FINAL EXAMINATION

GROUP - III
(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

JUNE - 2018

Paper-14 : STRATEGIC FINANCIAL MANAGEMENT

Time Allowed : 3 Hours **Full Marks : 100**

The figures in the margin on the right side indicate full marks.
Working Notes should form part of the respective answers.
Wherever necessary, candidates may make appropriate assumptions and clearly state them.
No present value factor table or other statistical table will be given in addition to this question paper.
Candidates may use the values tabulated at the relevant portions of this question paper.
This paper contains two sections, A and B. Section A is compulsory and contains question 1 for 20 marks. Section B contains question 2 to 8, each carrying 16 marks.
Answer any five questions from Section B.

Section – A

Answer all the questions. Each question carries two marks.

1. **Choose the Correct Option from the four alternatives given: (One mark is for the correct choice and one mark is for the justification/workings. You may present only the Roman numeral, your choice and the reason/working, without copying the question). 2×10=20**

(i) A company has ₹ 7 crore available for investment. It has evaluated its options and has found that only four investment projects given below have positive NPV. All these investments are divisible and get proportional NPVs.

Project	Initial Investment (₹ crore)	NPV (₹ crore)	PI
W	6.00	1.80	1.30
X	3.00	0.60	1.20
Y	2.00	0.50	1.25
Z	2.50	1.50	1.60

Which investment projects should be selected?
(A) Project W in full and X in part
(B) Project Z in full and W in part
(C) Project W in full and Z in part
(D) Project Z and Y in full and X in part

(ii) An investor is bullish about X Ltd. which trades in the spot market at ₹ 1,150. He buys two call option contracts with three months (one contract is 100 shares) with a strike price of ₹ 1,195 at a premium of ₹ 35 per share. Three months later, the share is selling at ₹ 1,240.
Net profit/loss of the investor on the position will be
(A) ₹ 1,000
(B) ₹ 16,000
(C) ₹ 11,000
(D) ₹ 2,000

(iii) Duhita Ltd. intends to buy an equipment. Quotes are obtained for two different makes A and B as given below:

	Cost (₹ Million)	Estimate life (years)
A	4.5	10
B	6.00	15

Ignoring the operations and maintenance costs which will be almost the same for A and B, which one would be chapter? The company's cost of capital is 10%
[Given: PVIFA (10%, 10 yrs.) = 6.1446 and PVIFA (10%, 15 years) = 7.6061]
(A) A will be cheaper
(B) B will be cheaper
(C) Cost will be the same
(D) They are not comparable and therefore nothing can be said about which is cheaper.

(iv) BLC Ltd. a valued customer engaged in import business, is in need to remit EURO 1 million to his European exporter. The spot rate of ₹/US$ is ₹ 65.47/65.57 and that of US$/EURO is $ 0.8053/0.8057. What rate will a banker quote to BLC Ltd. if the bank's margin is 0.50%?
(A) ₹ 53.09
(B) ₹ 53.067
(C) ₹ 53.01
(D) ₹ 52.99

(v) Given for a project:
Annual Cash inflow = ₹ 80,000, Useful life = 4 years
Undiscounted Pay-Back period = 2.855 years
What is the cost of the project?
(A) ₹ 1,12,084
(B) ₹ 2,28,400
(C) ₹ 9,13,600
(D) None of the above

(vi) A project had an equity beta of 1.4 and is to be financed by a combination of 25% Debt and 75% Equity. Assume Debt Beta as zero, R_f = 12% and R_m = 18%.

Hence, the required rate of return of the project is
(A) 16.72%
(B) 18.30%
(C) 17.45%
(D) 12.00%

(vii) An Indian Company is planning to invest in the US. The annual rates of inflation are 8% in India and 3% in USA. If the spot rate is currently ₹ 60.50/$, what spot rate can you expect after 5 years, assuming the inflation rates will remain the same over 5 years?
(A) ₹ 88.89
(B) ₹ 54.95
(C) ₹ 76.68
(D) ₹ 76.10

(viii) Which of the following securities is most liquid?
(A) Money Market instruments
(B) Capital Market instruments
(C) Gilt-edged securities
(D) Index futures

(ix) 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

(x) If the RBI intends to reduce the supply of money as part of anti-inflation policy, it might
(A) Lower the bank rate
(B) Increase the Cash Reserve Ration
(C) Decrease the SLR
(D) Buy Government securities in the open market.

Answer:

1. (i) (B)
Justification:
Project Z in full and W in part
All 4 projects have positive NPV. So PI is the selection criteria. Higher the PI, greater is the return for every rupee of investment. Z has highest and W has 2nd highest PI. So, option B is selected.

(ii) (D)
Justification:
Investor's Profit = (Spot Price – Strike Price – Premium) × No of Contracts × Lot Size = (₹ 1,240 – ₹ 1,195 – ₹ 35) × 2 × 100 = ₹ 2,000

(iii) (A) Make – A will be cheaper
Justification:
Equivalent annual cost of Make – A = 45,00,000 ÷ 6.1446 = ₹ 7,32,350
Equivalent annual cost of Make – B = 60,00,000 ÷ 7.6061 = ₹ 7,88,841

(iv) (A) ₹ 53.09
Justification:
BLC Ltd. needs EURO to pay for import.
BLC Ltd. will purchase EUROS.
Hence bank would quote for selling
= (₹ 65.57 x 0.8057) + (0.5% commission)
= (₹ 52.83 x 1.005) = ₹ 53.09/ EURO

(v) (B) ₹ 2,28,400
Justification:
Pay-back period = Cost of project / Annual cash inflow
So, Cost of project = Annual cash inflow x Pay-back period
= 80,000 x 2.855 = ₹ 2,28,400

(vi) (B)
Justification:
We know, B_P = [β EQUITY x {E / (D + E)}] + [β DEBT x {D / (D + E)}]
= (1.4 x 0.75) + (0 x 0.25) = 1.05

Rate of return of the project = $R_p = R_f + B_p (R_m - R_f)$
= 12% + 1.05 (18% - 12%)
= 12%+ 6.30%
= 18.30%

(vii) (C) ₹ 76.68

Justification:

$F = S \times [(1 + r_A)^n / (1+ r_B)^n]$; or, $F(₹/\$) = 60.50 \times [1 + 0.08)^5 / (1+ 0.03)^5]$

$= 60.50 \times 1.267455 = ₹76.68$

(viii) (C)

Justification:

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.

(ix) (A) Security Market Line

Justification:

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.

(x) (B) Increase Cash Reserve Ratio

Justification:

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 the open market.

Section – B

Answer any five questions out of the following seven questions.
Each question carries 16 marks.

2. (a) Electronics Pvt. Ltd. is considering a proposal to replace one of its machines. In this connection, the following information is available:

The existing machine was purchased 3 years ago for ₹ 20 Lakh. It was depreciated 20 per cent per annum on reducing balance basis. It has remaining useful life of 5 years, but its maintenance cost is expected to increase by ₹ 1 Lakh per year from the end of sixth year of its installation. Its present realizable value is ₹ 12 Lakh. The company has several machines having 20% depreciation.

The new machine costs ₹30 Lakh and is subject to the same rate and basis of depreciation. On sale after 5 years, it is expected to realize ₹18 Lakh. With the new machine, the annual pre-tax operating costs (excluding depreciation) are expected to decrease by ₹2 Lakh. In addition, the machine would increase productivity on account of which net pre-tax revenues would increase by ₹3 Lakh annually (reckoned at year end). The tax rate applicable to the company is 40% and the cost of capital is 10 per cent.

Advise the company on the choice of the machine from a financial perspective on the basis of NPV.

PV Factors (10%)

Year	1	2	3	4	5
PV Factor	0.909	0.826	0.751	0.683	0.621

Present an incremental analysis of using the existing machine versus replacing the machine with a new one. Present annual discounted cash flows in your answers with separate calculation showing annual discounted cash flows on account of incremental depreciation without netting off capital asset outflows or inflows. Calculations are to be presented to the nearest rupee. P.V. factors with above decimal places should be used. **10**

(b) The following two-way quotes appear in the foreign exchange market:

	Spot Rate	2-Months Forward
₹/US$	₹ 66.00/₹ 66.25	₹ 67.00/ ₹ 67.50

(i) How many US Dollars should a firm sell to get ₹ 50 Lakh after two months?

(ii) How many Rupees is the firm required to pay to obtain US $ 3,00,000 in the spot market?

(iii) Assume that the firm has US $ 1,19,000 earning no interest. ROI on Rupee Investment is 8% p.a. Should the firm encash the US $ now or 2 months later? 6

Answer:

2. (a) (i)

	Existing Machine (₹)	(Amount in ₹)
Cost	20,00,000	
Depreciation 20%, year 1	4,00,000	
	16,00,000	
Depreciation 20%, year 2	3,20,000	
WDV	12,80,000	
Depreciation 20%, year 3	2,56,000	
WDV at Y_0 =	10,24,000	

(ii) Base for incremental depreciation

Cost of New Machine	30,00,000
Less: WDV of existing machine	10,24,000
Difference	19,76,000

Depreciation at end of the Year		PV	Disc. Values
Year $_1$	3,95,200	0.909	3,59,237
Year $_2$	3,16,160	0.826	2,61,148
Year $_3$	2,52,928	0.751	1,89,949
Year $_4$	2,02,342	0.683	1,38,200
Year $_5$	1,61,874	0.621	1,00,524
			10,49,058
Tax Shield 40%			4,19,623

	Year $_0$	Year $_1$	Year $_2$	Year $_3$	Year $_4$	Year $_5$
Expenses				(1,00,000)	(1,00,000)	(1,00,000)
Revenue		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Net Revenue		3,00,000	3,00,000	2,00,000	2,00,000	2,00,000
Net Revenue after Tax		1,80,000	1,80,000	1,20,000	1,20,000	1,20,000
Cost of New Machine	(30,00,000)					
Resale – old Machine	12,00,000					
Resale – New Machine						18,00,000
Cash Flows other than Depreciation	(18,00,000)	1,80,000	1,80,000	1,20,000	1,20,000	19,20,000
PV Factor	1	0.909	0.826	0.751	0.683	0.621
Discount Annual C/F	(18,00,000)	1,63,620	1,48,680	90,120	81,960	11,92,320
						(1,23,300)

∴ PV of Cash Flows (Other than Depreciation)	(1,23,300)
Depreciation Impact	+ 4,19,623
Net Impact	+ 2,96,323

Hence it is beneficial to go in for the new machine.

(b) (i) US dollars for ₹ 50 Lakh in the forward Market

Action	Sell Foreign Currency in Forward Market
Relevant Rate	Forward Bid Rate = ₹ 67.00
US $ Required to get ₹ 50 Lakh	₹ 50,00,000 ÷ ₹ 67.00= US $ 74,626.87

(ii) Required to obtain US dollars 3,00,000 in the spot market

Action	Buy Foreign Currency in Spot Market
Relevant Rate	Spot Ask Rate = ₹ 66.25
Rupees Required to get $3,00,000	US $ 3,00,000 × ₹ 66.25 = ₹ 19,875,000

(iii) Evaluation of investment in Rupee

$$\text{Forward Premium (for Bid Rates)} = \frac{\text{Forward Rate ₹ 67 - Spot Rate ₹ 66}}{\text{Spot Rate ₹ 66}} \times \frac{\text{12 Months}}{\text{2 Months}} \times 100$$

= 9.09%

Comment: Annualized Forward Premium for Bid Rates (9.09%) is greater than the Annual Return on Investment in Rupees (8%). Therefore, the firm should not encash its US $ balance now. It should sell the US $ in the forward market and encash them two months later.

Alternative:

Alternatively, if it encashes now, ₹ = 66 x 1,19,000	= 78,54,000
Interest at 8% p.a. 2 months = 8% x 2/12 x 78,54,000	= 1,04,720
Amount at the end of two months	= 79,58,720
Hold for 2 months, then ₹ = 67 x 119000	= 79,73,000

Hence the amount should be encashed into Rupees two months later.

3. (a) The following quotes are available for 3-months options in respect of a share of P Ltd. which is currently traded at ₹ 310.

Strike Price	**₹ 300**
Call option	**₹ 30**
Put option	**₹ 20**

An investor devises a strategy of buying a call and selling the share and a put option. Risk free interest rate is 10% per annum.

Using Put-call parity theory

(i) Find out profit/loss of the investor.

(ii) What would be the position if the strategy adopted is selling a call and buying the put and the share? ($e^{0.025}$ = 1. 0253; $e^{0.25}$ = 1. 2840) **8**

(b) The Stock Research Division of Bharati Investment Services Ltd. has developed ex-ante probability distribution for the likely economic scenarios over the next one year and estimates the corresponding one period rates of return on Stock A, B and Market Index as follows:

Economic scenarios	**Probability**	**One period rate of return %**		
		Stock A	**Stock B**	**Market**
Recession	**0.15**	**-15**	**-3**	**-10**
Low growth	**0.25**	**10**	**7**	**13**
Medium growth	**0.45**	**25**	**15**	**18**
High growth	**0.15**	**40**	**25**	**32**

The expected risk free real rate of return and the premium for inflation are 3.0% and 6.5% p.a. respectively.

As a financial analyst in the Research Division you are required to calculate the

following for stock A and stock B:
(i) Expected return
(ii) Covariance of returns with the market returns
(iii) Beta **2+4+2=8**

Answer:

3. (a) (i) According to Put-Call Parity
$p = c+X\ e^{-rt} - S$
$S+ p = c+X\ e^{-rt}$
Here,
P = Put option price
c = Call option price
S = Spot Price
X = Ex. Price

Left Hand Side (LHS)= ₹ 310 + ₹ 20= ₹ 330
Right Hand Side (RHS)= ₹ 30 + ₹ 300/[(0.10 × 3/12)]= ₹ 322.60

Since LHS is not equal to RHS and the difference is ₹ 330 – ₹ 322.68 = ₹ 7.40

There is an arbitrage opportunity and the investor is devising a strategy of buying a call and selling the share and a put option.

From the put-call parity equation we can see that it is equivalent to;
$c\text{-}S\text{-}p = - X\ e^{-rt}$ or $(c\text{-}S\text{-}p)+ X\ e^{-rt} = 0$

Arbitrage Profits per Share			
Position	Immediate Cash Flow	Payoff in 3 Months	
		$S_t \leq 300$	$S_t > 300$
Sell Stock	310	$- S_t$	$- S_t$
Deposit PV (300)	-292.60	300	300
Buy Call	-30	0	S_t -300
Sell Put	+20	-(300 - S_t)	0
Total	₹ 7.40	0	0

S_t = Stock Price at expiration
This strategy would be adopted, since the initial payoff is positive.

(ii) If the investor would adopt by selling a call and buying the share and put option, then the Put-Call Parity Equation would be equivalent to $-c+S+p = X\ e^{-rt}$. The result of net cash outflow (initial payoff):

Arbitrage Profits per Share			
Position	Immediate Cash Flow	Payoff in 3 Months	
		$S_t \leq 300$	$S_t > 300$
Buy Stock	- 310	S_t	S_t
Borrow PV (300)	+292.60	- 300	- 300
Sell Call	+30	0	- (S_t -300)
Buy Put	- 20	(300 - S_t)	0
Total	- ₹ 7.40	0	0

This strategy would not adopted, since the initial payoff is negative.

(b) (i) **Expected return on stock**

$E(R_A) = \sum_{S=1}^{n} R_S P_S$

= 0.15(-15)+0.25x10+0.45x25+0.15x40 = 17.5%

$E(R_B)$ = 0.15x(-3)+0.25x7+0.45x15+0.15x25 = 11.8%

$E(R_M)$= 0.15x(-10)+0.25x13+0.45x18+0.15x32 = 14.65%

(ii) **Covariances**

$COV_{AM} = \sum_{S=1}^{n}\left[R_{A_S} - E(R_A)\right]\left[R_{M_S} - E(R_M)\right]P_S$

= 0.15[(-15)-17.5][(-10)-14.65]+0.25[10-17.5](13-14.65]+0.45[25-17.5][18-14.65]+0.15[40-17.5][32-14.65]

= 120.16875+3.09375+11.30625+58.55625

= 193.13

COV_{BM} = 0.15[(-3)-11.8][(-10)-14.65]+0.25[7-11.8][13-14.65]+0.45[15-11.8][18-14.65]+ 0.15 [25 -11.8][32-14.65]

= 54.723+1.98+4.824+34.353

= 95.88

$VAR_M(a^2{}_m)$ = $0.15[(-10)-14.65]^2+0.25[13-14.65]^2+0.45[18-14.65]^2$

= $0.15[32-14.65]^2$

=142.03

(iii) $\beta_A = \frac{COV_{AM}}{a_m^2} = \frac{193.13}{142.03} = 1.36$

$\beta_B = \frac{COV_{BM}}{a_m^2} = \frac{95.88}{142.03} = 0.675 = 0.68$

(iii) Alternatively, Rf = 9.5

Beta for A = β_A from CAPM = $\frac{RA - Rf}{Rm - Rf} = \frac{(17.5 - 9.5)}{14.65 - 9.5} = 1.553 = 1.6$

Beta for B = β_B from CAPM = $\frac{RB - Rf}{Rm - Rf} = \frac{(11.80 - 9.5)}{14.65 - 9.5} = 0.45$

4. (a) X Ltd. has imported goods from USA worth US $ 10 million and it requires 90 days to make the payment. The USA supplier has offered a 60 days interest free credit period and for additional credit for 30 days interest is to be charged at 8% per annum. (Consider 360 days p.a.)

The banker of X Ltd. Offers a 30 days loan at 10% per annum and its quotes for foreign exchange are as follows:

Spot 1 US $	**₹ 64.50**
60 days forward rate for 1 US $	**₹ 65.10**
90 days forward rate for 1 US $	**₹ 65.50**

You are required to evaluate the following options:

(i) Pay the USA supplier in 60 days or

(ii) Avail the supplier's offer of 90 days' credit. Advise X Ltd. accordingly.

(b) Your client holds the following securities:

Particulars of Securities	Cost (₹)	Dividends (₹)	Market Price (₹)	BETA
Equity Shares:				
Co. T	**8,000**	**800**	**8,200**	**0.8**
Co. Q	**10,000**	**800**	**10,500**	**0.7**
Co. M	**16,000**	**800**	**22,000**	**0.5**
Co. P	**34,000**	**3,400**	**32,300**	**0.2**

Assuming a Risk-free rate of 6%, calculate the expected rate of return in each, using the Capital Asset Pricing Model (CAPM). Assume equal proportion of securities for market portfolio as also for the client. Calculations should be presented up to two decimal places. **6**

Answer:

4. (a) (i) Payment to supplier in 60 days

If the payment is made to supplier in 60 Days, the applicable forward rate for 1 US$	₹ 65.10
Payment due	US$ 1,00,00,000
Outflow in rupees (US$ 1,00,00,000 × ₹ 65.10)	₹ 65,10,00,000
Add: Interest on Loan for 30 days @10% p.a.	₹ 54,25,000
Total Outflow	₹ 65,64,25,000

(ii) Payment to supplier in 90 days

Amount Payable	US$ 1,00,00,000
Add: Interest on Credit Period for 30 days @ 8% p.a.	US$ 66,667
Total Outflow in US$	US$ 1,00,66,667
Applicable forward for 1 US$	₹ 65.50
Total Outflow (US$ 1,00,66,667 × ₹ 65.50)	₹ 65,93,66,689

Comment: It is better to select alternative (i) as entails lower cash flows.

(b) Calculation of expected return on market portfolio (R_m)

Investment	Cost(₹)	Dividends(₹)	Capital Gains (₹)
Shares T	8,000	800	200
Shares Q	10,000	800	500
Shares M	16,000	800	6,000
Shares P	34,000	3,400	-1,700
	68,000	5,800	5,000

R_m = (5,800 + 5,000) / 68,000 X 100 = 15.88%

(i) Calculation of expected rate of return on individual security:

Security		
Share T	6 + 0.8(15.88-6.0)	= 13.90%
Share Q	6 + 0.7(15.88-6.0)	= 12.92%
Share M	6 + 0.5(15.88-6.0)	= 10.94%
Share P	6 + 0.2(15.88-6.0)	= 7.98%

5. (a) XYZ Ltd. is considering acquisition of an additional computer to supplement its computer services to its clients. It has two options:

(i) To purchase the computer for ₹ 22,00,000.

(ii) To lease the computer for 3 years from a leasing company for ₹ 5,00,000 as annual year end lease rent. The agreement also requires as additional one time lump sum lease rent payment of ₹ 6,00,000 at the end of the third year. Lease rents are payable at the year ends and the computer is returned to the lessor after the lease period.

The company estimates that the computer considered for purchase now will be worth

₹ 10 lakhs at the end of the third year and proceeds are taxable at the end of the third year at the usual 50% tax rates. Forecast pre-tax year end revenues are:

Year	₹
1	22,50,000
2	25,00,000
3	27,50,000

Annual year end pre-tax operating costs (excluding depreciation/lease rent of computer) are estimated at ₹ 9,00,000 with an additional ₹ 1,00,000 for start-up and training costs at the beginning of the first year, the tax benefit of which can be claimed at the end of the first year. These costs are to be borne by XYZ Ltd. XYZ Ltd. will borrow at 16% interest to finance the acquisition of the computer and the repayments are to be made according to the following schedule:

Year-end	Principal (₹)	Interest (₹)	Total (₹)
1	5,00,000	3,52,000	8,52,000
2	8,50,000	2,72,000	11,22,000
3	8.50,000	1,36,000	9,86,000

The company depreciates the computer at 60% of cost in the first year and the remaining at the end of the second year. Consider these at year ends. The Management of XYZ Ltd. approaches you, as a Management Accountant, for advice. Will the computer's use be justified? Which alternative would you recommend and why? Support your advice with relevant calculations. Present annual discounted cash flows to the nearest rupee, for each option using PV factors up to the decimals provided. Indicate inflows by '+' and outflows by '-' or '()'

Note: Present value factor at 8% and 16% rate of discount:

Year	1	2	3
8%	0.926	0.857	0.794
16%	0.862	0.743	0.641

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(b) A Portfolio Manager has the following four stocks in his portfolio:

Security	No. of shares	Market price (₹) per share	β = Beta
ADU	12,000	40	0.9
DVU	6,000	20	1.0
NDU	10,000	25	1.5
SVU	2,000	225	1.2

Compute the following:

(i) Portfolio Beta (β)

(ii) If the Portfolio Manager seeks to reduce the portfolio Beta to 0.8, how much risk-free investment should he bring in? Consider that he disposes the riskier securities first and replaces them with risk free investment. Present the revised portfolio. 6

Answer:

5. (a) Purchase of the Computer

Particulars	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)
Principal	5,00,000	8,50,000	8,50,000
Interest	3,52,000	2,72,000	1,36,000
Total A	8,52,000	11,22,000	9,86,000
Tax Shield @ 50%			
Interest	1,76,000	1,36,000	68,000
Depreciation	6,60,000	4,40,000	---
Total B	8,36,000	5,76,000	68,000

Net Cash outflow (A – B)	16,000	5,46,000	9,18,000
PV Factor at 8%	0.926	0.857	0.794
PV of cash outflows	14,816	4,67,922	7,28,892
Total PV of cash out flows			12,11,630
Less: PV of salvage value (₹ 10 lacs – Tax) * 0.794			3,97,000
Net PV of cash outflows			8,14,630

Lease of the computer

Particulars	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)
Lease rent	5,00,000	5,00,000	5,00,000
Lump sum payment			6,00,000
Total Payment	5,00,000	5,00,000	11,00,000
Less: Tax shield 50%	2,50,000	2,50,000	5,50,000
Net cash outflows	2,50,000	2,50,000	5,50,000
PV factor at 8%	0.926	0.857	0.794
PV of cash outflows at 8%	2,31,500	2,14,250	4,36,700
Total PV of cash outflows			8,82,450

Since PV of Net cash outflow of Purchase is lower, the company should purchase computer.

Working:
Depreciation = 60% on 1st year, rest 2nd year
Effective rate of interest after tax shield = 0.16 *(1 – 0.50) = 8%
Operating and training costs and revenue are common is both alternatives hence not considered while calculating NPV of cash flow.

Alternative:

Purchase

Particulars	Year 0 (₹)	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)
Revenue		22,50,000	25,00,000	27,50,000
Expenses Training Cost	(1,00,000)			
Operating Cost		(9,00,000)	(9,00,000)	(9,00,000)
Interest		(3,52,000)	(2,72,000)	(1,36,000)
Sale Proceeds				10,00,000
Cash flow before Tax	(1,00,000)	9,98,000	13,28,000	27,14,000
Tax 50%		(4,99,000)	(6,64,000)	13,57,000)
Depreciation Tax Shield		6,60,000	4,40,000	
Training Cost Tax Shield		50,000		
Principal Payment		(5,00,000)	(8,50,000)	(8,50,000)
Net Cash Inflows	(1,00,000)	7,09,000	2,54,000	5,07,000
P.V. Factor at 8%	1	0.926	0.857	0.794
Total P.V. of Cash Inflows	(1,00,000)	6,56,534	2,17,678	4,02,558
Total				11,76,770

Particulars	Year 0 (₹)	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)
Lease Rent		(5,00,000)	(5,00,000)	11,00,000)
Revenue		22,50,000	25,00,000	27,50,000
Training Cost	(1,00,000)			
Operating Cost		(9,00,000)	(9,00,000)	(9,00,000)
Cash flow before Tax	(1,00,000)	8,50,000	11,00,000	7,50,000

Tax 50%		(4,25,000)	(5,50,000)	(3,75,000)
Training Cost Tax Shield		50,000		
Net Cash Inflow	(1,00,000)	4,75,000	5,50,000	3,75,000
P.V. Factor at 8%	1	0.926	0.857	0.794
Total P.V. of Cash Inflows	(1,00,000)	4,39,850	4,71,350	2,97,750
Total				11,08,950

The computer's use is justified. It should be purchased.

(b) (i)

Security	No. of Shares	MPS	MV	Beta	Product
ADU	12,000	40	4,80,000	0.9	4,32,000
DVU	6,000	20	1,20,000	1.0	1,20,000
NDU	10,000	25	2,50,000	1.5	3,75,000
SVU	2,000	225	4,50,000	1.2	5,40,000
			13,00,000		14,67,000

$\beta = \frac{14,67,000}{13,00,000} = 1.1285 = 1.13$

(ii) Reduce β to 0.8
Beta can be reduced replacing High beta stocks in the portfolio with risk free investment which carry a Beta of Zero.

∴ Required Value = 0.8 × 13,00,000 = 10,40,000
Difference in value = ₹ 14,67,000 – 10,40,000 = 4,27,000
₹ 4,27,000 should be eliminated from product column (Value).
NDU has highest β and to be replaced ₹ 3,75,000.
Remaining value ₹ 52,000
Next highest beta is of SVU
Market value of ₹ 52,000 (Product) 52,000/1.2 = ₹ 43,334
No. of Share of SVU to be replaced = 43,334/225 = 192.5 or 193.
Total value of risk free investment to be brought in = ₹ [2,50,000 + (193 shares × 225)] = ₹ 2,50,000 + 43,425) = ₹ 2,93,425

₹ 2,93,425 securities should be replaced.

Security	No. of Shares	MPS	MV	Beta	Product
ADU	12,000	40	4,80,000	0.9	4,32,000
DVU	6,000	20	1,20,000	1.0	1,20,000
NDU	0	0	0	1.5	0
SVU	1,807	225	4,06,575	1.2	4,87,890
Risk free securities			2,93,425	0	0
			13,00,000		10,39,890

Beta = 10,39,890 / 13,00,000 = 0.8

6. (a) Y, a British firm with a US subsidiary, seeks to refinance some of its existing British pound debt to include floating rate obligations. The best floating rate it can obtain in London is LIBOR + 2.0%. Its current debts are as follows:

US$ 10 million owed to CT Bank at 9.5% (fixed annually); and
£ 5 million owed to MD Bank at 9.5% (fixed) annually.

HRS Company wishes to finance exports to Britain with £3 million of pound denominated fixed rate debt for six months. HRS is unable to obtain a fixed interest rate in London for less than 13.5% interest because of its lack of credit history in the UK. However, Lloyds Bank is willing to extend a floating rate British pound loan at LIBOR + 2%. HRS, however, cannot afford to pay more than 12%.

Assume that Y is in a strong bargaining position and can negotiate the best deal possible, but HRS will not pay over 12%. Assume further that transaction costs are 0.5% and exchange rates are stable.

Can Y and HRS help each another by an interest rate swap? If so, how? Compute the amount of gains for Y, HRS and the Swap Dealer.

Illustrate the effective post-swap interest rates of each party with a diagram. What are the effective interest rates for each party over the six months period of the swap?
8

(b) A manager is trying to decide which of the three mutually exclusive project X, Y or Z to undertake. Each of the projects could lead to varying net profits which are classified as outcomes I, II and III. The manager has constructed the following pay-off table or matrix (a conditional profit table).

Outcomes	**Probability**	**Project**		
		X	**Y**	**z**
		Net Profit (₹)		
I (Worst)	**0.2**	**5,00,000**	**7,00,000**	**9,00,000**
II (Most likely)	**0.5**	**8,50,000**	**7,50,000**	**10,00,000**
III (Best)	**0.3**	**13,00,000**	**14,00,000**	**11,00,000**

(i) Which project should be undertaken using Expected Value Criterion?
(ii) Which project should be chosen, if minimax regret rule is applicable? **8**

Answer:

6. (a)

Particulars		Cost of Funds Y and HRS	
	Objective	Fixed Rate	Floating Rate
Y	Floating	9.5% p.a.	LIBOR +2%
HRS	Fixed	13.5% p.a.	LIBOR +2%
Differential in absolute terms		4%	0

The differential between two markets = 4% - 0% = 4%. A total of 4% needs to be shared between Y, HRS and Swap Dealer.

Since HRS cannot pay more than 12% as against the fixed rate funding of 13.5%, it requires 1.5% benefit out of 4%. Commission to swap dealer is 0.5%. so, benefit to Y = 4% - 1.5% - 0.5% = 2%.

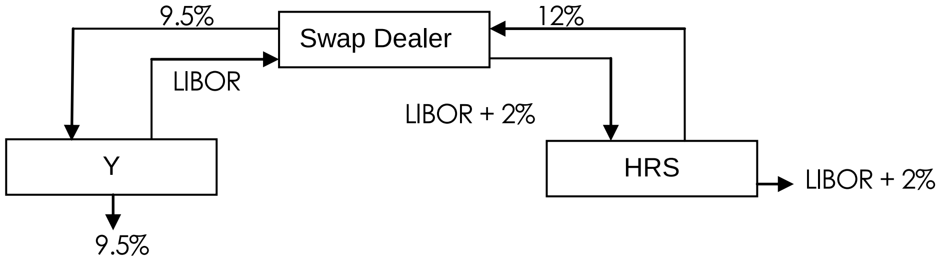
The swap can therefore be structured as follows:

Firm	Paid to Swap Dealer	Received from Swap Dealer	Paid to Market	Net Cost	Savings
Y	LIBOR	9.50%	9.50%	LIBOR	LIBOR+2% - LIBOR = 2%
HRS	10%	LIBOR	12%	12%	13.5% - 12% = 1.5%

Y gets floating rate funds at LIBOR as against LIBOR +2%, thereby getting advantage of 2%
HRS gets fixed rate funds at 13.5%, there by getting advantage of 1.5%

Finally Swap Dealer get commission of 0.5%.

Schematic Diagram



Effective interest rates:
If HRS is able to negotiate such that its total outflow is 12%, Commission will be borne by Y. Hence, effective interest rate for
Y = LIBOR
HRS = 12%

Alternatively
Y = LIBOR + 2% - 2.25%
= LIBOR – 0.25%
HRS = 12% (Fixed) + 0.25% (Commission)
= 12.25% (Fixed)

(b) (i)

Outcome	Probability	EVx (₹)	EV_Y (₹)	EV_Z (₹)
I (Worst)	0.2	1,00,000	1,40,000	1,80,000
II (Most Likely)	0.5	4,25,000	3,75,000	5,00,000
III (Best)	0.3	3,90,000	4,20,000	3,30,000
Total	1.0	9,15,000	9,35,000	10,10,000

If the project with the highest EV of profit is chosen, this would be product Z.

(ii) A table of regrets can be compiled, as follows, showing the amount of profit that might be foregone for each project, depending on whether the outcome is I, II or III.

Outcome	X (₹)	Y (₹)	Z (Rs)
I (Worst)	[9,00,000 - 5,00,000] = 4,00,000	[9,00,000-7,00,000] = 2,00,000	[9,00,000- 9,00,000] = 0
II (Most likely)	[10,00,000-8,50,000] = 1,50,000	[10,00,000-7,50,000] = 2,50,000	[10,00,000 10,00,000] = 0
III (Best)	[14,00,000 -13,00,000] = 1,00,000	[14,00,000-14,00,000] = 0	[14,00,000-11,00,000] = 3,00,000

Analysis: The **maximum regret** is ₹ 4,00,000 with project X , ₹ 2,50,000 with Y and ₹ 3,00,000 with Z. The lowest of these three maximum regrets is ₹ 2,50,000 with Y and so **project Y would be selected,** if the minimax regret rule is used.

7. (a) Bharat Oil Corporation (BOC) imports crude oil for its requirements on a regular basis. Its requirements are estimated at 100 tonnes per month. Of late, there has been a surge in the prices of oil. The current price (month of June) of crude oil is ₹ 5,500 per barrel. The firm expects the price to rise in the coming months to ₹ 5,800 by August. It wants to hedge against the rising prices for some of its requirements of the month of August.

Multi Commodity Exchange (MCX) in India offers futures contracts in crude oil. The

contract size is 100 barrels and August contract is currently traded at ₹ 5,668 per barrel.

BOC would like to hedge half its exposure in futures and leave the other half to market conditions. While hedging, the number of futures contracts dealt with should be rounded off to the next higher integer. Then, how many contracts should it book?

Compare the hedged and exposed parts regarding the effective price per barrel and also compute the effective price per barrel for the whole requirement of August, if in August,
(i) The spot price is ₹ 5,570 and futures price is ₹ 5,788,
(ii) The spot price is ₹ 5,417 and futures price is ₹ 5,455?

Ignore marking-to-market and initial margin on futures contracts.
Given that 1 tonne = 7.33 barrels. **10**

(b) 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 one month European call option with a strike price of ₹ 592 with the help of a Binomial Model. (Given that $e^{0.007}$ = 1.00702) **6**

Answer:

7. (a)

Particulars	
Quantity of crude oil required per month	100 tonnes
1 tonne	7.33 barrels
Quantity involved in barrels = 100*7.33 barrels	733 barrels
Exposure to be covered in future 50%	366.5 or 367 barrels
Contract size in futures	100 barrels
No of contracts to book =366.5/100=3.67=	4 contracts
Future price	₹ 5668 per barrel
Exposure in Future = 5668*4*100	₹ 2267200

In August BOC would unwind its futures position and buy requirement from spot market

For covered part:		
	₹	₹
Futures sold at price	5,788	5,455
Amount of futures sold = 4*100	23,15,200	21,82,000
Gain / Loss on futures (4 contracts)	48,000	-85,200

Spot price	5,570	5,417
Actual cost of buying 400 barrel	22,28,000	21,66,800
Effective cost of buying 400 barrel	21,80,000	22,52,000
Effective Price per barrel	5,450	5,630
Exposed Part:		
Effective Price per barrel	5,570	5,417
Total cost of 333 barrel	18,54,810	18,03,861
Total cost	40,34,810	40,55,861
Effective Price per barrel	5504.515689	5533.234652

(b)

Computation of Option Delta [Binomial Model]:

	FP1	FP2
Future spot price	630	570
Position on expiry date [compared to Exercise price]	In the money	Out of money
Action on Expiry date	Exercise	Lapse
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 x $e^{(-)rt}$ = ₹ 570 x $e^{-0.08 \times 1/12}$ = ₹570 / $e^{0.007}$ = ₹570 / 1.00702 = ₹566.

Value of call = Option Delta x [Current stock price - Amount to be invested at risk free rate]
= 0.633 x [₹ 600 - ₹ 566]
= ₹ 21.522.

8. Answer any four out of the following five questions:

(a) State the type of risk in the following situation: (You may present only the question Roman numeral and the type of risk in your answer) 4

(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 risk arising from the people, system and processes through which a company operates.

(iv) Changes in currency exchange rates.

(b) You are required to present Columns I, IV and V after filling up the contents of columns IV And V. 4

Sl. No.	Situation	Option Type	________ the money (Fill up In/At/Out of)	Action: (Exercise/Lapse/ Indifferent)
Column	**II**	**III**	**IV**	**V**
(i)	**CMP<EP**	**Call**		
(ii)	**CMP<EP**	**Put**		
(iii)	**CMP>EP**	**Call**		
(iv)	**CMP>EP**	**Put**		

EP=Exercise Price; CMP=Current Market Price

(c) Identify the following financial instruments: (You may present only the Roman numeral and the name of the instrument in your answers) 4

(i) X is a negotiable instrument issued in US $ and issued by a US Depository Bank for the benefit of a non US company that wishes to raise money in the US. X is listed on NYSE and NASDAQ. Issue of X offers access to both institutional and retail markets in the US.

(ii) Y is an instrument issued abroad by authorized overseas corporate bodies against shares or bonds of Indian companies held with nominated domestic custodial banks. An Indian company intending to issue Y will issue the corresponding

number of shares to an overseas depository bank. Y is freely transferable outside India and dividend in respect of the shares represented by Y are paid in Indian rupees. Y is traded on OTC basis (Over the Counter). Y is listed on the London Stock Exchange.

(iii) Z is a zero - interest bond sold at a discount and redeemed at face value on maturity. Investors in Z are not looking for immediate return. Z is issued by the issuer to meet the long term requirements spanning 20 - 30 years. Z can also be traded in the market.

(iv) W is a negotiable certificate issued by a company or the Government, entitles the holder to repayment of principal and interest. Interest is paid periodically at predetermined intervals and the principal is repaid at a specified maturity date.

(d) A certain project is expected to generate year and annual net cash inflows of ₹ 5,00,000 for four years. The cost of capital (real discount rate is 10%). Inflation rate is 5% p.a.

(i) What are the nominal cash flows and real cash flows of the second year's inflows which occur at the end of year 2?

(ii) What is the present value of the inflow of the second year that you would use in determining the NPV of the project? 4

(You are not required to calculate the values. You are only required to substitute the values in appropriate formulae for the answers).

(e) Explain the concept of 'option' in relation to a capital budgeting decision. What would be the value of the option? 4

Answer:

8. (a) (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 change-Equity risk under Market risk.

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

(iv) Changes in currency exchange rates- Foreign Investments Risk.

b)

Sl. No.	Situation	Option Type	the money (Fill up In/At/Out of)	Action: (Exercise/ Lapse/ Indifferent)
Column I	II	III	IV	V
(i)	CMP<EP	Call	Out of	Lapse
(ii)	CMP<EP	Put	In	Exercise
(iii)	CMP>EP	Call	In	Exercise
(iv)	CMP>EP	Put	Out of	Lapse

(c)

(i)	ADR or American Depository Receipt
(ii)	GDR or Global Depository Receipt
(iii)	Deep Discount Bond
(iv)	Bond

(d) (i) The nominal cash flow is ₹ 5,00,000.
The real cash flow at year end 2 is (5,00,000)/(1.05)

(ii) PV of nominal cash flow should be discounted by the nominal discount rate i.e.
Nominal discount rate =1 -(1.05 x 1.10) = 0.155 = 15.5%.

PV at year end 2 will be 5,00,000/1.155
or
PV will be real cash flow discounted by real discount rate = 5,00,000/1.05 ÷ 1.1

(e) An option is a special contract under which the option owner enjoys the right to buy or sell something without any obligation to do the same. The option to buy is a 'call option' and the option to sell is a 'put option'. In the context of capital budgeting decision, the opportunities that managers have are called managerial option or real option, involving the real assets, not financial assets. The options provide the managers opportunity or flexibility to increase gains or reduce losses. The holder of a real option is often unclear as to what the precise right is and low long the same will last.

Value of the option = NPV with option - NPV without option.