1%) - (LIBOR + 0.6%)]	0.5%
(b) Difference in Fixed Rates [13.4%- 12%]	1.4%
(c) Net Difference {[(a) - (b)] in Absolute Terms}	0.9%
(d) Amount paid for arrangement of Swap Option	(0.5%)
(e) Net Gain [(c) - (d)]	0.4%
(f) Company PQR's share of Gain [0.4/% X 50%]	0.2%
(g) Company DEF's share of Gain [0.4% X 50%]	0.2%

PQR is the stronger Company (due to comparative interest advantage). PQR has an advantage of 1.40% in Fixed Rate and 0.50% in Floating Rate. Therefore, PQR enjoys a higher advantage in Fixed Rate loans. Therefore, PQR will opt for Fixed Rate Loans with its Bankers. Correspondingly DEF Ltd will opt for Floating Rate Loans with its bankers.

Company PQR	Company DEF
1. Company PQR will borrow at Fixed Rate.	1. Company DEF will borrow at Floating Rate.
2. Pay interest to Bankers at Fixed Rate (i.e. 12.0%)	2. Pay interest to its Bankers at Floating Rate (i.e. LIBOR + 0.6%)
3. Will collect from Company DEF interest amount differential i.e. Interest computed at Fixed Rate (12.0%) Less Interest Computed at Floating Rate of (LIBOR + 0.1 %) = 11.9% -LIBOR	3. Will pay to Company PQR interest amount differential i.e. Interest computed at Fixed Rate (12.0%) Less Interest Computed at Floating Rate of (LIBOR + 0.1%) = 11.9% - LIBOR
4. Receive share of Gain from Company DEF (0.2%)	4. Pay to Company PQR its share of Gain = 0.2%
5. Effective Interest Rate: 2-3=12.0%-(11.90% - LIBOR) -0.2% = LIBOR - 0.1%	5. Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5%
	6. Effective Interest Rate: 2 + 3 + 4+5 = Floating Rate to Company DEF (LIBOR + 0.6%) + Interest Differential paid to Company PQR (11.9% - LIBOR) + Commission charges paid for arranging Swaps + Share of gain paid to Company PQR = LIBOR + 0.60 % + 11.9% - LIBOR + 0.5% +0.2% = 13.2%

20) Hindus Ltd. has to make US $ 5 million payment in three months' time. The required amount in dollars is available with Hindus Ltd. The management of the company decides to invest if for three months and the following information is available in this context:

The US $ deposit rate is 7% per annum.

The Sterling-Pound deposit rate is 9% per annum.

The spot exchange rate is $ 1.42 / £.

The three month forward rate is $ 1.40 / £.

Answer the following questions:

(i) Where should the company invest for better returns?

(ii) Assuming that the interest rates and spot exchange rate remain as above, what forward rate would yield an equilibrium situation?

(iii) Assuming that the US interest rate and the spot and forward rates remain as above, where should the company invest if the Sterling-Pound deposit rate were 12% per annum?

With the originally stated spot and forward rates and same dollar deposit rate, what is the equilibrium Sterling-Pound deposit rate?

Ans: Here, spot = \$1.42/ £ ; 3-m Forward = \$1.40/£ ; r_h = 7% ; r_f = 9%.

a) For Interest Rate Parity to hold, $(1 + r_h) = (F/S) \times (1 + r_f)$

Now LHS = 1.0175 ; RHS = $(1+ r_f)$ (F/S) = (1.0225) (1.40/1.42) = 1.0080

Since, LHS ≠ RHS, IRP is not holding exactly.

Since LHS > RHS, the Company needs to invest in \$ for better return.

b) For equilibrium, the interest rate parity equation should match i.e. F/S

$= (1+r_h) \div (1 + r_f)$

i.e. $F = S \times [(1+ r_h) \div (1 + r_f)$ = 1.42 × (1.0175 / 1.0225) = 1.4130

Only if the forward rate F = 1.4130, we have an equity barium situation.

c) Now, if spot = \$1.42/£; 3m Forward = \$1.40/£ ; r_h = 7%; r_f = 12%; we again check whether Interest Rate Party holds.

Now, LHS = 1.0175; RHS = $(1+ r_f)$ (F/S) = (1.0300) (1.40/1.42) = 1.0155

Since, LHS # RHS, IRP is not holding exactly.

Now since LHS > RHS, the Company needs to invest here also in dollars for better returns.

d) For equilibrium, the interest rate party equation should match

i.e. $F/S = (1+ r_h) \div (1+ r_f)$.

i.e. $(1+ r_f) = S/F \times (1+ r_h)$ = (1.42 /1.40) × 1.0175 = 1.0320

or r_f = 3.20% (for 3 months)

Only if the annual pound rate is *12.80%* (i.e. 3.20 × 4), we have a equilibrium situation.

21) A sugar mill in Maharashtra is expected to produce 100 MT of sugar in the month of February. The current market price today (the month of December) is ₹22 per kg. February futures contract in sugar due on 20th February is trading at ₹25 per kg. The sugar mill apprehends that the price lesser than ₹25 per kg will prevail in February due to excessive supply then.

How can the sugar mill hedge its position against the anticipated decline in sugar price in February?

Answer:

Sugar mill is long on the asset in February. Therefore, it needs to sell the futures contract today. The no. of contracts that needs to be sold is dependent upon the exposure in the physical assets and the value one needs to cover. Assuming each contract for sugar is for 10 M.T. the no. of contracts to be sold is 10.

No. of contracts to be sold = Quantity to be hedged / Quantity in each future contract = 100 M.T./10 M.T. = 10 Contracts.

Sugar mill would go short on futures in December. Prior to February, before the future contract expires, sugar mill buys futures contract to nullify its position in the futures contract. The asset, i.e. sugar is sold in the spot market. Prices realized by sugar mill in two different scenarios of decline or rise in sugar prices, using the principle of convergence of price on the due date of the contract, is worked out as follows:

When the price falls to ₹ 20 per k.g. in the futures contract

Sold futures in December	+25
Bought futures contract in February	-22
Gain in the futures contract	+3
Price realized in the spot mar	+22
Effective price realize	₹25 per k. g

Here, the loss of ₹3 (₹25 - 22) in the spot market is made up by an equal gain in the futures market.

When the price rises to ₹26 per k.g. in the futures market

Sold futures contract in December	+25
Bought futures contract in February	-26
Loss in futures contract	-1
Price realized in the spot market	+26
Effective price realized	₹25 per k. g)

Here, gain of ₹1 [₹26 – 25] in the spot market is offset by the equal in the futures market.

22) JB ltd. an American Company will need £ 3,00,000 in 180 days. In this connection, the following information is available:

Spot rate £1= $2.00

180 days forward rate of £ as of today = $ 1.96

Interest rates are as follows:

	U.K	US
180 days deposit rate %	**4.50**	**5.00**
180 days borrowing rate %	**5.00**	**5.50**

The Company has forecast the spot rates 180 days hence as follows:

Rate	Probability
$ 1.91	**25%**
$ 1.95	**60%**
$ 2.05	**15%**

Compare the benefits of money market hedge Vs. No hedge and advise JB Ltd. on the choice of the better strategy.

Answer: Money market hedge: Borrow $, convert to £, invest £, repay $ loan in 180 days

Amount in £ to be invested = 3,00,000/(1+i) = 3,00,000/1.045 = £ 2,87,081

Amount of $ needed to convert into £ = 2,87,081 × 2 = $ 5,74,162

Interest and principal on $ loan after 180 days

= $ 5,74,162 × (1 + 5.5 %) = $ 5,74,162 × 1.055 = $ 6,05,741

No hedge option:

Expected future spot rate	Dollar needed	Probability	
(1)	£ 3,00,000 × (1) =(2)	(3)	(2) × (3) =(4)
1.91	5,73,000	0.25	1,43,250
1.95	5,85,000	0.60	3,51,000
2.05	6,15,000	0.15	92,250
			5,86,500

Probability distribution of outcomes for no hedge strategy appears to be more preferable because less no. of dollars are needed under this option to arrange £3,00,000.

23) The following data relate to JB Ltd's share price:

Current Price: ₹ 3,000 per share

6 months' future price = ₹ 3,500 per share

It is possible to borrow money in the market for transactions in securities at 12% p.a. Consider continuous compounding of interest.

Assume that no dividend was paid in the intervening period.

You are required to calculate the theoretical minimum price of a 6 months' forward purchase and explain the possible arbitrage opportunity.

Answer: Theoretical Forward Price

Spot Price = ₹3000

Required Rate of return = 12%

Time period = 6m = 0.5 yr

Theoretical forward price = spot price × e^rate × period = 3000 e $^{0.12\times0.5}$ = 3000 e$^{0.06}$

= ₹(3000 × 1.0618) = ₹3185.40

6 months future contract rate is ₹3,500.

Actual future price is higher and hence it is overvalued.

Action: Buy spot, sell future for arbitrage advantage.

Borrow ₹ 3,000 for a period of 6 months at 12% and buy the stock now at ₹3,000

Amount payable interest plus principal after 6m = ₹3185.4 (on continuous compounding)

Sell in the Futures market at forward price at ₹3,500.

Gain in futures market = ₹500

Net gain = ₹(500 -185.4) =₹ 314.6

24) An Indian exporting firm, Rohit and Bros., would be covering itself against a likely depreciation of pound sterling. The following data is given:

Receivables of Rohit and Bros	**£ 5, 00,000**
Spot rate	**₹56.00/£**
Payment date	**3 months**
3 months interest rate	**India: 12% per annum**
	UK : 5% per annum

Compute arbitrage gain.

Ans: The only thing left is Rohit and Bros. to cover the risk in the money market. The following steps are required to be taken:

Step1 Borrow pound sterling for 3 months. The borrowing has to be such that at the end of three months, the amount becomes £ 5, 00,000. Say, the amount borrowed is £ x. Therefore,

$$x\left[1+0.05\times\frac{3}{12}\right] = 5,00,000 \quad \text{or} \quad x = £\ 4,93,827$$

Step 2 Convert the borrowed sum into rupees at the spot rate.
This gives: £ 4, 93,827 × ₹ 56 = ₹ 27,654,312

Step3 The sum thus obtained is placed in the money market at 12 per cent to obtain at the end of 3 months:

$$S = ₹\ 27,654,312 \times \left[1+0.12\times\frac{3}{12}\right] = ₹\ 28,483,941$$

Step4 The sum of £ 5, 00,000 received from the client at the end of 3 moths is used to refund the loan taken earlier.

From the calculations it is clear that the money market operation has resulted into a net gain of ₹ 483,941 (i.e. 28,483,941 – 5, 00,000 × 56).

If pound sterling has depreciated in the meantime, the gain would be even bigger.

25) Nihar, a foreign exchange dealer, is actively engaged in simultaneously buying and selling same foreign currencies to make guaranteed profit.

The rates prevailing in the market are as follows:

Spot rate	**:**	**₹65.80/$**
3 months forward rate	**:**	**₹66.40/$**
3 months interest rates	**:**	**₹ : 7% p. a.**
		$: 11% p. a.

Discuss the possibility of a net gain in arbitrage if Nihar's borrowing potential is limited to ₹100 million.

Answer: 3 month forward rate of dollar is higher (at ₹ 66.40) than the spot rate (₹ 65.80). It implies that the dollar is at premium.

Premium (%) $= \frac{₹66.40 - ₹65.80}{65.80} \times \frac{12}{3} \times 100 = 3.647$ or 3.65% P.a

Interest rate differential = 11% – 7% = 4% p.a.

Since the interest rate differential (4%) and premium (3.65%) do not match, there are arbitrage gain possibilities. An arbitrageur (Nihar) can take the following steps in this regard:

(i) Nihar (arbitrageur) borrows, say ₹ 100 million at 7% for 3 months (as ₹ carries lower interest rate)

(ii) He then converts ₹ 100 mollion in US $ at the spot rate of ₹ 65.80 in the spot market. He gets an amount of US $ 1519757 (i.e. 100,000,000/65.80 = 1519756.839 or 1519757)

(iii) He invests US $ 1519757 in the US money market at 11% interest p.a. for 3 months and he obtains interest of US $ 41793 ($ $1519757 \times \frac{3}{12} \times \frac{11}{100}$)

(iv) Total sum available with arbitrageur, 3 months from now is (US $1519757 + $41793) = US $1561550.

(v) Since he would get US $1561550 after 3 months, he sells forward US $ 1561550 at the rate of ₹ 66.40.

(vi) As a result of forward deal, at the end of 3 months from now, he would get ₹ 103686920, i.e. ($ 1561550 x 66.40)

(vii) He refunds ₹ 100 million borrowed, along with interest due on it. The refunded sum is ₹ 100,000000 + ₹ 1750,000 i.e. (₹ $100,000,000 \times \frac{3}{12} \times \frac{7}{100}$) ₹ 101750000.

(viii) Net gain is ₹ 103686920 – 101750000 = ₹ 1936920

26) The following two way quotes appear in the Foreign Exchange Market

	Spot	Three Months' Forward
₹/US $	₹ 66/66.25	₹ 67/67.50

(i) By what % has the Dollar currency changed? Indicate the nature of change. (Answer with reference to the ask rate).

(ii) By what % has the Rupee changed? Indicate the nature of change. (Answer with reference to the bid rate).

(iii) How many US Dollars should a firm sell to get ₹ 45 lakhs after three months?

(iv) How many rupees is the firm required to pay so as to obtain US $ 2,20,000 in the spot market?

(v) Assume that the firm has US $ 90,000 in current account earning interest. Return on rupee investment is 10% per annum. Should the firm encash the US $ now or 3 months later?

Answer:

(i) Ask rate:

Computation of annualized appreciation/depreciation

= (Forward rate-spot rate)/spot rate x100 x 12/3

= (67.50-66.25)/66.25 x 100 x 12/3

= 7.55%

Result is positive, so appreciation.

(ii) Bid rate:

Computation of annualized appreciation/depreciation

Spot =66 ₹/$	=0.01515 $/₹
3 months forward= 67 ₹/$	=0.01493 $/₹
Difference	=0.00022
	=.00022/.01493 x 100 x 12/3
	= 5.89%

(iii) Action= Sell US $ in forward market relevant rate= Forward bid rate=₹67.

US $ required= ₹4500000/₹67=US $ 67164.

(iv)Action = Buy US $ in spot market relevant rate= Spot Ask rate= ₹66.25

Rupees required to obtain US $220000 =US $220000 x ₹66.25/US $= ₹14575000

(v) Evaluation of Investment in Rupee

Particulars	Encash Now	Encash after 3 months
Relevant rate	Spot bid rate= ₹66	Forward bid rate= ₹67
₹ available for US $90000	₹5940000	₹6030000
Add: Interest for 3 months (if converted now)	5940000 x 10% x 3/12 =148500	Not applicable
Amount available after 3 months	₹6088500	₹6030000

Conclusion: Encashing now yields higher return. So it is better to encash now.

27) P Ltd. exports electronic instruments to importers of USA, and Japan on 180 days credit terms. You are given the following information of the company:

Cost and sales information

Particulars	Japan	USA
Variable cost per unit	₹ 600	₹ 1560
Export sale price per unit	Yen 1200	USD 30.50
Receipts from sale due in 180 days	Yen 120,00,000	USD 3,05,000

Foreign Exchange Rate information

Particulars	Yen/₹	USD/₹
Spot Market	1.693 - 1.714	0.01610 - 0.01670
6-Months Forward	1.701 - 1.712	0.01652 - 0.01662
6-Months Spot	1.719 - 1.733	0.01658 - 0.01661

You are asked to advise P Ltd. whether it should hedge its foreign currency risk or not. Present relevant figures in support of your advice.

Answer:

	Japan		USA	
Particulars	Bid Rate	Ask rate	Bid rate	Ask Rate
Spot Market	1.714	1.693	0.0167	0.0161
	0.583430572	0.590667454	59.88023952	62.11180124
6 months forward	1.712	1.701	0.01662	0.01652
	0.58411215	0.587889477	60.16847172	60.53268765
6 months spot	1.733	1.719	0.01661	0.01658
	0.577034045	0.581733566	60.20469597	60.31363088

	Japan		USA	
	Spot	Forward	Spot	Forward
Variable Cost per unit(a)	600	600	1560	1560
Export Sale(b)	1200	1200	30.5	30.5
Relevant bid rate(c)	0.577	0.584	60.205	60.168
Export sale per unit(d)	692.4	700.8	1836.2525	1835.124
Contribution per unit(e)=(d-a)	92.4	100.8	276.2525	275.124
Contribution ratio(f)=e/d	13.34488735	14.38356164	15.04436345	14.99212042
Advice	Hedging using forward contract.		Do not hedge	

Advice: The Company should hedge its foreign currency risks/exposure in Japanese Yen as it stands to gain a higher contribution to sales ratio and therefore higher profit margin. However for sale to USA, company need not hedge its risk.

28) Lotus Finance Ltd. is engaged in leasing business. The company wants your advice to structure the lease of a machine costing ₹30 lacs. The machine will have no salvage value. The life of the machine and the lease period will be 5 years and it has to be fully depreciated in 5 years on straight line basis. The average post-tax cost of funds to Lotus Finance is 10%, but to cover the effects of inflation, they prefer to hike this rate by 2%. Assume tax rate is 50% and that taxes are paid on the last day of the year.

Calculate the minimum annual lease rent to be charged if

(i) the lease rents are payable on the first day of each year.

(ii) the lease rents are payable on the last day of each year;

What is the type of the above lease? Give reasons for your classification

Answer: (i)

End of Yr.	0	1	2	3	4	5	Annuity Factor
Inflows: Lease rent	x	x	x	x	x		4.0382
Defn Tax Shield 50% $\left[\frac{30-0}{5}\right]$		3	3	3	3	3	3.6052
Outflows: (Taxes) Initial (30)		(x/2)	(x/2)	(x/2)	(x/2)	(x/2)	3.6052 1
P/V factor 12%	1	0.893	0.797	0.712	0.636	0.567	

Minimum lease rental if pd on the 1st day of the year.

$-30 \times 1 - 3.605 \times \frac{x}{2} + 3 \times 3.6052 + X \times 4.0382 = 0.$

$X (4.0382 - 1.8026) = 30 - 10.8156$

$= 19.1844$

$X = \frac{19.1844}{2.2356} = 8.58132$

Lease rent = ₹ 8,58,132.

(ii) If lease rents are paid on the last day of the years

$-30 \times 1 + 3.6052 \times \frac{x}{2} + 3 \times 3.6052 = 0.$

$\frac{3.6052 \times x}{2} = 19.1844$

$x = \frac{19.1844}{3.6052} \times 2 = 10.6426273$

∴ Lease rent = 10,64,263

(iii) The type of lease is a financial lease

Reason: (i) Lessor is only the financial, not interested in the asset.

(ii) Time of the lease is the same as the life of the assets.

(iii) Cost of the asset fully amortised during the base period.

29) A contract has been made between M & T Construction Company Ltd. and a foreign embassy to build a block of ten flats to be used by the foreign embassy as guest houses. As per the terms of the contract the foreign embassy would provide the plans and the land costing ₹ 50 lakh to M & T Construction Company Ltd. The Company would build their flats at their own cost and lease them to the foreign embassy for 15 years. As per the contract the flats will be transferred to the foreign embassy after 15 years at a nominal value of ₹ 16 lakh. The company estimates the cost of construction as follows:

Area per flat	**1500 sq. feet**
Construction cost	**₹ 1200 per sq. feet**
Registration and other costs	**5% of cost of construction**

The company will also incur ₹ 8 lakh each in years 14 and 15 towards repairs of flats. M & T Construction Company Ltd. proposes to charge the lease rentals as follows:

Years	Rentals
1-5	Normal
6-10	130% of the normal
11-15	150% of normal

The company's present tax rate averages at 35% which is likely to be the same in future. The full construction and registration costs will be written off over 15 years at a uniform rate and will be allowed for tax purposes.

Additional information: (a) Minimum desired rate of return 10% (b) Rentals and Repairs will arise on the last day of the year and (c) construction, registration and other costs will be incurred at the beginning of the project (t=0).

Calculate the normal lease rent per annum per flat.

Answer: Calculation of Present Value of cash outflow

	₹	₹
Cost of construction 1500 × 1200 × 10		1,80,00,000
Registration and other costs @ 5%		9,00,000
Cost of repairs	8,00,000	
Less: Tax Savings (35%)	2,80,000	
	5,20,000	
Present Value of Cost of Repairs for year 14=520000X0.26333	1,36,932	
Present Value of Cost of Repairs for year 15=520000X0.23939	1,24,483	2,61,414
		1,91,61,414
Rounded off		1,91,61,400

Present Value Factor PV (14 Years) =0.26333

Present Value Factor PV (15 Years)=0.23939

Let X be the normal lease rent per 10 flats per annum and present value of recurring cash inflow for 15 years.

Particulars	1-5 years	6-10 Year	11-15 Years
Lease Rent (per annum	X	1.3X	1.5X
Depreciation (18900000/15)	1260000	1260000	1260000
PBT	X - 1260000	1.3X - 1260000	1.5X - 1260000
PAT 65%	0.65X – 819000	.78X – 819000	0.975X – 819000
CIAT = PAT+Depreciation	0.65X + 441000	0.78X + 441000	0.975X + 441000
PVCF (as given in QP)	3.7907	2.3538	1.4615
PV(g) =	2.464X + 1671699	1.836X + 1038026	1.425X+644522
Total	5.725X+3354247		

P/V of terminal cash Inflows:	Rs.
Nominal Value of flats after 15 years	1600000
Less: Tax on profit (35%*1600000)	560000
	1040000
P/V=1040000*0.239	248560

At 10 %rate of return: P/V of cash inflows= P/V of Cash outflows

5.725 X+3354247+248560=19161400

5.725 X=15558593

X=2717658.16

Lease rent per flat=Rs.2717658.16/10 =Rs.271765.82

30) Write Short Note on:

a)Reverse Book Building

b) Limitation of credit rating

c) Name the participants in commodity futures.

d) What are the benefits of future trading?

e) State the type of risk in following situations:

i) The risk of loss arising from sovereign state freezing foreign currency payments

ii) The risk that stock prices or stock indices values and/or their implied volatility may change

iii) The risks arising from the people, systems and processes through which a company operates

iv) Changes in currency exchange rates

f) Illustrate types of Liquidity Risk.

g) Write down the main activities of RBI.

h) How does commercial banks grant loans?

i) Foreign Currency Convertible Bonds (FCCBs)

j) Leading and lagging.

Answer:

a) Reverse Book Building is method of buy-back of securities. It is an efficient price discovery mechanism adopted when the company aims to buy the shares from the public and other shareholders. This is generally done when the company wishes to delist itself from the trading exchanges. The reverse book building route is a difficult and costly process. Price discovery is a problem in case of small companies as their shares are thinly traded, making it difficult to delist through the reverse book building route. Unless the shares are delisted, the small companies have to pay all listing charges.

b) Credit rating is a very important indicator for prudence but it suffers from certain limitations. Some of the limitations are:

(i) Conflict of Interest – The rating agency collects fees from the entity it rates leading to a conflict of interest. Since the rating market is very competitive, there is a distant possibility of such conflict entering into the rating system.

(ii) Industry Specific rather than Company Specific –Downgrades are linked to industry rather than company performance. Agencies give importance to macro aspects and not to micro ones; overreact to existing conditions which come from optimistic / pessimistic views arising out of up / down turns. At times, value judgments are not ruled out.

(iii) Rating Changes – Ratings given to instruments can change over a period of time. They have to be kept under constant watch. Downgrading of an instrument may not be timely enough to keep investors educated over such matters.

(iv) Corporate Governance Issues – Special attention is paid to:

- Rating agencies getting more of their revenues from a single service or group.
- Rating agencies enjoying a dominant market position. They may engage in aggressive competitive practices by refusing to rate a collateralized / securitized instrument or compel an issuer to pay for services rendered.
- Greater transparency in the rating process viz. in the disclosure of assumptions leading to a specific public rating.

(v) Basis of Rating – Ratings are based on 'point of time' concept rather than on 'period of time' concept and thus do not provide a dynamic assessment.

(vi) Cost Benefit Analysis – Since rating is mandatory, it becomes essential for entities to get themselves rated without carrying out cost benefit analysis.

(c) Participants in Commodity Future

- Farmers/Producers
- Merchandisers / Traders
- Importers
- Exporters
- Consumers/ Industry
- Commodity Financers
- Agriculture credit providing agencies
- Corporate having price risk exposure in commodities.

(d) Benefits of Futures Trading

- Price discovery for commodity players
  - A farmer can plan his crop by looking at prices prevailing in the futures market
- Hedging against price risk
  - A farmers can sell in futures to ensure remunerative prices
  - A processor/ manufacturing firm can buy in futures to hedge against volatile raw material costs
  - An exporter can commit to a price to his foreign clients
  - A stockiest can hedge his carrying risk to ensure smooth prices of the seasonal commodities round the year
- Easy availability of finance
  - Based on hedged positions commodity market players (farmers, processors, manufacturers, exporters) may get easy financing from the banks.

(e) i) The risk of loss arising from sovereign state freezing foreign currency payments-Country risk under Credit risk

ii) The risk that stock prices or stock indices values and/or their implied volatility may change-Equity risk under Market risk

iii) The risks arising from the people, systems and processes through which a company operates-Operational risk

iv) Changes in currency exchange rates-Foreign Investment Risk

(f) Types of Liquidity Risk

Market liquidity - An asset cannot be sold due to lack of liquidity in the market – essentially a sub-set of market risk. This can be accounted for by:

- Widening bid/offer spread
- Making explicit liquidity reserves
- Lengthening holding period for VaR calculations

Funding liquidity - Risk that liabilities:

- Cannot be met when they fall due
- Can only be met at an uneconomic price
- Can be name-specific or systemic

(g) The Reserve Bank is the umbrella network for numerous activities, all related to the nation's financial sector, encompassing and extending beyond the functions of a typical central bank:

- Monetary Authority
- Issuer of Currency
- Banker and Debt Manager to Government
- Banker to Banks
- Regulator of the Banking System
- Manager of Foreign Exchange
- Maintaining Financial Stability
- Regulator and Supervisor of the Payment and Settlement Systems
- Developmental Role

(h) Banks grant loan in following ways:–

(i) Overdraft: - Banks grant overdraft facilities to current account holder to draw amount in excess of balance held.

(ii) Cash credit: - Banks grant credit in cash to current account holder against hypothecation of goods.

(iii) Discounting trade bills:- The banks facilitate trade and commerce by discounting bills of exchange.

(iv) Term loan: - Banks grant term loan to traders and to agriculturists against some collateral securities.

(v) Consumer credit:- Banks grant credit to households in a limited amount to buy durable goods.

(vi) Money at call or short term advances:- Banks grant loan for a very short period not exceeding 7 days to dealers / brokers in stock exchange against collateral securities.

(i) Foreign Currency Convertible Bonds (FCCBs):

They mean bonds issued in accordance with relevant scheme and subscribed by a non-resident in foreign currency and convertible into depository receipts or ordinary shares of the issuing company in any manner, either in whole or in part, on the basis of any equity-related warrants attached to debt instruments. A company seeking to issue FCCBs should have consistent track record of good performance for 3 years.

FCCBs are unsecured; carry a fixed rate of interest and an option for conversion into as fixed number of equity shares of the issuer company. Interest on redemption price (if conversion option is not exercised) is payable in Dollars. Interest rates are very low by Indian domestic standards.

FCCB has been popular with issuers. Local debt markets can be restrictive with comparatively short maturities and high interest rates. On the other hand, a straight equity may cause a dilution in earnings, and certainly dilutions in control, which many shareholders, especially major family shareholders, would find unacceptable. Foreign investors also prefer FCCBs because of dollar-denominated servicing, the conversion option and the arbitrage opportunities presented by conversion of FCCBs into equity at discount on prevailing market-price in India. The major drawbacks are that the issuing company cannot plan capital structure as it is not assured of conversion of FCCBs. In addition, FCCBs would result in creation of external debt for the country, as there would be foreign exchange outflow from the country, if conversion option is not exercised by the investors.

Some other regulations are: (i) Interest payment on bond, until the conversion option is exercised, shall be subjected to TDS; (ii) Conversion of FCCBs into shares shall not give rise to capital gain in India; and (iii) Transfer of FCCBs shall not give rise to capital gain in India.

(j) Leading and Lagging

It refers to the adjustment of the times of payments that are made in foreign currencies. Leading is the payment of an obligation before due date while lagging is delaying the payment of an obligation past due date. The purpose of these techniques is for the company to take advantage of expected devaluation or revaluation of the appropriate currencies. Lead and lag payments are particularly useful when forward contracts are not possible.

It is more attractive to use for the payments between associate companies within a group. Leading and lagging are aggressive foreign exchange management tactics designed to take the advantage of expected exchange rate changes. Buckley (1988) supports the argument.