

# Practice Kit

ICAP

## Business finance decisions

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## Questions

### CHAPTER 1 – AN INTRODUCTION TO BUSINESS FINANCE DECISIONS

#### 1.1 COMPANY OBJECTIVES

- (a) Justify and criticise the usual assumption made in financial management literature that the objective of a company is to maximise the wealth of the shareholders. (Do not consider how this wealth is to be measured.)
- (b) Outline other goals that companies claim to follow, and explain why these might be adopted in preference to the maximisation of shareholder wealth.

#### 1.2 POSSIBLE CONFLICTS

“The major objective of financial management is to maximise the value of the firm.”

Analyse how the achievement of the above objective might be compromised by the conflicts which may arise between the management and the other stakeholders in an organisation.

#### 1.3 OWNERSHIP

“Ascertaining exactly who owns a company’s shares and what, if any, are their particular preferences and objectives” is a basic piece of information needed by management, if it is to ensure that, as far as possible, it is acting in the shareholder’s interest.

- (a) Explain why a publicly quoted company might seek to know the detailed composition of its shareholders and their objectives in investing in the company.
- (b) Explain any **FIVE** the major advantages which may accrue to the corporate finance manager from obtaining this information.

## CHAPTER 3 – DISCOUNTED CASH FLOW

### 3.1 BADGER PLC

Badger plc., a manufacturer of car accessories is considering a new product line. This project would commence at the start of Badger plc.'s next financial year and run for four years. Badger plc.'s next year end is 31<sup>st</sup> December 2016.

The following information relates to the project:

A feasibility study costing Rs. 8 million was completed earlier this year but will not be paid for until March 2017. The study indicated that the project was technically viable.

#### Capital expenditure

If Badger plc. proceeds with the project it would need to buy new plant and machinery costing Rs. 180 million to be paid for at the start of the project. It is estimated that the new plant and machinery would be sold for Rs. 25 million at the end of the project.

If Badger plc. undertakes the project it will sell an existing machine for cash at the start of the project for Rs. 2 million. This machine had been scheduled for disposal at the end of 2020 for Rs. 1 million.

#### Market research

Industry consultants have supplied the following information:

Market size for the product is Rs. 1,100 million in 2016. The market is expected to grow by 2% per annum.

Market share projections should Badger plc. proceed with the project are as follows:

	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Market share	7%	9%	15%	15%

Cost data:

	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
	<b>Rs. m</b>	<b>Rs. m</b>	<b>Rs. m</b>	<b>Rs. m</b>
Purchases	40	50	58	62
Payables (at the year-end)	8	10	11	nil
Payments to sub-contractors,	6	9	8	8

Fixed overheads (total for Badger plc)

With new line	133	110	99	90
Without new line	120	100	90	80

#### Labour costs

At the start of the project, employees currently working in another department would be transferred to work on the new product line. These employees currently earn Rs. 3.6 million per annum. They will not be replaced if they work on the new project.

An employee currently earning Rs. 2 million per annum would be promoted to work on the new line at a salary of Rs. 3 million per annum. A new employee would be recruited to fill the vacated position.

As a direct result of introducing the new product line, employees in another department currently earning Rs. 4 million per annum would have to be made redundant at the end of 2017 and paid redundancy pay of Rs. 6.2 million each at the end of 2018.

### **Material costs**

The company holds a stock of Material X which cost Rs. 6.4 million last year. There is no other use for this material. If it is not used the company would have to dispose of it at a cost to the company of Rs. 2 million in 2017. This would occur early in 2017.

Material Z is also in stock and will be used on the new line. It cost the company Rs. 3.5 million some years ago. The company has no other use for it, but could sell it on the open market for Rs. 3 million early in 2017.

### **Further information**

The year-end payables are paid in the following year.

The company's cost of capital is a constant 10% per annum.

It can be assumed that operating cash flows occur at the year end.

Time 0 is 1<sup>st</sup> January 2017 (t1 is 31<sup>st</sup> December 2017 etc.)

### **Required**

Calculate the net present value of the proposed new product line (work to the nearest million).

## **3.2 HASAN AND SONS LIMITED**

Hasan and Sons Limited is considering the purchase of a locally manufactured machine for Rs. 3 million. In view of the fact that the shares of the company are not quoted, it finds it difficult to raise money through the issue of shares. The purchase of this machine becomes absolutely necessary if the sales target given to the sales manager is to be achieved. In order to ensure that the machine is purchased, the domineering proprietor of the company and the accountant met informally to decide on how to source for funds.

Many finance options were considered and they eventually agreed to negotiate for a loan from Microfinance Bank Ltd. The bank agreed to give the company a loan of Rs. 2.5 million, which means that the company will have to source for the balance of Rs.0.5 million elsewhere. However, the company has no tangible collateral with which to secure additional loan to cover the balance of the value of the machine. In view of this difficulty, the finance officer offered to advance the shortfall. The proprietor graciously accepted this offer.

The duration of the loan is 20 years with an interest rate of 12% per annum. The annual interest charge is to be calculated on the balance outstanding at the beginning of each year. Repayment is to be made in 20 equal annual instalments. Each instalment will include both interest and capital. A working capital of Rs. 250,000 will be required at the beginning of the year. The amount will be sourced internally. The machine is expected to generate net cashflows of Rs. 540,000 per annum for **FIVE** consecutive years from its predominantly local sales.

### **Required**

- (a) Calculate the amount to be paid in each year on the loan;
- (b) Calculate the NPV of the machine and advise on its viability; and

### 3.3 DCF AND RELEVANT COSTS

Consolidated Oil wants to explore for oil near the coast of Ruritania. The Ruritanian government is prepared to grant an exploration licence for a five-year period for a fee of Rs. 300,000 per year. The option to buy the licence must be taken immediately; otherwise another oil company will be granted the licence.

However if it does take the licence now, Consolidated Oil will not start its explorations until the beginning of the second year.

To carry out the exploration work, the company will have to buy equipment now. This would cost Rs. 10,400,000, with 50% payable immediately and the other 50% payable one year later. The company hired a specialist firm to carry out a geological survey of the area. The survey cost Rs. 250,000 and is now due for payment.

The company's financial accountant has prepared the following projected statements of profit or loss. The forecast covers years 2-5 when the oilfield would be operational.

#### Projected statements of profit or loss

	Year							
	2		3		4		5	
	Rs. '000	Rs. '000	Rs. '000	Rs. '000	Rs. '000	Rs. '000	Rs. '000	Rs. '000
Sales		7,400		8,300		9,800		5,800
Minus expenses:								
Wages and salaries	550		580		620		520	
Materials and consumables	340		360		410		370	
Licence fee	600		300		300		300	
Overheads	220		220		220		220	
Depreciation	2,100		2,100		2,100		2,100	
Survey cost written off	250		-		-		-	
Interest charges	650		650		650		650	
	—	4,710	—	4,210	—	4,300	—	4,160
Profit		2,690		4,090		5,500		1,640

#### Notes

- (i) The licence fee charge in Year 2 includes the payment that would be made at the beginning of year 1 as well as the payment at the beginning of Year 2. The licence fee is paid to the Ruritanian government at the beginning of each year.
- (ii) The overheads include an annual charge of Rs. 120,000 which represents an apportionment of head office costs. The remainder of the overheads are directly attributable to the project.
- (iii) The survey cost is for the survey that has been carried out by the firm of specialists.
- (iv) The new equipment costing Rs. 10,400,000 will be sold at the end of Year 5 for Rs. 2,000,000.

- (v) A specialised item of equipment will be needed for the project for a brief period at the end of year 2. This equipment is currently used by the company in another long-term project. The manager of the other project has estimated that he will have to hire machinery at a cost of Rs. 150,000 for the period the cutting tool is on loan.
- (vi) The project will require an investment of Rs. 650,000 working capital from the end of the first year to the end of the licence period.

The company has a cost of capital of 10%. Ignore taxation.

### Required

Calculate the NPV of the project.

## 3.4 SADEEQ ENERGY PLC

Sadeeq Energy Plc is a fast growing profitable company. The company is based in Lahore and has just won a new contract to supply gas to the State Electricity Board. In this regard, the company planned to commission a 35-kilometre pipeline at a cost of Rs. 260m to enable it execute the contract. The pipeline, when installed, will carry the gas to an agreed location under the control of the State Electricity Board.

The anticipated revenue from sales to the State Electricity Board is expected to be Rs. 120m per annum.

Apart from this contract, the pipeline could also be used to transport Liquefied Natural Gas (LNG) to other willing customers in the suburb. The sales from this source are put at Rs. 80m per annum.

The management of Sadeeq Energy Plc considers the useful life of the pipeline to be 20 years. The financial manager estimates a profit to sales ratio of 20% per annum for the first 12 years and 17% per annum for the remaining life of the project.

The project is not likely to have any salvage value.

Sadeeq Energy Plc will enjoy exemption from tax for this project as a result of a recent government investment incentive.

The company's cost of capital is 15%.

### Required

- (a) Distinguish between mutually exclusive investment and independent investment.
- (b) Why is the investment decision important to organizations and what techniques can be used to ensure that optimal investments are undertaken by firms?
- (c) Evaluate the project by estimating its payback period?
- (d) Compute the project's NPV and IRR.

### 3.5 BETA LIMITED

Beta Limited (BL) is engaged in the business of manufacturing and marketing of high quality plastic products to the large departmental stores in Pakistan and United Arab Emirates. BL is presently experiencing a decline in sales of its products. Market research carried out by the Marketing Department suggests that sustained growth in sales and profits can be achieved by offering a wide range of products rather than a limited range of quality products. In this regard, BL is considering the following two mutually exclusive options:

#### Option I : Introduce low quality products in the market

Following information has been worked out by the Chief Financial Officer of the company:

Net present value using a nominal discount rate of 13%	Rs. 82 million
Discounted payback period	3.1 years
Internal rate of return	10.5%
Modified internal rate of return	13.2% approximately

#### Option II : Import variety of plastic products from China

BL would buy in bulk from Chinese suppliers and sell it to the existing customers. The projected net cash flows at current prices after acceptance of this option are as follows:

	Year 0	Year 1	Year 2	Year 3	Year 4
Against import from China (US\$ in million)	(25.00)	(20.00)	(21.33)	(22.33)	(20.67)
From operation in UAE (US\$ in million)	-	22.47	24.15	25.23	23.37
From operations in Pakistan (Rs. in million)	-	333	350	414	450

The following information is also available:

- (i) The current spot rate is Re. 1=US\$ 0.0111.
- (ii) BL evaluates all its investment using nominal rupee cash flows and a nominal discount rate.
- (iii) Inflation in Pakistan and USA is expected to be 10% and 3% per annum respectively.

Tax may be ignored.

#### Required

Evaluate the two options using net present value, discounted payback period, internal rate of return and modified internal rate of return. Give brief comments on each of the above methods of evaluation and their relevance in the given situation. ***For the purpose of evaluation, assume that BL has a four year time horizon for investment appraisal.***



## CHAPTER 4 – DCF: TAXATION AND INFLATION

### 4.1 MORE INVESTMENT APPRAISAL AND TAX

CVB is considering whether to invest in new equipment costing Rs. 600,000. The equipment is expected to have an economic life of five years and will have no disposal value at the end of Year 5 (and no disposal costs).

CVB's after-tax cost of capital is 15%. Tax is charged at an annual rate of 35% and is payable in the year following the year in which the taxable profits arise.

The following forecasts relate to the project under consideration:

	Rs.000s				
Year	1	2	3	4	5
Sales income	250	250	300	350	400
Direct materials	50	55	58	64	70
Direct labour	25	25	30	30	35
Total direct costs	75	75	88	94	105
Depreciation	120	120	120	120	120

There will be tax allowances on the cost of the equipment, calculated at 25% each year on the reducing balance basis. The first depreciation tax allowance (capital allowance) would be claimed in year 0 (or very early in year 1).

Assume that:

- (1) taxable profits are defined as income minus direct costs and capital allowances
- (2) cash profits in each year = sales minus direct costs

#### Required

Calculate the net present value of the project and recommend whether or not the project should be undertaken.

### 4.2 INVESTMENT APPRAISAL AND TAX

JKL is considering whether to invest in the purchase of a new machine costing Rs. 250,000. The machine will have a four-year life and a net disposal value of Rs. 100,000 at the end of Year 4.

In addition, Rs. 38,000 of working capital will be required from the start of the project, increasing to Rs. 50,000 at the beginning of the second year. All the working capital will be recovered at the end of Year 4.

The project is expected to generate extra annual revenues of Rs. 200,000 and incur annual cash operating costs of Rs. 80,000 for each year of the project. JKL's cost of capital is 10% after tax.

Corporation tax is charged on profits at 35%. Tax is payable in the year following the year in which the profits occur. There will be a 25% annual writing-down allowance on capital expenditure, for tax purposes. The tax-allowable depreciation is calculated by the reducing balance method.

**Required**

Calculate the NPV of the project and state whether or not it should be undertaken.

**4.3 ALAWADA LIMITED**

Alawada Limited is considering a five-year project whose initial cost would be Rs. 3million. The contribution consists of annual sales of Rs. 2.8million and variable costs of Rs. 2million for 1,000,000 units of sales per annum. These are the expected money values in year 1.

All sales would be made through a single distributor who has asked for a fixed selling price of Rs. 2.80 per unit for three years after which prices could be increased by 20% for year 4 and held constant at this new price for years 4 and 5. The variable cost is Rs. 2.00 per unit and it consists of material cost of Rs.0.80 which is expected to increase by 5% per annum and the balance represents labour cost which is expected to increase by 10% per annum for each year. The company's cost of capital is assumed to be 10%.

**Required**

- (a) Calculate the net present value of the project and advise on its viability.
- (b) State **TWO** features of capital budgeting decision.
- (c) Give **FOUR** reasons why capital budgeting decision is important.

**4.4 KOHAT LIMITED**

Kohat Limited (KL) is considering to set-up a plant for the production of a single product IGM3. The initial capital investment required to set up the plant is Rs. 15 billion. The expected life of the plant is only 5 years with a residual value of 20% of the initial capital investment. The plant will have an annual production capacity of 1.0 million tons.

A local group has offered to purchase all the production for Rs. 8,000 per ton in year 1 and thereafter at a price to be increased 5% annually. Other relevant information is as under:

- (i) In year 1, operating costs (other than wages and depreciation) per annum would be Rs. 2,000 per ton. They are expected to increase in line with Producer Price Index (PPI). Annual wages would be Rs. 1.0 billion and are linked to Consumer Price Index (CPI).
- (ii) KL's cost of capital for this project, in real terms is 6%. General inflation rate is 11%.
- (iii) The tax rate applicable to the company is 30% and the tax is payable in the same year. The company can claim normal tax depreciation at 20% per annum under the reducing balance method.

Price indices of the last six years are given below:

Year	2010	2011	2012	2013	2014	2015
PPI	107	119	130	142	160	175
CPI	112	125	139	155	173	195

The costs linked to the above indices are expected to grow at their historic compound annual growth rate.

### Required

Advise whether KL should invest in the project.

## 4.5 JAP RECREATION CLUB

The management of JAP Recreation Club is evaluating the option to launch a restaurant that would serve complete meal to its members. Presently, it has a snack bar shop which sells snacks and drinks only.

A management consultant firm was hired at a fee of Rs. 85,000 to prepare the feasibility of the project. JAP's Accountant has extracted the following information from the consultant's report:

- (i) The restaurant will be launched on the first day of the next year.
- (ii) The club membership has been increasing at the rate of 5% per annum. As a result of this facility, it is expected that the rate would increase to 10% per annum.
- (iii) The cost of equipment for the restaurant is estimated at Rs. 7,000,000. It would have a residual value of Rs. 510,000 at the end of its estimated useful life of four years.
- (iv) It is estimated that during the first year, an average of 100 customers would visit the restaurant, per day. The number would increase in line with the increase in membership. The average revenue from each customer is estimated at Rs. 400 whereas variable costs per customer would be Rs. 260.
- (v) Four employees would be appointed in the first year at an average salary of Rs. 200,000 per annum. A fifth employee would be hired from the third year.
- (vi) The annual fixed overheads for the current year are estimated at Rs. 4.8 million. 15% of the fixed overheads are allocated to the snack bar. As a result of the establishment of the restaurant the annual expenditure would increase as follows:

	Rupees
Electricity and gas	340,000
Advertising	170,000
Repair and maintenance	85,000

After the establishment of restaurant, 20% of the overheads would be allocated to the restaurant whereas allocation to snack bar would reduce to 10%.

- (vii) The snack bar is presently serving an average of 250 customers per day and the number is increasing in proportion to the number of members. If the restaurant is launched, the number of customers would reduce by 40% in the first year but would continue to increase in subsequent years in line with the member base. The average contribution margin from snack bar is Rs. 50 per customer.
- (viii) The tax rate applicable to the company is 35% and it is required to pay advance tax in four equal quarterly instalments. JAP can claim tax depreciation at 25% under the reducing balance method. Any taxable losses arising from this investment can be set off against profits of other business activities.
- (ix) JAP's post tax cost of capital is 17% per annum before adjustment for inflation. The rate of inflation is 10%.

### Required

Advise whether JAP should invest in the project. Assume that each year has 360 days.

## 4.6 ARG COMPANY

ARG Company is a leisure company that is recovering from a loss-making venture into magazine publication three years ago. Recent financial statements of the company are as follows.

### Statement of profit or loss for the year ending 30 June 20X5

	\$000
Sales revenue	140,400
Cost of sales	112,840
Gross profit	27,560
Administration costs	23,000
Profit before interest and tax	4,560
Interest	900
Profit before tax	3,660
Tax	1,098
Profit after tax	2,562
Dividends paid	400
Retained profit	2,162

**Statement of financial position as at 30 June 20X5**

	\$000	\$000
Non-current assets		50,000
Current assets		
Inventory	2,400	
Receivables	20,000	
Cash	1,500	
		<u>23,900</u>
		<u>73,900</u>
Equity and liabilities		
Ordinary shares, \$1 par value		2,000
Capital reserves		27,000
Accumulated profits		1,900
		<u>30,900</u>
9% Bonds (redeemable in 9 years)		10,000
Current liabilities		<u>33,000</u>
		<u>73,900</u>

The company plans to launch two new products, Alpha and Beta, at the start of July 20X5, which it believes will each have a life-cycle of four years. Alpha is the deluxe version of Beta. The sales mix is assumed to be constant.

Expected sales volumes for the two products are as follows.

Year	1	2	3	4
Alpha	60,000	110,000	100,000	30,000
Beta	75,000	137,500	125,000	37,500

The standard selling price and standard costs for each product in the first year will be as follows.

Product	Alpha	Beta
	\$/unit	\$/unit
Direct material costs	12.00	9.00
Incremental fixed production costs	8.64	6.42
	<u>20.64</u>	<u>15.42</u>
Standard mark-up	10.36	7.58
	<u>31.00</u>	<u>23.00</u>
Selling price		

ARG Company traditionally operates a cost-plus approach to product pricing.

Incremental fixed production costs are expected to be \$1 million in the first year of operation and are apportioned on the basis of sales value. Advertising costs will be \$500,000 in the first year of operation and then \$200,000 per year for the following two years. There are no incremental non-production fixed costs other than advertising costs.

In order to produce the two products, investment of \$1 million in premises, \$1 million in machinery and \$1 million in working capital will be needed, payable at the start of July 20X5. The investment will be financed by the issue of \$3 million of 9% debentures, each \$100 debenture being convertible into 20 ordinary shares of ARG Company after 8 years or redeemable at par after 12 years.

Selling price per unit, direct material cost per unit and incremental fixed production costs are expected to increase after the first year of operation due to inflation:

Selling price inflation: 3% per year

Direct material cost inflation: 3% per year

Fixed production cost inflation: 5% per year

These inflation rates are applied to the standard selling price and standard cost data provided above. Working capital will be recovered at the end of the fourth year of operation, at which time production will cease and ARG Company expects to be able to recover \$1.2 million from the sale of premises and machinery. All staff involved in the production and sale of Alpha and Beta will be redeployed elsewhere in the company.

ARG Company pays tax in the year in which the taxable profit occurs at an annual rate of 25%. Investment in machinery attracts a first-year capital allowance of 100%. ARG Company has sufficient profits to take the full benefit of this allowance in the first year. For the purpose of reporting accounting profit, ARG Company depreciates machinery on a straight line basis over four years. ARG Company uses an after-tax discount rate of 13% for investment appraisal.

### **Other information**

Assume that it is now 30 June 20X5

The ordinary share price of ARG Company is currently \$4.00

Average interest cover for ARG Company's sector is 7.0 times.

Average gearing for ARG Company's sector is 45% (long-term debt/equity using book values)

### **Required**

- (a) Calculate the net present value of the proposed investment in products Alpha and Beta.
- (b) Identify and discuss any likely limitations in the evaluation of the proposed investment in Alpha and Beta.
- (c) Evaluate and discuss the proposal to finance the investment with a \$3 million 9% convertible debenture issue.

## 4.7 HAFEEZ LTD

Hafeez Ltd is planning to bid for a contract to supply a machine under an operating lease arrangement, for 5 years. The terms of proposed contract include a special arrangement whereby the supplier / lessor will have to operate and maintain the machine, during the term of lease. Hafeez Ltd is required to quote a consolidated annual fee consisting of lease rentals and operating changes which shall be payable in arrears. The following relevant information is available:

- (i) The cost of machine is Rs. 50 million and the expected useful life is 10 years. The residual value at the end of five years is estimated to be 25% of the cost of machine.
- (ii) Operating cost for the first year is estimated at Rs. 6 million and is expected to increase at the rate of 10% per annum.
- (iii) The tax rate applicable to the company is 35% and the tax is payable in the same year. The company can claim initial and normal depreciation at 25% and 10% respectively under the reducing balance method.
- (iv) The weighted average cost of capital of the company is 14%.

### Required

- (a) Calculate the annual consolidated fee to be quoted for the contract if the company's target is to achieve a pre-tax net present value of 15% of total capital outlay.
- (b) Using the fee quoted above, calculate the project's internal rate of return (IRR) to the nearest percent

## CHAPTER 5 – DCF: RISK AND UNCERTAINTY

### 5.1 RISK IN INVESTMENT APPRAISAL

East must purchase a new machine for making a new product. There is a choice between two machines, Machine A and Machine B. Each machine has an estimated life of three years with no expected scrap value.

Machine A costs Rs. 15,000 and Machine B costs Rs. 20,000.

The variable costs of manufacture would be Rs. 1 per unit if Machine A is used and Rs.0.50 per unit if Machine B is used. The product will sell for Rs. 4 per unit.

The demand for the product is uncertain. Following some market research, the following estimates of annual sales demand have been made:

Annual demand	Probability
<b>Units</b>	
2,000	0.2
3,000	0.6
5,000	0.2

The sales demand in each year will be the same. For example, if the demand is 2,000 units in Year 1, it will be 2,000 units for every year of the project.

Taxation and fixed costs will be unaffected by any decision made.

East's cost of capital is 6%.

#### Required

- (a) Calculate the NPV for each of investment options, Machine A and Machine B, for each of the possible levels of sales demand.
- (b) Calculate the expected NPV for each of the investment options.
- (c) Assume now that the decision is taken to buy Machine A.
  - (i) Calculate the probability that the NPV of the project will be negative
  - (ii) Calculate the minimum annual sales required for the NPV of the project to be positive.

### 5.2 CALM PLC

Calm Plc designs and manufactures Personal Stress-Monitoring Device (PSMD). The device is designed for checking individuals' stress levels. A typical device has a commercial life of three years.

Recently, the company developed a new device known as "SIMPLE" and paid Rs. 10 million as development cost.



The following projections were made in respect of the product “SIMPLE”:

### Sales Revenue

	Probability	Year 1 Rs. m	Year 2 Rs. m	Year 3 Rs. m
If demand is above average	0.25	240	500	160
If demand is average	0.60	140	340	80
If demand is below average	0.15	50	180	50

Variable costs will amount to 30% of sales. Sales revenue and variable cost will be received and paid respectively on the last day of the year in which they arise.

If “SIMPLE” is produced, a special machine will have to be purchased at the beginning of Year 1 at a cost of Rs. 190 million, payable at the time of purchase. The machine will have a scrap value of Rs. 10 million at the end of the product’s life. The amount is receivable one year after the last year in which production takes place. If purchased, the machine will be installed in an unused part of one of Calm Plc.’s factories. The company has been trying to let this unused factory space at a rent of Rs. 16 million per annum. Although, there seems to be no chance of letting the space in year 1, there is a 60% chance of letting it for two years at the beginning of year 2 and a 50% chance of letting it for one year at the beginning of year 3 provided it has not been let at the beginning of year 2. All rental income will be received annually in advance. Fixed costs, which include depreciation of the special machine on a straight-line basis, are expected to amount to Rs. 70 million per annum.

These costs which are all specific to the production of “SIMPLE” and will be paid on the last day of the year in which they arise with the exception of depreciation,

Advertising expenses will be paid on the first day of each year and will amount to Rs. 30 million at the start of year 1, Rs. 20 million at the start of year 2 and Rs. 10 million at the start of year 3. Calm Plc. has a cost of capital of 20%.

### Required

Analyse and evaluate the production of “SIMPLE” based on expected present value. (Show all relevant calculations).

## 5.3 OUTLOOK PLC

Outlook Plc is considering a new project for which the following information is relevant:

- ☐ Initial investment of Rs. 350,000 with nil scrap value.
- ☐ Expected life span of 10 years
- ☐ Sales volume - 20,000 units per annum
- ☐ Selling price - Rs. 20 per unit
- ☐ Direct variable cost of Rs. 15 per unit
- ☐ Fixed cost excluding depreciation of Rs. 25,000 per annum.

The project has IRR of 17%.

The company's hurdle rate of 15%.

### Required

- (a) Compute the sensitivity of the NPV to each of the underlisted variables:
  - (i) Sales price
  - (ii) Initial outlay
  - (iii) Sales volume
  - (iv) Variable cost
  - (v) Fixed cost
- (b) State the **TWO** most sensitive variables

## 5.4 ZAHEER LTD

Zaheer Ltd is a manufacturer of auto parts and is currently operating at below capacity due to slump in the demand for automobiles. The company has received a proposal from a truck assembler for supply of 40,000 gear boxes per annum for five years at Rs. 1,900 per gear box.

The cost of each gear box is as follows:

	<b>Rupees</b>
Material costs	800
Labour costs	500
Variable production overheads	150
Variable selling overheads	200
Fixed overheads (allocated)	150
	1,800

Company has already incurred a cost of Rs. 5 million on the preparation of technical feasibility. The additional cost for setting up the facility for this order would be Rs. 20 million. The company qualifies for tax allowable depreciation on the cost of setting up the facility on a straight-line basis over the life of the project.

The company has a post-tax cost of capital of 15%. The rate of tax applicable to the company is 30%.

### Required

- (a) Evaluate whether the proposal is financially feasible for the company. Assume that revenue and cost of gear box will remain the same during the next five years.
- (b) Carry out a sensitivity analysis to determine which of the following variables is most sensitive to the feasibility of the order:
  - ☐ Material costs
  - ☐ Labour costs
  - ☐ Additional cost of setup

## 5.5 JKL PHONE LIMITED

JKL Phone Limited is a cellular service provider. The Marketing Director has recently proposed a marketing strategy which envisages the introduction of a new package for pre-paid customers, to gain market share. He has carried out a market research and suggests that the call rates forming part of the proposed package should either be Re. 0.75 or Re. 1.00 or Rs. 1.25 per minute.

Based on market research, sales demand at different levels of economic growth is estimated as follows:

	Probability	Call Rates		
		Rs. 0.75	Re. 1	Rs. 1.25
		Subscribers in million		
Recession	0.30	0.70	0.50	0.30
Moderate	0.50	0.80	0.60	0.40
Boom	0.20	0.90	0.80	0.60

He foresees that the average airtime usage per subscriber would be 1800 minutes or 1600 minutes with a probability of 40% and 60% respectively. In order to cater to the increased subscriber base, the company would need to commission new cell sites, details of which are as follows:

No. of subscribers (in million)	Cost of new sites (Rs. in million)
Up to 0.5 million	180.00
Between 0.5 – 0.8 million	300.00
Between 0.8 – 1.0 million	540.00

It is assumed that the present customers of the company would continue to use the existing packages.

### Required

Evaluate the proposal submitted by the Marketing Director and advise the most suitable call rates.

## 5.6 KHAYYAM LIMITED (KL)

The directors of Khayyam Limited (KL) are considering an investment proposal which would need an immediate cash outflow of Rs. 500 million. The investment proposal is expected to have two years economic life with salvage value of Rs. 50 million at the end of second year.

KL's Budget and Planning Department anticipates that Net Cash Inflows After Tax (NCIAT) are dependent on exchange rate of the US \$ and has made the following projections:

	Exchange Rate Rs. 84-87		Exchange Rate Rs. 88-91		Exchange Rate Rs. 92-95	
	NCIAT	Probability	NCIAT	Probability	NCIAT	Probability
Year 1	250	65%	320	35%	-	-:
Year 2						
- If Year 1 exchange rate is Rs. 84-87	280	20%	330	65%	360	15%
- If Year 1 exchange rate is Rs. 88-91	340	5%	380	50%	400	45%

All NCIATs are in millions of rupees

KL uses a 14% discount rate for investments having similar risk levels.

### Required

- Draw a decision tree to depict the above possibilities.
- Determine whether it would be advisable for Khayyam Limited to undertake this project.

## CHAPTER 6 – DCF: SPECIFIC APPLICATIONS

### 6.1 LEASE OR BUY

A company is considering whether to acquire a new machine. The machine has a purchase cost of Rs. 30,000, an expected useful life of five years and a disposal value of Rs. 6,000 at the end of year 5. The machine would generate additional cash flows of Rs. 10,000 in each of its five years.

Two methods of financing are under consideration:

- (i) To buy the machine with money obtained from a bank loan, at an interest rate of 8% after tax.
- (ii) To lease the machine. The lease payments to the lessor would be Rs. 7,000 at the end of each of the next five years.

The company's cost of capital is 10% after tax.

Corporation tax is 30%. If the machine is purchased, the company will be able to claim capital allowances (tax depreciation allowances) of 25% each year on a reducing balance basis. Tax is payable at the end of the year following the year in which the profits are earned. The first capital allowance would be claimed against profits earned during Year 1.

#### Required

- (a) Recommend whether the machine should be acquired.
- (b) If your recommendation is to acquire the machine, recommend whether it should be purchased or leased.

### 6.2 MOHANI LIMITED

Mohani Limited (ML) has decided to acquire an additional machine to augment its production. The cost of the machine is Rs. 3,200,000 and the expected useful life of the machine is 5 years. The salvage value at the end of its useful life is estimated at Rs. 400,000.

To finance the cost of machine, the company is considering the following options:

- (A) Enter into a leasing arrangement on the following terms:

Lease term	5 years
Security deposits	10% of the cost of machine
Insurance costs	payable by lessor
Installment	Rs. 860,000 payable annually at the beginning of the year.
Purchase Bargain Option	At the end of lease term against security deposit.

- (B) Obtain a 5 year bank loan at an interest of 11% per annum. The loan including interest would be repayable in 5 equal annual instalments to be paid at the end of each year.

The company plans to depreciate the machine using straight-line method. The insurance premium is Rs. 96,000 per annum. The corporate tax rate is 35%. For the purpose of taxation, allowable initial and normal depreciation is 50% and 10% respectively under the reducing balance method. The weighted average cost of capital is 14%.

### Required

Which of the two methods would you recommend to the management? Show all relevant calculations.

## 6.3 DS LEASING COMPANY LIMITED

DS Leasing Company Limited has been approached by BP Industries Limited, with a request to arrange a 4-year lease contract in respect of a state of the art machine. The cost of machine is Rs. 20 million and the expected useful life is 4 years. The residual value at the end of lease term is estimated at 10% of cost.

DS would finance the purchase of machine by borrowing at 16% per annum. The interest would be payable annually and the principal amount would have to be repaid in four equal annual instalments commencing from the end of first year.

DS provides free-of-cost maintenance services for all its leased assets. These services are provided by the company's Maintenance Department whose costs are mostly fixed. If BP acquires this service from any other vendor, it would have to pay an annual fee of 3% of the cost of machine. Insurance cost will be borne by BP and is estimated at 4% of the cost of machine.

The tax rate applicable to both companies is 35% and the tax is payable in the next year. Allowable initial and normal depreciation on the machine is 25% and 10% respectively. The weighted average cost of capital of DS and BP are 18% and 20% respectively.

Both companies follow the same financial year. It may be assumed that the purchase would be finalized on the last day of the financial year.

### Required

- (a) Calculate the annual rental (payable in advance) which DS should charge in order to break even on the lease contract.
- (b) Assume that BP has the following two options for financing the cost of machine:
  - (i) DS has offered to lease the machine at an annual rental of Rs. 7 million, payable in advance.
  - (ii) EFT Bank has offered to finance the machine at 18% per annum. The loan including interest would be repayable in 4 equal annual installments to be paid at the end of each year. Insurance costs would be borne by BP.

Determine which course of action BP should follow.

## 6.4 HIN TEXTILE MILLS LIMITED

In order to reduce the cost of electricity consumption, HIN Textile Mills Limited has decided to install a gas generator and discontinue the power supply being obtained from a utility company. The gas generator which would meet their requirements would cost Rs. 80 million. The following two proposals are being considered by HIN:

### Option 1: Offer from BAL Leasing Company Limited

BAL has offered a three year lease at a quarterly rent of Rs. 7.46 million payable in arrears. In addition, HIN would be required to pay a security deposit of Rs. 10 million at the time of signing the lease agreement. Generator will be transferred to HIN at the end of the lease term, against the security deposit.

The fair value of the generator, at the end of lease period is estimated at Rs. 20 million. Operating and maintenance costs of the generator are estimated as follows:

Costs	Frequency	Rs. in million
Staff salary	Monthly	0.50
Lubricants and filters	Quarterly	1.00
Parts replacement	Half yearly	3.00
Overhaul	At the end of 2nd year	15.00

### Option 2 : Offer from PUS Rental Services

PUS has also offered to sign a three year contract according to which HIN would pay quarterly rent of Rs. 11 million in arrears, with a 10% increase in each subsequent year. The lease rental would include the cost of maintenance and overhauling of the generator, which will be borne by PUS.

It may be assumed that HIN's cost of capital is equal to the IRR offered by BAL.

### Required

Evaluate which of the above proposals should be accepted by HIN. (*Ignore taxation*)

## 6.5 CRANK PLC

The Board of Directors of Crank Plc. is concerned about the optimal replacement cycle of one of its equipment. The initial outlay required to purchase a new equipment is Rs. 1.5million. The longer the asset is held, the higher the operating and maintenance costs and the lower the residual value. Relevant data on the various cost items relating to the equipment are given below:

Year	0	1	2	3
Initial outlay (Rs.'000)	1500			
Operating and Maintenance Cost (Rs.'000)		300	600	750
Residual value (Rs.'000)		1,050	750	600
Cost of Capital is 10%				

### Required

Determine the optimal period of replacing the equipment using the annual equivalent cost method.

## 6.6 ASSET REPLACEMENT

A business entity is considering its policy for the replacement of machines. One type of machine in regular use is machine X. This machine has a maximum useful life of four years, but maintenance costs and other running costs rise with use. An estimate of costs and disposal values is as follows:

**Machine X: Purchase cost Rs. 40,000**

Year	Maintenance costs and other running costs in the year	Disposal value at the end of the year
	Rs.	Rs.
1	8,000	25,000
2	12,000	20,000
3	20,000	10,000
4	25,000	0

The cost of capital is 10%.

### Required

Calculate the equivalent annual cost of a replacement policy for the machine of replacement:

- (a) every one year
- (b) every two years
- (c) every three years
- (d) every four years.

Recommend a replacement policy for the machine.

## 6.7 ROTOR PLC

Rotor Plc is considering investment in a computer-controlled machine which can be replaced by an identical one when it gets to the end of its economic life. The machine has a maximum life of four years but, as its productivity declines with age, it could be replaced after either one, two, three or four years. The financial details of the machine are as given below:

		Rs.'000
Cost		6,000,000
Running cost:		
Year	1	450,000
	2	480,000
	3	570,000
	4	630,000
Scrap value after:		
Year	1	4,500,000
	2	3,900,000
	3	3,000,000
	4	2,100,000



The board of directors of Rotor Plc is concerned with deciding on its replacement policy.

As the financial manager of the company, **you are required to advise** the board on the optimal replacement policy of the machine assuming that the company's cost of capital is 10%.

## 6.8 UVW RENTAL SERVICES

UVW Rental Services, a partnership concern, is in the business of providing power back-up solutions to its corporate clients. At present, it is the policy of the company to replace the old power generators with the new ones after every three years.

During a recent management meeting, the operation manager informed that a 350KVA generator has reached its replacement period. He suggested that since the replacement cost of this generator has significantly increased due to depreciation of rupee, the company should not dispose of the generator at the end of its replacement period and rather get it overhauled and continue.

Following information relating to the generator is available:

(i)	Cost	Written Down Value	Estimated Cost of Overhauling	Current Disposal Value	Replacement Cost
Amount in Rupees					
	3,900,000	1,750,000	2,200,000	945,000	5,250,000

- (ii) It is expected that after overhauling:
- ☐ the generator can be used for another two years. However, running cost of overhauled generator would be Rs. 440 per hour which is 10% higher in comparison with the running cost of the new generator.
  - ☐ the overhauled generator would be sold after two years at a value of 15% of current replacement cost while the new generator is expected to fetch 25% of current replacement value, after three years.
- (iii) The company rents out the generator at Rs. 2,000 per hour and such generators are hired for approximately 2,500 hours per annum, irrespective of their age.
- (iv) The company's cost of capital is 17% per annum before adjustment for inflation. The rate of inflation is 8%.
- (v) The company receives all payments after deduction of tax at the rate of 6% which is considered full and final settlement of its tax liability.

### Required

- (a) Advise whether the management should replace the generator or overhaul and continue to use the existing one.
- (b) Calculate the percentage change in estimated cost of overhauling at which the management would be indifferent between the two options.

## CHAPTER 7 – EVALUATING FINANCIAL PERFORMANCE

### 7.1 EQUITY RATIOS

The following figures have been extracted from the annual accounts of Rainy:

**Issued share capital:** 1,000,000 ordinary shares of Rs. 1 each, fully paid.

**Issued debt capital:** Rs. 250,000 10% debentures.

#### Reserves

Capital (share premium reserve)	Rs. 200,000
Accumulated profits	Rs. 800,000

#### Profit and distributions

Profit for the year	Rs. 600,000 (before interest and tax)
Ordinary dividend payments	Rs.0.20 per share

The current market price of Rainy's equity shares is Rs. 3.20 each. Its debentures are priced at Rs. 90 per cent. The company's rate of corporation tax (income tax) is 30%.

#### Required

Calculate the ratios that are likely to be of interest to an investor or potential investor in Rainy.

Comment on each.

### 7.2 AYELAND AND ZEDLAND

An important client has asked you to review the performance of two overseas companies in which he is thinking of investing. Both companies are claiming to have been successful during the last four years.

One company is located in the country of Ayeland, the other in Zedland.

Company 1 in Ayeland		Lire (million)			
	20X0	20X1	20X2	20X3	
Revenue	432	567	693	810	
Profit after tax	55	76	102	126	
Share price (lire)	1,058	1,330	1,620	2,001	
Equity beta				1.55	
Company 2 in Zedland		Francs (000)			
	20X0	20X1	20X2	20X3	
Revenue	12,000	12,430	13,100	14,569	
Profit after tax	1,840	2,004	2,320	2,540	
Share price (francs)	236	192	204	229	
Equity beta				0.98	

**Data for the two countries:**

<b>Ayeland</b>	<b>20X0</b>	<b>20X1</b>	<b>20X2</b>	<b>20X3</b>
Retail price (inflation) index	450.3	610.2	773.1	924.2
Stock market index	5,005	6,002	7,450	9,470
Risk free rate				19%
<b>Zedland</b>	<b>20X0</b>	<b>20X1</b>	<b>20X2</b>	<b>20X3</b>
Retail price (inflation) index	100	104.3	107.1	110.8
Stock market index	10,200	8,896	9,320	9,457
Risk free rate				4%

The equity betas and the risk free rate were estimated over the period 20X0–20X3.

**Required**

- Prepare a report for the client discussing the performance of the two companies. Relevant calculations should be included in the report.
- Discuss what other information would be useful to assess the performance of the two companies.

**7.3 KHAN INDUSTRIES PLC**

The directors of two divisions of Khan Industries plc were each asked last year to improve their division's performance.

Summarised financial data at that time for the two divisions is shown below.

	<b>Division A</b>	<b>Division B</b>
	<b>Rs.'000</b>	<b>Rs.'000</b>
Revenue	840	610
Operating profit	95	78
Interest	6	8
Taxable profit	89	70
Non-current assets	580	430
Current assets	290	250
Current liabilities	210	180
Medium and long term debt	40	55
Shareholders' equity	620	445
Capital employed	660	500

The results for the current year have just been announced as:

	<b><i>Division A</i></b>	<b><i>Division B</i></b>
	<b>Rs.'000</b>	<b>Rs.'000</b>
Revenue	1,000	650
Operating profit	122	94
Interest	18	8
Taxable profit	104	86
Non-current assets	680	440
Current assets	350	240
Current liabilities	260	170
Medium and long term debt	140	55
Shareholders' equity	630	455
Capital employed	770	510

### Required

Analyse the performance of the two divisions, and from the perspective of the future strategic development of Khan Industries suggest what controls the directors of Khan Industries might introduce to influence the future development of the divisions.

## CHAPTER 8 – CAPITAL RATIONING

### 8.1 CAPITAL RATIONING

A company has identified five investment projects that it would like to undertake. None of the investments can be delayed. If they are not undertaken now, the opportunity to invest will be lost. Details of the five investments are as follows:

Investment	Capital investment required in Year 0	NPV of the investment
	Rs.	Rs.
A	60,000	12,000
B	80,000	21,600
C	50,000	8,500
D	45,000	10,800
E	55,000	9,900

Capital is in short supply, and only Rs. 150,000 is available for investment. The company cannot therefore undertake all five investments.

#### Required

In order to maximise the total NPV of its investments, recommend which investments to undertake:

- assuming that all five investment projects are divisible.
- assuming that none of the five investments is divisible, and the choice is either 0% and 100% of each investment.

### 8.2 BASRIL COMPANY

Basril Company is reviewing investment proposals that have been submitted by divisional managers. The investment funds of the company are limited to Rs. 800,000 in the current year. Details of three possible investments, none of which can be delayed, are given below.

#### Project 1

An investment of Rs. 300,000 in work station assessments. Each assessment would be on an individual employee basis and would lead to savings in labour costs from increased efficiency and from reduced absenteeism due to work-related illness. Savings in labour costs from these assessments in money terms are expected to be as follows:

Year	1	2	3	4	5
Cash flows (Rs.000)	85	90	95	100	95

#### Project 2

An investment of Rs. 450,000 in individual workstations for staff that is expected to reduce administration costs by Rs. 140,800 per annum in money terms for the next five years.

### Project 3

An investment of Rs. 400,000 in new ticket machines. Net cash savings of Rs. 120,000 per annum are expected in current price terms and these are expected to increase by 3.6% per annum due to inflation during the five-year life of the machines.

Basril Company has a money cost of capital of 12% and taxation should be ignored.

#### Required

- (a) Determine the best way for Basril Company to invest the available funds and calculate the resultant NPV:
  - (i) on the assumption that each of the three projects is divisible
  - (ii) on the assumption that none of the projects are divisible.
- (b) Explain how the NPV investment appraisal method is applied in situations where capital is rationed.
- (c) Discuss the reasons why capital rationing may arise.

## 8.3 CB INVESTMENT LIMITED

CB Investment Limited (CBIL) has identified various projects for investments. Details of the projects are as follows:

Projects	A	B	C	D	E	F
Initial investment required now (Rs. in million)	(300)	(120)	(240)	(512)	(800)	(400)
Forecasted annual net cash inflows (Rs. in million)	150	50	140	256	440	300
Discount rate (based on risk involved in the project)	10%	11%	12%	11%	13%	14%
Project duration (years)	4	5	3	6	3	2
Year from which net cash inflows would commence	1	2	1	3	1	1

Other relevant information is as follows:

- (i) Project A and B are mutually dependent and are non-divisible.
- (ii) Project C can be scaled down but cannot be scaled up.
- (iii) Project D, E and F are mutually exclusive. They cannot be scaled down but can be scaled up.

Total financing available with the company is Rs. 1,000 million. It may be assumed that all cash flows would arise at the beginning of the year.

#### Required

Determine the most beneficial investment mix.

## CHAPTER 9 – SOURCES OF FINANCE

### 9.1 RIGHTS

A company wishes to increase its production capacity by purchasing additional plant and equipment. To finance the new investment, the company will make a 1 for 4 rights issue. The shares are currently quoted on the Stock Exchange at Rs. 5.50 per share and the new shares will be offered to shareholders at Rs. 4.50 per share.

Ignore the transaction costs of the share issue.

#### Required

Calculate:

- (a) the theoretical ex-rights price per share.
- (b) the value of the rights on each existing share.

### 9.2 KAMALIA CARRIERS PLC

- (a) Explain the term “rights issue”.
- (b) Differentiate between “rights issue” and “public issue”.
- (c) (i) Kamalia Carriers Plc is about to make a one-for-three rights issue. Its current capital structure is as follows:
  - ☐ 6 million Ordinary shares of Rs. 1 each (current market value is Rs. 6.20 per share)
  - ☐ 15% Debentures (Redeemable at par in 10 years time) – Rs. 6 million.
- (ii) The money raised from the rights issue may be used to execute the following;
  - ☐ Buy back all the 15% debentures at their current market value. It is expected that this investment will be priced to offer investors a yield of 9% which is the current market-yield on debenture loan.
  - ☐ Finance a new project costing Rs. 1.6 million.

#### Required

- (i) Determine the finance required to redeem the debentures and finance the new project.
- (ii) Determine the issue price per share;
- (iii) Calculate the theoretical ex-rights price; and
- (iv) Calculate the theoretical nil paid value of a right per share

#### Note:

The total finance required for (i) and (ii) should be rounded up to the next Rs. 100,000 for the purpose of the rights issue.

### 9.3 RIGHTS ISSUE

Smeaton Furniture wishes to increase its production capacity by purchasing additional plant and equipment at a cost of Rs. 3.8 million. The abridged profit and loss account for the year ended 30<sup>th</sup> November 20X6 is as follows:

	Rs. m
Sales turnover	140.6
Profit before interest and taxation	8.4
Interest	6.8
Profit before tax	1.6
Tax	0.4
Profit after taxation	1.2

Earnings per share 15 cents

In order to finance the purchase of the new plant and equipment, the directors of the company have decided to make a rights issue equal to the cost of the equipment. The shares are currently quoted on the Stock Exchange at Rs. 2.70 per share and the new shares will be offered to shareholders at Rs. 1.90 per share.

#### Required

- (a) Calculate:
  - (i) the theoretical ex-rights price per share
  - (ii) the value of the rights on each existing share
  - (iii) assuming the increase in production capacity will lead to an increase in profit after tax of Rs. 600,000 per annum and the P/E ratio of the company will remain unchanged after the rights issue, calculate the market value per share after the rights issue.
- (b) What are the options available to a shareholder who receives a rights offer from a company?

### 9.4 STOCK EXCHANGE LISTING

- (a) Outline the advantages and disadvantages of obtaining a stock exchange listing.
- (b) What are the types of issue costs that are associated with obtaining a stock exchange listing?

### 9.5 CONVERTIBLE BONDS

A company has the following equity shares and bonds in issue:

2,000,000 equity shares of Rs.0.50 each.

Rs. 1,000,000 of 4% convertible bonds.



The current earnings per share (EPS) is Rs.0.25.

The rate of tax is 30%.

The convertible bonds are convertible into equity shares at the rate of 40 shares for every Rs. 100 of bonds.

### Required

On the basis of this information, calculate the expected change in EPS if all the bonds are converted into equity shares.

## 9.6 SHOAIB INVESTMENT COMPANY

Shoaib Investment Company Limited is a listed company having a share capital of Rs. 1,000 million consisting of 100 million shares of Rs. 10 each.

The company's net equity at book value, as of March 31, 2016 was Rs. 2,000 million.

The company maintains a debt equity ratio of 70:30 based on market value. Long term debt constitutes 90% of total liabilities of the company.

It is the policy of the company to invest 60% of its total assets in listed securities. The correlation between the market value of these listed securities held by the company and KSE-100 Index is 1.1.

On March 31, 2016, the company's shares were traded at price to book value ratio (P/B ratio) of 1.4.

During the quarter April 1, 2016 to June 30, 2016, KSE-100 Index fell by 20%. This fall in the index also affected the market price of the company's shares and as of June 30, 2016, they were being traded at P/B ratio of 0.9. There was no significant change in the amount of liabilities and other assets of the company, during the quarter.

### Required

- (a) Compute the amount of fresh equity required to be injected as of June 30, 2016 in order to maintain the debt equity ratio.
- (b) The company has been approached by Mr. Alam, a large investor, who has offered to provide the required capital as computed in (a) above at a discount of 10% of market value. Compute the % holding of Mr. Alam in the company, if his proposal is accepted.

## 9.7 SAJAWAL SUGAR MILLS LIMITED

Sajawal Sugar Mills Limited (SSML), a medium sized listed company, is planning to expand its production capacity. The management has estimated that the expansion would require an outlay of Rs. 300 million.

Following figures have been extracted from SSML's financial statements for the year ended June 30, 2016.

## Statement of financial position

	Rs. in million
Paid up capital (Rs. 10 each)	400
Retained earnings	150
Non-current liabilities	600
Current liabilities	100
	1,250
Fixed assets	1,100
Current assets	150
	1,250

## Statement of comprehensive income

	Rs. in million
Net profit after tax	125
EPS	3.13

To finance the expansion, SSML is considering a right issue. However, the management of SSML wants to maintain its existing debt equity ratio, return on total assets ratio and dividend payout percentage. Moreover, they wish to keep the ex-right price to be the same as current market price.

SSML follows a policy of retaining 30% of its profits. The current market price of its shares is Rs. 20 whereas its share price beta is 1.23. Presently, market return is 16% whereas yield on one year treasury bills is 12%. Market is assumed to be strong form efficient.

**Required**

Under the circumstances referred to in the above situation, what should be:

- The right ratio
- The right offer price
- Theoretical ex-right price
- Value of each right

**9.8 PSD ENGINEERING LIMITED**

The Directors of PSD Engineering Limited, a listed company, are planning to raise Rs. 100 million for a new project. They are considering two possible options of fund raising. The first is to make a two-for-five right issue of ordinary shares priced at Rs. 12.50 per share. The second option is to issue 9% Term Finance Certificates (TFCs) at par, redeemable in 2026.

The following information has been extracted from the financial statements of PSD for the year ended March 31, 2016:

	Rs. in million
Issued ordinary shares Rs. 10 each	200
Retained earnings	390
	590
10% TFCs at par, repayable in 2018	350
	940

The shares of the company are currently traded at Rs. 16 per share. The profit before interest and taxation of PSD for the year ended March 31, 2016 is Rs. 95 million.

It is expected that the right issue will not affect PSD's current price earnings ratio. However, the issue of TFCs would result in fall in price earnings ratio by 30%.

The tax rate applicable to the company is 35%.

### Required

- (a) Make appropriate calculations in each of the following independent situations:
  - (i) Assuming a right issue of shares is made, calculate:
    - ☐ the theoretical ex-rights price of an ordinary share.
    - ☐ the value of the right.
  - (ii) Assuming the market is strong form efficient and it is expected that new project would generate positive net present value of Rs. 96 million. Calculate the theoretical ex-right price in this case.
  - (iii) Assuming that the new project would increase the company's profit before interest and tax for the next year by 10%. Calculate the price of an ordinary share in one year's time under each of the two financing options.
- (b) Briefly discuss why issue of term finance certificates is expected to result in fall in price earnings ratio.

## CHAPTER 10 – PORTFOLIO THEORY AND THE CAPITAL ASSET PRICING MODEL

### 10.1 TWO-ASSET PORTFOLIO

An investor is planning to invest in two securities, Security X and Security Y. The expected return from each security will depend on the state of the economy, as follows:

State of the economy	Probability	Return from Security X	Return from Security Y
		%	%
Strong	0.25	15	20
Fair	0.60	10	8
Weak	0.15	2	(6)

#### Required

- Calculate the mean and standard deviation of the expected return from Security X.
- Calculate the mean and standard deviation of the expected return from Security Y.
- Calculate the covariance of the returns from Security X and Security Y. The formula for a covariance is:

$$\text{Cov}_{x,y} = \sum (x - \bar{x})(y - \bar{y})$$

- Calculate the correlation coefficient for returns from Security X and Security Y, for a portfolio consisting of 50% of the funds invested in Security X and 50% of the funds invested in Security Y. The formula for correlation coefficient is:

$$\rho_{x,y} = \frac{\text{Cov}_{x,y}}{\sigma_x \times \sigma_y}$$

where:

$\sigma_x$  = the standard deviation of returns from Security X

$\sigma_y$  = the standard deviation of returns from Security Y

Comment on the correlation coefficient.

- Calculate expected return, the variance and standard deviation of a portfolio consisting of 50% of the funds invested in Security X and 50% of the funds invested in Security Y. The formula for correlation coefficient is:

$$a^2(\text{Variance X})^2 + (1 - a)^2(\text{Variance Y})^2 + 2a(1 - a) \text{Cov}_{x,y}$$

where:

$a$  = the proportion of the portfolio invested in Security X

$(1 - a)$  = the proportion of the portfolio invested in Security Y

Variance X = the variance of the returns from Security X

Variance Y = the variance of the returns from Security Y

- (f) Calculate expected return, the variance and standard deviation of a portfolio consisting of 80% of the funds invested in Security X and 20% of the funds invested in Security Y.

## 10.2 COEFFICIENT OF VARIATION

A multinational company is planning to invest in two developing countries, and it will invest equal amounts of capital in each country. It is looking at returns and risk in each of three possible countries that might be selected for investment.

The company is particularly concerned about the political risk in each country, and the threat of political risk to its expected returns. A firm of management consultants has produced the following statistical estimates of expected returns and political risk in each of the countries.

Country	Expected investment return (%)	Political risk (%)
Country A	16	25
Country B	22	36
Country C	30	45

The expected return from investing in any of the three countries is independent of the returns that would be obtained from the other countries.

Required

- (a) Calculate the risk, return and coefficient of variation of the following three investment portfolios:
- 50% in Country A, 50% in Country B
  - 50% in Country A, 50% in Country C
  - 50% in Country B, 50% in Country C
- (b) Comment on the results.

## 10.3 PORTFOLIO RETURN

A client has asked for advice on his investment portfolio. Details of his securities in the stock market (which is regarded as efficient) with the associated risk characteristics are given below:

### SECURITIES

	X	Y	Z
Standard deviation (%)	5	15	14
Correlation coefficient (%)	80	40	60
Proportion of amount invested (%)	30	30	40

The expected return on shares in general and on the basis of past return and inflationary expectation was estimated to be 20%. It is expected that the risk premium will be about 5%. The risk of the market as measured by its standard deviation is 8%. All the three securities lie on the Securities Market Line (SML).

### Required

Prepare the following computations for a discussion with your client, as a prelude to your advice:

- (i) The expected portfolio return
- (ii) The risk of the portfolio

## 10.4 DOLPHIN PLC.

Dolphin Plc. is all equity financed.

The directors are considering investment in one of two projects which are mutually exclusive. The cash flows of the two projects are as follows:

	Project A	Project B
	(Hire Purchase Finance)	(Mortgage Finance)
Initial Outlay	Rs. 10 million	Rs. 24 million
Cash flow:		
Years 1 – 3	Rs. 4.8million p.a.	Rs. 7.8million p.a.
Years 4 and 5	Rs. 5.6million p.a.	Rs. 8.9million p.a.
Residual Value	Rs. 1million	Rs. 1 million

Other additional information is given as follows:

Current market price/share	=	Rs. 150
Current annual gross dividend/share	=	Rs. 15
Expected dividend growth rate p.a.	=	10%
Beta co-efficient for company's shares	=	0.7
Expected rate of return on risk free securities	=	9%
Expected rate of return on market portfolio	=	17%

### Required

- (a) Evaluate the viability of each project using the Capital Asset Pricing Model (CAPM) and Dividend Growth Model (DGM).
- (b) Identify which project to accept giving your reasons.
- (c) Explain the **THREE** factors that must be estimated for any valuation model.

## 10.5 RISK AND RETURN

A divisional manager's attitude to investing in new projects is affected by his attitude to risk. He is prepared to invest in a project that is more risky, provided that it offers a higher expected return.

He is currently considering four mutually exclusive projects, for which the estimated returns and risk are as follows:

Project	Estimated project NPV	Risk ( $\sigma$ )
Project 1	80% chance of + Rs. 4 million, 20% chance of + Rs. 2 million	0.80
Project 2	70% chance of + Rs. 5 million, 30% chance of + Rs. 1.5 million	1.60
Project 3	60% chance of + Rs. 6 million, 40% chance of + Rs. 1 million	Not yet calculated
Project 4	50% chance of + Rs. 8 million, 50% chance of – Rs. 1 million	Not yet calculated

### Required

- Calculate the risk with Project 3 and Project 4.
- Suggest which of the four projects the divisional manager will select.

## 10.6 OBTAINING A BETA FACTOR

A beta factor will be estimated for Security Y from the following data.

Month	Returns from the market portfolio	Returns from Security Y
	%	%
1	+ 2	+ 3
2	– 1	– 2
3	– 2	– 2
4	+ 3	+ 5
EV of monthly return	+ 0.5	+ 1.0

### Required

- Use this data to calculate:
  - the standard deviation of the monthly return from the market portfolio and
  - the standard deviation of the monthly return from Security Y.

- (b) Calculate the correlation coefficient for the market returns and the returns from Security Y. This is calculated as:

$$\rho_{m,y} = \frac{\text{Cov}_{m,y}}{\sigma_m \times \sigma_y}$$

where:

$\sigma_m$  = the standard deviation of returns from the market portfolio

$\sigma_y$  = the standard deviation of returns from Security Y

The formula for the covariance is:

$$\text{Cov}_{x,y} = \Sigma (x - \bar{x})(y - \bar{y})$$

- (c) Use this data to calculate the beta factor for Security Y. You can use either of the following formulas.

$$\beta = \frac{\text{Cov}_{m,y}}{\text{Var}_m}$$

Alternatively

$$\beta = \frac{\rho_{m,y} \times \sigma_y}{\sigma_m}$$

## 10.7 SODIUM PLC

Sodium Plc is a highly diversified company operating in a number of different industries. Its shares are widely traded on the Stock Exchange and have a current market price of Rs. 3.20.

Its dividend payments over the last five years are:

Year	DPS
2016	0.25
2015	0.23
2014	0.20
2013	0.19
2012	0.18

Sodium Plc is considering two investment opportunities: one is the Hotel and Tourism (H&T) sector and the other is the Food and Beverages (F&B) sector. Both projects have relatively short lives and their cash flows are as follows:

	H & T	F & B
Year	Rs.'m	Rs.'m
1	85	190
2	170	180
3	150	200



The investment in Hotel and Tourism would cost Rs. 300 million while that in Food and Beverages would cost Rs. 400 million.

The directors have discovered that industry beta for Hotel & Tourism and Food and Beverages sectors are 1.2 and 2.2 respectively. They believe the investments being considered are typical of projects in the relevant industries.

Sodium Plc industries beta is 1.6, treasury bill rate is 9% and the average return on companies quoted on the stock exchange is 14%.

### Required

- (a)
  - (i) Compute the net present values of both projects using the company's weighted average cost of capital as a discount rate.
  - (ii) Compute the NPVs using a discount rate which takes account of the risk associated with the individual projects.
  - (iii) Advise the directors regarding the project to accept.
- (b) Enumerate the uses and limitations of the Capital Asset Pricing Model (CAPM)

## 10.8 DR JAMAL

Dr Jamal has the following portfolio of shares in five listed companies:

Companies	Black	Blue	Yellow	Purple	White
Shares held (units)	15,000	18,000	10,000	12,000	20,000
Price per unit	Rs.0.50	Rs.0.60	Rs.0.40	Rs.0.25	Rs.0.35

The following data are given in relation to the shares:

Companies	Black	Blue	Yellow	Purple	White
Market value per share	Rs. 2.50	Rs. 2.20	Rs. 1.90	Rs. 1.50	Rs.0.60
Current dividend yield	2.2%	4.0%	5.2%	2.6%	1.8%
Beta factor	1.32	1.20	0.80	1.05	0.80

At present the risk-free rate of return is 8% while the market return is 14%.

### Required

- (a) Calculate
  - (i) the beta factor
  - (ii) the required return on the portfolio.
- (b) Explain the relevance of portfolio theory to Dr Jamal

## 10.9 MR. FARAZ

Mr. Faraz, a large investor, wants to invest Rs. 100 million in the stock market by developing a portfolio consisting of those shares which have a track record of good performance.

He contacted a Stock Analyst to identify such stocks. After a detailed study, the Stock Analyst recommended investments in shares of five different companies. Based on his recommendation, Mr. Faraz invested the amount on January 1, 2016. The relevant details are as follows:

Company	Investment (Rs.)	Price per Share on Jan 1, 2016 (Rs.)	Expected Dividend Yield	Standard Deviation	Covariance with KSE 100
A	15,000,000	60	3.50%	24%	2.10%
B	18,000,000	245	3.00%	22%	3.00%
C	22,000,000	225	2.50%	18%	2.60%
D	25,000,000	130	8.00%	15%	1.90%
E	20,000,000	210	5.00%	20%	2.80%

The stock analyst also informed him that the standard deviation and market return of the KSE-100 Index is 15% and 20% respectively. The risk free rate of return is 8%.

### Required

- Assuming that Mr. Faraz estimates his cost of equity by using the Capital Asset Pricing Model, compute the required rate of return on each security.
- As at December 31, 2016, compute the following:
  - ☐ Estimated value of portfolio.
  - ☐ Portfolio beta.
  - ☐ Estimated total return on portfolio.

## 10.10 MUSHTAQ LIMITED

Mushtaq Limited is considering two possible investment projects. Both the projects have a life of one year only. The returns from new projects are uncertain and depend upon the growth rate of the economy. Estimated returns at different levels of economic growth are shown below:

Economic Growth (Annual Avg.)	Probability of Occurrence	Returns (%)		
		Project 1	Project 2	Market
1%	0.25	20	22	30
3%	0.50	30	28	25
5%	0.25	40	40	40

Risk free rate of return is 10%.

### Required

Evaluate the above projects using the Capital Assets Pricing Model.

### 10.11 ATTOCK INDEX TRACKER FUND

Attock Index Tracker Fund (AITF) is an open-end mutual fund and was incorporated in 2011. However, since inception, its performance has remained unimpressive and it has generally been outperformed by KSE-100 index.

You have recently joined AITF as its Fund Manager and have been asked by the management to review the current composition of the portfolio. Details relating to the shares currently held in the portfolio are as follows:

Name of company	Market price per share	No of shares	Standard deviation	Covariance	Price forecast after one year	Dividend per share next year
	Rupees	in 000			Rupees	Rupees
A	25	150	0.15	0.024	27	2.00
B	15	230	0.24	0.039	17	1.00
C	46	190	0.16	0.044	52	2.50
D	106	50	0.32	0.033	111	4.00
E	75	100	0.19	0.018	85	2.00
F	114	120	0.22	0.041	125	3.00
G	239	60	0.19	0.032	220	5.50
H	156	80	0.21	0.04	168	3.00
I	145	35	0.18	0.034	170	2.50
J	67	45	0.22	0.033	75	1.00

**Following information is also available:**

- The average market return of the KSE-100 Index companies is 12% and the standard deviation is 18%.
- The risk free rate of return is 8%.
- The correlation between the market value of securities held by AITF and KSE-100 Index is 0.737.
- The average return on AITF's shares is 11% with standard deviation of 22%.

**Required**

- Compute the AITF's systematic risk and assess the extent to which AITF has matched the performance of KSE-100 Index.
- Determine whether AITF achieves the return according to its risk profile.
- Identify those shares in AITF's portfolio which are expected to underperform and should be removed.
- Compute the revised beta of AITF i.e. after excluding the underperforming shares. Assume that cash generated from disposal of underperforming shares will be used to buy the remaining shares in proportion to their current holdings.

### 10.12 IRON LIMITED

Iron Limited (IL) is considering four projects for investing the excess liquidity available with the company. Each project will last for three years. The details are as follows:

	Projects			
	A	B	C	D
Net annual cash flows (Rs. in millions)	85	87	90	95
Expected return	16%	14%	17%	15%
Standard deviation of returns	20%	18%	27%	30%
Estimated correlation of returns with market returns	0.82	0.85	0.91	0.78

The current market returns are 14% with a standard deviation of 16%. Risk free rate of return is 10%.

#### Required

- Evaluate which of the above projects may be selected for investment by Iron Limited. Rank the selected projects in order of preference.
- Determine the overall systematic risk that would be associated with the above investments if IL decides to invest in all the projects selected in (a) above.

### 10.13 FR CO-OPERATIVE HOUSING SOCIETY

The Trustees of FR Co-operative Housing Society are planning to invest its surplus funds in different open end mutual funds. Details of proposed investments along with market information gathered from a stock analyst are as follows:

	Mutual Funds		
	A	B	C
<b>Information on proposed investment</b>			
Date of investment	01-Jul-16	01-Aug-16	01-Sep-16
Amount of investment	Rs. 500,000	Rs. 1,000,000	Rs. 500,000
Estimated net asset value on acquisition	Rs. 10.50	Rs. 10.00	Rs. 9.70
Estimated net asset value as on December 31, 2016	Rs. 10.40	Rs. 10.00	Rs. 9.90
<b>Expected dividends (during the investment holding period)</b>			
Cash dividend to be received	Rs. 9,500	Rs. 15,000	
Bonus to be received	10%	5%	5%

	<b>Mutual Funds</b>		
	<b>A</b>	<b>B</b>	<b>C</b>
<b>Funds characteristics</b>			
Front end load (Buying load)	3.00%	2.00%	1.50%
Back end load (Selling load)	1.00%	0.00%	2.00%
Sharpe ratio	0.71	0.31	0.16
Correlation with benchmark indices	0.75	0.9	0.83
<b>Expected performance of benchmark indices</b>			
Benchmark index	KSE 100	KSE 30	KMI 30
Total annual return %	16	17	12
Standard deviation of annual returns	0.1	0.18	0.13

The yield on 1-year treasury bills is 9%.

**Required**

- Estimate the effective annual yield which FR would earn, from the date of investment up to December 31, 2016.
- In respect of each fund, evaluate whether it would achieve the return in accordance with its risk profile.

## CHAPTER 11 – DIVIDEND POLICY

### 11.1 DIVIDENDS AND RETENTIONS

The directors of an all-equity company are considering the company's policy on dividends and retentions. The cost of capital is 9% and the company is able to invest in new capital projects that will earn this return. The company's shares are quoted and traded on a major stock market.

In the year just ended, the earnings per share were Rs. 2.00 per share. The company pays a dividend annually, and is about to pay a dividend for the year just ended on the basis of its selected dividend and retentions policy.

Required

Suggest what the company's share price might be if the directors select a policy of paying annual dividends that are equal to:

- (a) 25% of earnings
- (b) 50% of earnings
- (c) 70% of earnings

### 11.2 ACKERS PLC

Ackers Plc. has been experiencing difficult trading conditions over the past few years. In the current year, net earnings are likely to be Rs. 20 million, which will just be sufficient to pay a dividend of Rs. 1 per share. The earnings and dividends for the company over the past five years are shown below:

Year	Net earnings per share	Net dividend per share
	Rs.	Rs.
2012	1.40	0.84
2013	1.35	0.88
2014	1.35	0.90
2015	1.30	0.95
2016	1.25	1.00

There are 20,000,000 ordinary shares in issue, majority of which, are owned by private investors. There is no debt in the capital structure. Members of the Board of Directors are considering a number of strategies for the company, some of which, will have an impact on the company's future dividend policy. The company's shareholders require a return of 15% on their investment.

The following four dividend payment options are being considered:

- (i) Pay out all earnings as dividend
- (ii) Pay a dividend of 50% out of earnings and retain the remaining 50% for future investment

- (iii) Pay a dividend of 25% out of earnings and retain the remaining 75% for future investment.
- (iv) Retain all earnings for an aggressive expansion programme and pay no dividend at all.

The directors have not been able to agree on any of the four options.

Some of them prefer option (i) because they believe that doing anything else would have an adverse impact on the share price.

Others favour either option (ii) or option (iii) because the company has identified some good investment opportunities and they believe one of these options would be in the best long-term interest of the shareholders.

An adventurous minority favours option (iv) and thinks that the option will allow the company to take over a relatively small but vibrant competitor.

### Required

- (a) Discuss the company's dividend policy between 2012 and 2016 and its possible consequences on earnings.
- (b) Advise the directors of Ackers Plc. on the share price which might be expected immediately following the announcement of their decision if they pursue each of the four options, using an appropriate valuation model

**Note: (Make necessary assumptions).**

## 11.3 DIVIDEND POLICY

The objective of dividend policy should be to maximise the shareholders' return so that the value of their investment is maximised.

- (a) State and explain any **SIX** factors which determine the dividend policy of a large public company whose shares are quoted on the stock exchange.
- (b) State why a stable dividend policy might be expected to lead to a higher market valuation of a company's share.
- (c) Mainland Plc. has just made earnings of Rs. 2,250,000. Its Directors are trying to decide on a dividend policy. If they retain 20% of earnings, they believe they can achieve an annual growth rate of 5% in earnings and dividend. If they retain only 10% of earnings, the growth rate would be 2% and shareholders would expect a return of 14%.

Which retention policy would maximise the value of the company's shares.?

## 11.4 YB PAKISTAN LIMITED

YB Pakistan Limited is engaged in the manufacture of pharmaceutical products. On April 1, 2016 the Board of Directors approved a plan which envisages an investment of Rs. 300 million on account of capital expenditures over the next five years. Following information has been extracted from the management accounts of the company which have been prepared in respect of the year ended March 31, 2016:

	Rs. in millions
Sales revenue	190.00
Cost of goods sold	110.00
Operating expense	30.00
Interest expense	15.00
Property plant and equipment	100.80
Shareholders' equity	135.00

The following information is also available:

- (i) Annual outlay of investment in next five years is estimated to be 13%, 16%, 22%, 22% and 27% respectively of the total amount.
- (ii) The company expects that the operating profit (excluding depreciation) generated by the existing assets will grow at the rate of 12% per annum. In addition, the new investments would yield pre-tax cash flows of 15% per annum.
- (iii) The company follows a policy of maintaining a debt equity ratio of 40:60.
- (iv) Interest rates on existing and future long term debts are expected to be the same and are not expected to change during the next five years. The current debt is repayable at the end of five years. All future debts would be repayable on or after six years.
- (v) The company has a short term financing facility of Rs. 50 million. The outstanding balance as of March 31, 2016 was Rs. 20 million. Assume that interest @ 16% is payable at the end of each year on the closing balances.
- (vi) The company invests its surplus funds into highly secured investments which yield 8% per annum.
- (vii) The additional working capital requirements are estimated at 10% of additional capital expenditures.
- (viii) Accounting depreciation is calculated at the rate of 15% of written down value. It is equal to tax depreciation and therefore is allowable for tax purposes. The current corporate tax rate is 40%. To promote corporate business, the Government has announced an annual reduction of 2% in tax rate till it is reduced to 34%.
- (ix) The company follows the residual dividend policy for payment of dividends. You may assume that all cash flows are incurred at year end.

### Required

- (a) Calculate the expected dividend for the next five years in accordance with the existing payout policy of the company.
- (b) Ascertain whether the company would be able to pay off its existing loan at the expiry of five years.



**11.5 AL-GHAZALI PAKISTAN LIMITED**

- (a) Briefly discuss the Dividend Irrelevance Theory developed by Miller and Modigliani (MM). State three arguments against the validity of this theory.
- (b) Al-Ghazali Pakistan Limited (AGPL) is a listed company whose shares are currently traded at Rs. 80 per share. AGPL's Board has approved a proposal to invest Rs. 600 million in a project which is expected to commence on 31 December 2016. There are no internal funds available for this investment and the company would have to finance the project from the profit for the year ending 31 December 2016 and through right issue.

AGPL has a share capital consisting of 20 million shares of Rs. 10 each and its profit for the year ending 31 December 2016 is projected at Rs. 250 million.

The annual return on 1-year treasury bills, the standard deviation of returns on AGPL's shares and the estimated correlation of returns with market returns are 7.5%, 8% and 0.8 respectively. The current market return is 12.9% with a standard deviation of 5%.

**Required**

Using MM Theory of Dividend Irrelevance, estimate the price of AGPL's shares as at 31 December 2016, if the company declares:

- (i) 20% dividend
  - (ii) Nil dividend
- (c) Justify the MM Theory of Dividend Irrelevance, based on your computation in (b) above.

## CHAPTER 12 – FINANCING OF PROJECTS

### 12.1 GEARING

The following information is available about Company A and Company B:

	Company A	Company B
Capital structure	Rs.	Rs.
Equity shares of Rs. 1	10,000	10,000
Reserves	20,000	90,000
	<hr/>	<hr/>
	30,000	100,000
10% debt capital	70,000	0
	<hr/>	<hr/>
	100,000	100,000
	<hr/>	<hr/>
Annual profit	Rs.	Rs.
Sales	80,000	80,000
Variable costs	10,000	60,000
	<hr/>	<hr/>
Contribution	70,000	20,000
Fixed operating costs	60,000	10,000
	<hr/>	<hr/>
Profit before interest and tax	10,000	10,000
Interest costs	7,000	0
	<hr/>	<hr/>
Profit	3,000	10,000
Tax (20%)	600	2,000
	<hr/>	<hr/>
Profit after tax (= earnings after interest and tax)	2,400	8,000
	<hr/>	<hr/>

Assume that annual sales now increase for both companies by 25% to Rs. 100,000.

#### Required

- (a) Calculate the increase in earnings for each company as a result of the increase in sales. Assume that there is no change in the variable costs as a percentage of sales or in total annual fixed costs.
- (b) For each company, calculate:
  - (i) the operational gearing ratio (the percentage change in earnings before interest and tax as a ratio of the percentage increase in sales)
  - (ii) the financial gearing ratio (the percentage change in earnings after tax as a ratio of the percentage increase in earnings before interest and tax)
  - (iii) the combined gearing effect.

## 12.2 FINANCING SCHEMES

The statement of financial position of Brunel as at 31<sup>st</sup> November Year 6 is as follows:

### Statement of financial position as at 30th November Year 6

	Rs. m	Rs. m
Non-current assets		24.8
Current assets		
Inventory	18.5	
Trade receivables	21.4	
Bank	1.9	
		41.8
Total assets		66.6
Equity and liabilities		
Rs.0.50 ordinary shares		10.0
Accumulated profits		22.4
Total equity		32.4
10% Debentures		15.0
Current liabilities		
Trade payables	15.1	
Taxation	4.1	
		19.2
Total equity and liabilities		66.6

An statement of profit or loss for the year to 30<sup>th</sup> November Year 6 is as follows:

	Rs. m
Sales	115.4
Profit before interest and taxation	17.9
Interest payable	1.5
Profit before taxation	16.4
Tax (25%)	4.1
Profit after taxation	12.3

The company wishes to expand its production facilities to meet an increase in sales demand for its products. It will need Rs. 18 million of new capital to invest in equipment. It is expected that annual profit before interest and taxation will increase by Rs. 5 million.

Brunel is considering the following three possible methods of financing the expansion programme:

- (i) Issuing 9 million Rs.0.50 equity shares at a premium of Rs. 1.50 per share.
- (ii) Issuing 12 million 12% Rs. 1 preference shares at par and Rs. 6 million 10% debentures at par.

- (iii) Issuing 6 million equity shares at a premium of Rs. 1.50 per share and Rs. 6 million 10% debentures at par.

Assume that the rate of tax on profits is 25%.

### Required

- (a) For each of the financing schemes under consideration:
- prepare a projected statement of profit or loss for the year ended 30th November Year 7.
  - calculate the expected earnings per share for the year ended 30th November Year 7.
  - calculate the expected level of financial gearing as at 30th November Year 7, assuming that dividend payments during the year are Rs.0.30 per share.
- (b) Assess each of the three financing schemes under consideration from the viewpoint of an existing equity shareholder in Brunel.

## 12.3 MM, GEARING AND COMPANY VALUATION

A company has 4,000,000 equity shares in issue. The shares have a current market value of Rs. 10 each. The company is considering whether to issue Rs. 15,000,000 of debt finance and use the cash to buy back and cancel some equity shares. The tax rate is 30%.

According to Modigliani and Miller, if the company decided to issue the debt capital and repurchase shares, what would be:

- the total value of the geared company, and
- the value of equity in the company?

## 12.4 DIVERSIFY

Bustra Company is engaged in plastics manufacture. It is now considering a new investment that would involve diversification into chemicals manufacture, where the business risk is very different from the plastics manufacturing industry.

Research has produced the following information about three companies currently engaged in chemicals manufacturing, in the same part of the industry that Bustra is planning to invest.

Company	Equity beta	Financed by:
A	2.66	40% equity capital, 60% debt capital
B	1.56	75% equity capital, 25% debt capital
C	1.45	80% equity capital, 20% debt capital

Bustra is financed by 60% equity capital and 40% debt capital, and would intend to maintain this same capital structure if the new capital investment is undertaken.

The risk-free rate of return is 5% and the return on the market portfolio is 9%. Tax is at the rate of 25%. You should assume that the debt capital of Bustra and Companies A, B and C is risk-free.

### Required

- (a) Calculate a suitable cost of equity for the proposed investment by Bustra in chemicals manufacturing.
- (b) Suggest a weighted average cost of capital that should be used to carry out an investment appraisal (NPV calculation) of the proposed project.

## 12.5 FINANCIAL AND OPERATING GEARING

SETH produces and sells a single product. The company has issued share capital of 800,000 equity shares of Rs. 1 each. For the year ended 31<sup>st</sup> March Year 4, the company sold 60,000 units of the product at a price of Rs. 30 each.

The statement of profit or loss for the year to 31<sup>st</sup> March Year 4 is as follows:

	Rs.000	Rs.000
Sales		1,800
Variable costs	720	
Fixed costs	360	
	<hr/>	1,080
Net profit before interest and tax		720
Minus interest payable		190
		<hr/>
Net profit before tax		530
Tax at 35%		186
		<hr/>
Net profit after tax		344
		<hr/>

The company has decided to introduce a new automated production process, in order to improve efficiency. The new process will increase annual fixed costs by Rs. 120,000 (including depreciation) but will reduce variable costs by Rs. 7 per unit. There will be no increase in annual sales volume.

The new production process will be financed by the issue of Rs. 2,000,000 12.5% debentures.

### Required

- (a) Calculate the change in earnings per share if the company introduces the new production process.
- (b) Assume that the company introduces the new production process immediately on 1<sup>st</sup> April Year 5. Calculate for the year to 31<sup>st</sup> March Year 5:
  - (i) the degree of operating gearing
  - (ii) the degree of financial gearing
  - (iii) the combined gearing effect.

## 12.6 OPTIMAL WACC

A company has estimated that its cost of debt capital varies according to the level of gearing, as follows:

Gearing	Cost of debt
	%
20	5.0
30	5.4
40	5.8
50	6.5
60	7.2

Gearing is measured as the market value of the company's debt as a proportion of the total market value of its equity plus debt.

The rate of tax is 30%. The ungeared equity beta factor for the company is 0.90.

The risk-free rate of return is 4% and the return on the market portfolio is 9%

### Required

Identify the optimal gearing level and WACC.

## 12.7 GEARED BETA

A company has Rs. 1,500,000 in equity capital and Rs. 500,000 in debt capital (at market values). The beta value of the equity is 1.126 and the beta of the debt capital is 0.

The risk-free cost of capital is 5% and the market portfolio return is 11%. The tax rate is 30%.

### Required

- Calculate the current weighted average cost of capital (WACC).
- Calculate the asset beta for the company and explain what this means.
- Calculate what the equity beta, the cost of equity and the WACC would be if the company consisted of 60% equity and 40% debt.

## 12.8 ADJUSTED PRESENT VALUE

Harvey is an aluminium engineering company. It now wishes to diversify its operations into the plastics business. The proposed investment project will require the purchase of a machine costing Rs. 450,000. This will produce cash flows of Rs. 220,000 for each of the three years of its life, and it will have no residual value at the end of that time.

It is proposed to finance the purchase of the machine with a mixture of debt and equity capital. 40% of the cost will be financed by a three-year loan that will be repaid in three equal instalments. The remaining 60% of the cost will be financed by a placing of new equity.

Issue costs, which are tax-allowable, will be 5% for the equity and 2% for the debt, measured as a percentage of the net finance raised.

The plastics industry has an average equity beta of 1.356 and an average debt: equity ratio of 1:5, at market values. Harvey's current equity beta is 1.8 and 20% of its capital (at market value) consists of long-term debt which is regarded as risk-free.

The risk-free rate is 10% per annum and the expected return on an average market portfolio is 15%. Corporation tax is at 35%, payable one year in arrears. The machine will attract a 70% capital allowance in the first year, and the balance will be allowable against tax over the next three years, at an equal amount in each year.

### Required

Carry out an appraisal of the investment using each of the three following methods:

- PV of the project, using the company's current weighted average cost of capital (WACC)
- NPV of the project, using a WACC adjusted for business risk and financial risk
- the adjusted present value (APV) of the project

## 12.9 APV METHOD

A company in the engineering industry is considering making an investment in a telecommunications project. The investment will cost Rs. 2,000,000, and will be financed by a new issue of Rs. 1,000,000 in equity and a new issue of Rs. 1,000,000 debt capital.

The company's current gearing level is 30% debt and 70% equity.

The telecommunications industry has an average industry equity beta of 1.30625. The average gearing ratio in the industry is 20% debt and 80% equity.

The rate of taxation is 25%.

The risk-free rate of return is 4% and the average market return is 9%. The company's debt is risk-free.

The cash flows from the project before taxation are expected to be:

Year	Cash flow
	Rs.
1	100,000
2	140,000
3	120,000

Tax is payable one year in arrears.

You should ignore tax depreciation (capital allowances) on the initial investment.

The costs of raising the equity capital will be 4% of the amount raised. The costs of raising the debt capital will be 3% of the amount raised. The debt will be in the form of a three-year loan, and the principal will be repaid in full at the end of Year 3.

**Required**

Calculate:

- (a) the NPV of the project, using the Modigliani and Miller formulas to derive a cost of capital for the project
- (b) calculate the adjusted present value (APV) of the project.

**12.10 MORE APV**

Pobol Company specialises in business consultancy, but its directors are considering an investment in software development, which would represent a major diversification of the company's business activities. The following draft financial proposal has been prepared:

Year	0	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Revenue		6,800	7,800	8,800	9,200
Cash operating costs		5,500	6,600	7,100	7,500
Allocated head office costs		100	150	150	200
Royalty payments	600	500	400	300	200
Market research costs	120	-	-	-	-
	720	6,100	7,150	7,550	7,900
Expenditure on equipment	3,000				
Working capital	400				

The following information is also available:

- (1) The project will have a six-year life.
- (2) All prices are calculated in money terms, allowing for inflation. After Year 4, it is expected that revenues and cash operating costs will remain unchanged in real terms, but will increase at the rate of inflation which is expected to be 3% per year. Royalty payments are expected to be Rs. 200,000 per year in Years 5 and 6.
- (3) Head office cash flows will increase as a consequence of the investment by Rs. 50,000 per year in Years 1 – 3 and by Rs. 60,000 per year in Years 4 – 6.
- (4) The market research costs in Year 0 have already been incurred.
- (5) Highly-skilled consultancy staff will have to be switched to managing the project, resulting in lost contribution of Rs. 100,000 per year in Years 1 and 2.
- (6) The working capital investment will remain unchanged. The investment in equipment and working capital will be financed by a new six-year loan at 6% interest. Issue costs for the loan will be 2% and are not tax-allowable.
- (7) The cash for the royalty payments and market research in Year 0 come from internally-generated cash flows.



- (8) Tax is payable at the rate of 25%, and is payable in the same year that the tax liability arises.
- (9) Tax-allowable depreciation will be 20% in Year 1 and will then be a constant amount for the next five years.
- (10) The average equity beta of companies in the software sector that Pobol Company is considering is 1.39. The market return is 10% and the risk-free interest rate is 6%.
- (11) The average gearing of companies in the software sector that Pobol Company is considering is 80% equity and 20% debt.

### Required

Calculate the adjusted present value (APV) of this project.

## 12.11 JALIB LIMITED

Jalib Limited (JL) is planning to invest in a project which would require an initial investment of Rs. 399 million. The project would have a positive net present value of Rs. 60 million if funded only from equity. There are no internal funds available for this investment and the company wants to finance the project through debt. However, JL's existing TFCs contain a covenant that at any point in time, the debt to equity ratio in terms of Market Values should not exceed 1:1.

Currently, the market values of JL's equity (40 million shares are outstanding) and debt are Rs. 672 million and Rs. 599 million respectively. Markets can be assumed to be strong form efficient.

### Required

- (a) Using Modigliani & Miller theory relating to capital structure, calculate the minimum amount of equity that the company will have to issue to comply with the TFCs' covenant.
- (b) Advise the Board of Directors as regards the following:
  - ☐ the right share ratio and the price at which right shares may be issued to raise the amount of equity as determined in (a) above, without affecting the market price of shares.
  - ☐ What would be the impact on the market price of the company's shares if the required amount of equity is arranged by issue of shares at Rs. 14 per share?

*(Round off all the amounts to nearest millions and price computations to two decimal places)*

## 12.12 JAVED LIMITED

Javed Limited is a listed company and is engaged in the business of manufacture and export of garments. 100% of the company's revenue comes from exports which are taxable @ 1% under final tax regime.

An extract of the company's latest statement of financial position as on June 30, 2016 is as follows:

	<b>Rs. in million</b>
Ordinary Share capital (Rs. 10 each)	100
Capital Reserves	40
Retained Earnings	85
	225
Term Finance Certificates (Rs. 100 each)	150
	375

Term Finance Certificates (TFCs) are due to be redeemed at par on June 30, 2010. TFCs carry floating mark up i.e. 6 months KIBOR plus 2% which is payable at half yearly intervals. Currently, TFCs with similar credit rating are available at six months KIBOR plus 1%.

During the year ending June 30, 2017, the company expects to post a net profit of Rs. 15 million. Cost of equity of a similar ungeared company is 19%. The shares of other companies in this sector are being traded at P/E ratio of 8. On June 30, 2016 the six monthly KIBOR was 14%.

### Required

Compute the weighted average cost of capital of the company as at July 1, 2016.

## 12.13 GHI LIMITED

GHI Limited is an all equity financed company with a cost of capital of 14%. For last several years, the company has been distributing 70% of its profits to the ordinary shareholders and is expected to continue to do as in future. The company plans to enter into a new line of business. Taking it as an opportunity to reduce the cost of capital, it is considering to issue debt to finance the expansion. The Corporate Consultant of GHI has provided the following industry data relating to different levels of leverage:

<b>Debt/Assets</b>	0%	10%	40%	50%
<b>Cost of Debt</b>	-	8%	10%	12%
<b>Equity Beta</b>	1.20	1.30	1.50	1.70

The following information is also available:

- (i) The estimated value of assets after the investment in new line of business would be Rs. 250 million.
- (ii) The forecasted revenue for the next year is Rs. 200 million.
- (iii) Fixed costs for the next year are estimated at Rs. 40 million whereas variable costs will be 60% of the revenue.
- (iv) The par value of GHI's ordinary share is Rs. 10.
- (v) The tax rate applicable to the company is 35%.

The rate of return on 1-year Treasury Bills is 6% and the market return is 10%.

### Required

Advise the optimal capital structure which GHI Limited should formulate. Show all relevant workings.

### 12.14 NS TECHNOLOGIES LIMITED

- (a) Briefly explain the Adjusted Present Value (APV) method and identify its advantages over the Weighted Average Cost of Capital method.
- (b) NS Technologies Limited is in the business of developing financial software. The directors of the company believe that the scope of future growth in the software sector is limited and are considering to diversify into other activities. An option available with the company is to sign an eight year distribution contract with a leading manufacturer of telecommunication equipment.

Some of the important information related to the above proposal is as follows:

- (i) Total investment is estimated at Rs. 600 million. It includes developing the necessary infrastructure, purchase of equipment and working capital requirements.
- (ii) The investment is expected to generate pre-tax net cash flows of Rs. 180 million per year.
- (iii) Presently NS is paying interest @ 9% on its long term debt.
- (iv) NS maintains a debt equity ratio of 55:45 whereas its equity beta is 0.9.
- (v) Average debt ratio, overall beta and debt beta of telecommunication equipment distribution segment is 40%, 1.5 and 1.3 respectively.
- (vi) The market rate of return is 14% whereas yield on one year treasury bills is 6%.
- (vii) Costs associated with the issuance of debt and equity instruments are estimated at 1% and 3% respectively.
- (viii) Tax rate applicable to the company is 35%. Tax is paid in the same year as the income to which it relates.
- (ix) In case the contract is not renewed upon expiry, after tax cash flows of Rs. 90 million would be generated from disposal of allied resources.

#### Required

Evaluate the above proposal using the APV method.

### 12.15 COPPER INDUSTRIES LIMITED

The management of Copper Industries Limited (CIL) intends to raise financing for the company's expansion project but is concerned about the impact of proposed additional financing on the company's existing capital structure and values.

The management is aware that there is an inverse relationship between interest cover and cost of long term debt and the following relationship exist between interest cover and cost of debt:

Interest cover (times)	> 8	6 to 8	4 to 6	2 to 4
Cost of long term debt	8%	9%	11%	13%

The management has found that the following two debt equity ratios are usually prevalent in the industry and are also acceptable to the company's banker.

- (i) 70% equity, 30% debt by market values
- (ii) 50% equity, 50% debt by market values

The latest audited financial statements depict the following position:

	Rs. in million
Net profit before tax	272
Depreciation	50
Interest @ 9%	55
Capital expenditure	150

Market value of existing equity and debt is Rs. 825 million and Rs. 550 million respectively. CIL's equity beta is 1.25 and its debt beta may be assumed to be zero. The risk-free rate of return and market return are 7% and 15% respectively. Applicable tax rate is 35%.

**Assume that:**

- ❑ CIL's cash flow growth rate would remain constant and would not be affected by any change in capital structure.
- ❑ Market value of the company at the existing weighted average cost of capital, after the proposed expansion, would remain the same.

**Required**

- (a) Calculate the following under the current as well as each of the above debt equity ratios being considered by the company:
  - (i) Weighted average cost of capital
  - (ii) Value of the company
- (b) Compare the three options and give recommendations in respect thereof to the company.

## 12.16 MAC FERTILIZER LIMITED

Mac Fertilizer Limited (MFL) is a listed company and is engaged in the business of manufacturing of phosphate fertilisers. MFL intends to diversify its operations by manufacturing and distributing steel products. This diversification would require an investment of Rs. 3,600 million for establishing the plant and meeting the working capital requirement. MFL plans to finance the investment as follows:

- ❑ 55% of the investment would be financed by issuing Term Finance Certificate (TFCs) carrying interest at 12% per annum and repayable in 2022.
- ❑ The balance amount would be generated by issuing right shares at Rs. 65 per share.

An extract of MFL's statement of financial position as at 31 December 2015 is given below:

Equity and liabilities	Rs. in million	Assets	Rs. in million
Share capital (Rs. 10 each)	7,000	Non-current assets	50,000
Retained earnings	23,000		
TFCs (Rs. 100 each)	28,000	Current assets	40,000
Current liabilities	32,000		
	<u>90,000</u>		<u>90,000</u>

The existing TFCs carry mark-up @ 11.5% per annum and are due for redemption at par in 2020.

Currently, MFL's shares and TFCs are traded at Rs. 80 and Rs. 102.50 respectively. Equity beta of the company is 1.3.

The proposed investment has been evaluated at a discount rate of 17% which is based on existing cost of equity plus a premium that takes cognisance of the risks inherent in the steel industry. However, there are divergent views among the directors regarding the discount rate that has been used.

- ❑ Director A is of the view that the premium charged to reflect the risk in the steel industry is too low. He is of the opinion that the company's existing weighted average cost of capital is more appropriate discount rate for evaluation of this investment.
- ❑ Director B suggests that the discount rate should be representative of the steel industry. He has provided the following data pertaining to a listed company, Pepper Steel Limited (PSL).
  - 900 million shares of Rs. 10 each are outstanding which are currently being traded at Rs. 35.
  - Long term loan amounted to Rs. 8,000 million obtained from local banks at the average rate of 13%.
  - Equity beta of the company is 1.5.

You have been appointed as the Lead Advisor by an Investment Bank working on this transaction. You have obtained the following information:

Interest rate for 6-months treasury bills	8%
Market return	13%
Applicable tax rate for all companies	30%

Debt beta of MFL and PSL is assumed to be zero.

### Required

Compute the discount rate based on suggestions given by Directors A and B and discuss which suggestion is more appropriate.

## CHAPTER 13 – BUSINESS VALUATION

### 13.1 VALUATION MODEL

The shareholders in a company expect a return of 8% per year on their investment. In the year just ended, the company paid dividends of Rs.0.24 per share.

#### Required

- (a) Assume that the company pays out all of its annual profits as dividends, and the annual dividend per share is expected to be Rs. 24 in perpetuity.

Using the dividend valuation model, suggest what the expected share price of the company should be.

- (b) Assume that the expected annual rate of growth in dividends is expected to be 3%.

Using the dividend growth valuation model, suggest what the expected share price of the company should be.

- (c) Assume that the company is expected to retain 60% of its profits and reinvest the money to earn an annual return of 9%.

Using the dividend growth valuation model (the Gordon growth model), suggest what the expected share price of the company should be.

### 13.2 VALUATION

A company has just paid an annual dividend of Rs. 38. The board of directors has a target of increasing the share price to Rs. 800, and is considering policies for investment and growth.

Shareholders expect a return on their investment of 10% per year.

#### Required

Calculate the annual expected growth rate in dividends that would be required to raise the share price to Rs. 800. Use the dividend growth model to make your estimate.

### 13.3 VALUATION OF BONDS

Assume that bond investors require a return of 9% per year on their investments.

#### Required

Estimate the market value of the following bonds:

- (a) Irredeemable 7.5% bonds that pay interest annually.
- (b) Bonds paying coupon interest of 6% per year annually, that are redeemable at par in four years' time.
- (c) Bonds paying coupon interest of 10%, redeemable at par after three years, where interest is payable every six months.

**Notes:**

An annual cost of capital of 9% is equal to a six-monthly cost of capital of 4.4%.

DCF factor at 4.4%, periods 1 – 7 = 5.914

DCF factor at 4.4%, periods 1 – 8 = 6.623

- (d) A convertible bond with a coupon of 5% and interest payable annually: these bonds are convertible after three years into equity shares at the rate of 20 shares for every Rs. 100 nominal value of bonds. The expected share price in three years' time is Rs. 7.

### 13.4 ANNUITIES AND BOND PRICES

- (a) Calculate the value of the following bonds:
- (i) a zero coupon bond redeemable at par in ten years' time
  - (ii) a bond with an 8% coupon, with interest payable half-yearly, and redeemable at par after ten years.
- Assume that the yield required by investors is 5%, and that this is 2.5% each half year for the purpose of valuing the 8% coupon bond.
- (b) Calculate the value of both bonds in part (a) of the question if the yield required by investors goes up by 1%, to 6% for the zero coupon bond and 3% each half year for the 8% coupon bond.

### 13.5 WARRANTS AND CONVERTIBLES

Conver and Warren each have in issue 2,000,000 ordinary shares of Rs. 1 nominal value.

Conver also has Rs. 2,500,000 of 12% convertible debentures in issue. Each Rs. 100 of bonds is convertible into 20 ordinary shares at any time until the date of expiry of the bonds. If the bonds have not been converted by the expiry date, they will be redeemed at 105.

Warren has 500,000 equity warrants in issue. Each warrant gives its holder an option to subscribe for 1 ordinary share at a price of Rs. 5.00 per share. The warrants can be exercised at any time until the date of their expiry.

The shares of both companies, the convertible debentures and the warrants are all actively traded in the stock market.

**Required**

- (a) Calculate the value of each Rs. 100 unit of convertible debentures of Conver and the value of each warrant of Warren on the day of expiry, if the share price for each company at that date is:
- (i) Rs. 4.40
  - (ii) Rs. 5.20
  - (iii) Rs. 6.00
  - (iv) Rs. 6.80

In each of the four cases (i)–(iv), advise the holders of the convertibles and warrants whether they should exercise their conversion and option rights. Ignore taxation.

- (b) Calculate the earnings per share for each company.
- (i) In a year when all the convertibles and warrants remained outstanding for the whole period.
- (ii) For the first full year following conversion of all the convertibles in Conver and the exercise of all the warrants in Warren.

Profits for each company are currently Rs. 1.2 million each year before interest and taxation. The corporation tax rate is 50%.

Assume that any new cash raised by the company will be invested to earn 10% each year before taxation.

### 13.6 KENCAST LIMITED

The entire share capital of Kenecast Limited, an unlisted company, is held by the three directors of the company – Parvez, Qadir and Rizwan. They have decided to sell their shares in order to complete a divestment proposal agreed with management and, as such, wish to know the likely value of the shares before approaching prospective buyers. Should they fail to get buyers for the shares, the company will go into liquidation.

The following information is provided in respect of the company:

- (a) Statement of financial position of Kenecast Limited as at 31 December, 2017.

<b>Non-current assets:</b>	<b>Rs.'000</b>	<b>Rs.'000</b>
Freehold properties at cost		6,500
Equipment at cost less depreciation		15,600
<b>Current assets:</b>		
Inventories	6,975	
Accounts receivables	4,825	
Cash equivalent – bank	650	
	<u>12,450</u>	
<b>Less: Current liabilities</b>	<u>4,150</u>	
		<u>8,300</u>
		<u>30,400</u>

- (b) Extracts from the published statement of profit or loss and other comprehensive income for the last three years are

	<b>2015</b>	<b>2016</b>	<b>2017</b>
	<b>Rs.'000</b>	<b>Rs.'000</b>	<b>Rs.'000</b>
Depreciation	2,250	2,250	2,250
Directors remuneration	2,500	2,900	3,000
Profit for the year	3,250	3,600	4,175
Dividends	2,250	2,250	2,250



It was discovered that inventories were over-valued at the end of 2016 by Rs. 600,000. The directors have increased their remuneration in order to reduce the company's tax liability. A realistic charge for services rendered would be Rs. 1,875,000. The equipment is old and it is in need of replacement. The annual depreciation, based on current replacement cost, is in the region of Rs. 3,000,000.

- (c) Each of the directors expressed different opinions on the valuation method to be adopted.

Parvez believes that the shares should be valued using a price/earnings ratio. For this purpose, he argues that earnings should be defined as the average reported profits for the last three years, after making proper charges for depreciation and directors' remuneration and correcting the error made on inventories in 2008.

Qadir recommends break-up basis using liquidation values as provided by experts.

Rizwan, on the other hand, believes that dividend yield basis should be used, with available data obtained from two similar but listed companies where he is a shareholder.

- (d) The relevant data of the two listed companies engaged in similar line of business as Kencast Limited are as follows:

	<b>Dividend yield</b>	<b>Price earnings</b>
Company 1	9%	5.4
Company 2	11%	6.6

- (e) Figures obtained from experts for items appearing in the Statement of Financial Position of Kencast Limited as at 31 December 2017 are as stated below:

	<b>Replacement values Rs.'000</b>	<b>Liquidation values Rs.'000</b>
Freehold properties	15,000	15,000
Equipment	8,650	5,400
Inventories	4,350	8,000

### Required

- (a) Compute the value for the entire share capital of Kencast Limited using
- Price/Earnings basis (with earnings computed on the basis proposed by Parvez)
  - Liquidation (break-up) basis and
  - Dividend yield basis

Note: Assume you are making the valuation as at 31 December, 2017. Ignore taxation and liquidation costs. (Show all workings).

- (b) Identify any **TWO** limitations associated with each of the methods above.

### 13.7 A PLC'S AND B PLC

A Plc is proposing to take over B Plc by means of an issue of its own shares in exchange for those of Bayela and has to decide on the terms of its offer.

Extracts from A Plc's and B Plc's statement of financial position are set out below.

	<b>A Plc</b>	<b>B Plc</b>
	<b>Rs.'000</b>	<b>Rs.'000</b>
Ordinary shares of Rs. 1 each	1,000,000	500,000
Preference share capital	200,000	-
Share premium account	-	20,000
Profit and loss account	380,000	40,000
10% Debentures	150,000	50,000
	<u>1,730,000</u>	<u>610,000</u>

Other pieces of information concerning the two companies are as follows:

	<b>A Plc</b>	<b>B Plc</b>
	<b>Rs.</b>	<b>Rs.</b>
Maintainable annual profits after tax attributable to equity	240,000,000	150,000,000
Current market value of ordinary shares	2.40	2.70
Current EPS	0.24	0.30
P/E ratio	10	9
Current market price of debts	125%	125%

The company's income tax rate is 30%.

#### Required

Determine the offer which the directors of A Plc would make to the shareholders of B Plc on each of the following bases:

- Net Asset
- Earnings
- Market value
- Financial analysis

### 13.8 MNO CHEMICALS LIMITED

MNO Chemicals Limited is a fertilizer company. The company is planning to diversify into the food business and has identified two companies, PQ (Pvt.) Limited and RS Limited (a listed company), as potential target for acquisition. MNO Chemicals Limited intends to buy one of these companies in a share exchange arrangement.

Extracts from the latest financial statements of the three companies are given below:

**Statement of financial position**

	<b>MNO Chemicals</b>	<b>PQ (Pvt.) Limited</b>	<b>RS Limited</b>
	<b>Rupees in millions</b>		
Share capital (Rs 10 each)	1,500	800	1,200
Retained earnings	700	300	350
TFCs	1,000	400	500
Current liabilities	300	100	200
	3,500	1,600	2,250
Non-current assets	3,000	1,400	1,800
Investment held for trading	-	-	300
Current assets	500	200	150
	3,500	1,600	2,250

**Statement of comprehensive income**

	<b>MNO Chemicals</b>	<b>PQ (Pvt.) Limited</b>	<b>RS Limited</b>
	<b>Rupees in millions</b>		
Sales	2,500.00	800.00	1,200.00
Operating profit before interest, depreciation and income tax	1,250.00	400.00	540.00
Interest	(100.00)	(48.00)	(55.00)
Depreciation	(450.00)	(180.00)	(270.00)
Other income	200.00	20.00	45.00
Net profit before tax	900.00	192.00	260.00
Tax @ 35%	(315.00)	(67.20)	(91.00)
Net profit	585.00	124.80	169.00
Dividend payout (50%:70%:50%)	292.50	87.36	84.50

**Additional information:**

- (i) All companies maintain a stable dividend payout policy.
- (ii) It is estimated that earnings of PQ and RS will grow by 4% and 5% respectively.
- (iii) The risk free rate of return is 8% per annum and the market return is 13% per annum. The market applies a premium of 300 basis point on the required returns of unlisted companies.

- (iv) RS Limited's equity beta is estimated to be 1.20.
- (v) Synergies in administrative functions arising from merger would increase after tax profits by 5% in the case of PQ and 6% in the case of RS.

### Required

Which of the two companies should be acquired by MNO Chemicals Limited? Show necessary computations to support your answer.

## 13.9 FREE CASH FLOW

A company expects to make profits before interest and tax next year of Rs. 3 million.

Other budgeted information is as follows:

	Rs.
Interest charges	400,000
Taxation	600,000
Dividend payments	1,200,000
Depreciation charges	550,000
Increase in working capital	150,000
Capital expenditure:	
Asset replacement expenditure	1,000,000
Discretionary expenditure	700,000

### Required

Calculate the expected amount of free cash flow next year.

## 13.10 FINANCIAL PLAN

The board of directors of NNW have asked for a four-year financial plan to be prepared for Year 5 to Year 8. They have approved the following assumptions for the plan:

- (1) Sales growth will be at the rate of 8% each year into the foreseeable future.
- (2) Cash operating costs will be 70% of sales.
- (3) Investment in new plant and equipment is expected to grow in line with the growth in sales, and the net book value of plant and equipment will grow at the same rate.
- (4) Tax-allowable depreciation will grow in line with the growth in sales.
- (5) Inventory, receivables, cash and trade payables will also increase at the same rate as the growth in sales.
- (6) There will be no change in long-term borrowing. Interest on the bank overdraft will be payable at 7%. The interest charge for bank overdraft in the statement of profit or loss each year should be calculated on the opening bank overdraft at the beginning of the year.
- (7) Tax on company profits will be 30%.

- (8) The company policy is to pay dividends as a constant percentage amount of earnings. This policy will not change.
- (9) The cost of equity capital has been estimated as 12%.

The statement of profit or loss of NNW for the year to 31st December Year 4 is as follows:

	Rs. million
Sales	1,800
Cash operating costs	(1,260)
EBITDA	540
Tax allowable depreciation	(160)
Earnings before interest	380
Interest	(78)
Profit before tax	302
Tax at 30%	(91)
Profit after tax	211
Dividends	(135)
Retained profit	76

The statement of financial position of NNW as at the end of Year 4 is as follows:

	Rs. m	Rs. m
Plant and equipment		2,020
Current assets		
Inventory	520	
Receivables	640	
Cash	30	
		1,190
Total assets		3,210
Share capital (shares of Rs.0.05 each)		450
Reserves		1,200
		1,650
Long term loan at 8%		800
Trade payables		450
Bank overdraft		310
		3,210

### Required

- (a) Prepare a financial plan for Years 5 to 8, showing the profit after tax, dividends, retained profits for each year and a summary statement of financial position as at the end of each year.
- (b) Calculate the expected free cash flow in each year of the financial plan.
- (c) Comment briefly on the financial plan.
- (d) Use the dividend growth model to estimate a market value per share as at the end of Year 8 (the end of the financial planning period). State any assumptions that you make in your estimate.

### 13.11 TAKEOVER

Flat Company intends to make a takeover bid for Slope Company, a company in the same industry. The initial offer will be to exchange every 3 shares in Slope for 2 new shares in Flat.

The most recent annual data for the two companies is shown below.

	<b>Flat</b> Rs.000	<b>Slope</b> Rs.000
Sales revenue	7,619	6,000
Operating costs	4,962	3,480
Tax allowable depreciation	830	700
Earnings before interest and taxation	1,827	1,820
Interest	410	860
Profit before tax	1,417	960
Tax at 30%	425	288
	992	673
Dividends	500	410
Retained earnings	492	263
Annual replacement capital expenditure	920	790

Other information

	<b>Flat</b>	<b>Slope</b>
Expected annual growth in sales, operating costs including depreciation, replacement capital expenditure and dividends for the next 4 years	5%	4%
Expected annual growth in these items from year 5 onwards	3%	2%
Gearing, measured as the ratio of debt to debt plus equity, (both debt and equity measured at market value)	25%	40%
Market price per share (cents)	320	154
Number of shares in issue (millions)	6	9
Market cost of fixed interest debt	7%	8%
Equity beta	1.20	1.35

The risk-free rate of return is 5% and the market return is 11%.

The takeover will result in some cost savings in operations so that the earnings before interest and taxation of the combined group would be Rs. 4,100,000 in Year 1 after the takeover, and growth in sales, costs, depreciation and replacement capital expenditure would be 5% per year for the following three years and then 4% per year from Year 5 onwards.

The senior financial manager of Flat Company has been assessing the value of the takeover bid for the shareholders of both companies, and has decided to use free cash flow analysis as a basis for valuing the companies before and after the takeover. He believes that the total equity value of the group after the takeover will be significantly higher than the sum of the current equity values of the two separate companies.

The weighted average cost of the combined company should be calculated as the weighted average of the current cost of capital of the individual companies, weighted by the current market value of their debt and equity.

### Required

- (a) Using free cash flow analysis, and making any assumptions you consider necessary, calculate a value for:
  - (i) the current equity in Flat Company
  - (ii) the current equity in Slope Company
  - (iii) the equity in Flat Company after the takeover.
- (b) Explain the limitations of your estimates in (a).
- (c) Give your views as to whether the takeover bid is likely to have the support of the shareholders in (1) Flat Company and (2) Slope Company.

## 13.12 MK LIMITED

MK Limited is presently considering a proposal to acquire 100 % shareholdings of ZA Limited which is engaged in the same business. The financial data extracted from the latest audited financial statements and other records of the two companies is presented below:

	<b>MK</b>	<b>ZA</b>
	<b>Rs. in million</b>	
Sales revenue	12,000	8,460
Operating expense excluding depreciation	(7,695)	(4,905)
Depreciation	(1,305)	(990)
Profit before interest and tax	3,000	2,565
Interest	(644)	(1,494)
Profit after interest	2,356	1,071
Taxation (35%)	(825)	(375)
Profit after taxation	1,531	696
Dividend payout	50%	55%
Capital expenditure during the year (Rs. in million)	700	650
Debt ratio	40%	55%
Market rate of interest on debentures	6.5%	7.5%
Number of shares issued (in million)	100	90
Market price of share (Rs.)	20	12
Equity beta	1.1	1.3

The following further information is available:

- (i) Both the companies follow the policy of maintaining stable dividend payouts and debt ratios.
- (ii) Annual growth in sales, operating expenses, depreciation and capital expenditures are estimated as under:

	<b>Year 1 – 2</b>	<b>Year 3 onward</b>
MK	4.0%	5.0%
ZA	5.5%	5.0%

- (iii) Accounting depreciation is the same as tax depreciation.
- (iv) The prevailing risk-free rate of return is 8% whereas the market return is 13%. The key aspects of the feasibility study carried out by MK are as follows:
- ❑ MK would issue 7 shares in exchange for 9 shares of ZA.
  - ❑ A rationalization of administrative and operational functions after takeover would reduce operating expenses including depreciation, from 75% to 70% of total sales.
  - ❑ The annual growth in sales, operating costs, depreciation and capital expenditures in the merged company would be as follows:

Year 1 – 2	5.0%
Year 3 onward	5.5%

### Required

- (a) Based on an analysis of Free Cash Flows, calculate the value of MK Limited, ZA Limited and the company which would be formed after the merger.
- (b) Estimate the synergy effect which is expected to accrue to MK Limited on account of acquisition of ZA Limited.

## 13.13 PLATINUM LIMITED

- (a) Briefly discuss the possible synergistic effects which are the primary motivation for most mergers and takeovers.
- (b) The board of directors of Platinum Limited (PL), a leading manufacturer of electrical goods, is considering to takeover Diamond Limited (DL), a competitor of an important product line, by offering seven ordinary shares for every six ordinary shares of DL.

The summarized statement of financial position and summarized statement of profit or loss of the two companies for the latest financial year are given below:

### Summarised Statement of Financial Position

	PL	DL
	Rupees in million	
Total assets	4,535	959
Shareholders equity		
Ordinary shares (Rs. 10 each)	900	192
Reserves	1,089	121
	1,989	313
Total liabilities	2,546	646
Total equity and liabilities	4,535	959



**Summarised Statement of profit or loss**

	PL	DL
	<b>Rupees in million</b>	
Turnover	3,638	901
Profit before tax	312	86
Tax	81	28
Profit after tax	231	58

The current price earnings ratios of PL and DL are 15 and 19 respectively.

In case of successful bidding, the directors envisage that:

- ☐ after tax savings in administrative costs would be Rs. 24 million per annum.
- ☐ the price earnings ratio of the merged company would be 18.
- ☐ the dividend payout ratio of PL would not be affected.

**Required**

- (i) Total value of the proposed bid based on PL's current share price.
- (ii) Expected earnings per share and share price of PL following the successful acquisition of DL.
- (iii) The board of directors is also considering the alternative to offer three zero coupon debentures (redeemable in 8 years at Rs. 100) for every 2 DL shares. PL can currently issue new 8 year loan at an interest rate of 11% per annum. Discuss whether this proposal is likely to be viewed favourably by DL's shareholders.

**13.14 EMH**

Several studies show that the annual reports and financial statements are regarded as important sources of information for making decisions on equity investment. Other types of studies indicate that the market price of the shares in a company does not react in the short term to the publication of its annual reports and financial statements.

**Required**

- (a) Explain briefly the concept of the Efficient Market Hypothesis (EMH) and each of its forms and the degree to which existing empirical evidence supports them.

A company's board of directors makes a decision on 1<sup>st</sup> May to invest in a new project that will have an NPV of + Rs. 4,000,000. The decision is announced to the stock market on 12<sup>th</sup> May.

- (b) The company has 50 million shares in issue and at close of trading on 30<sup>th</sup> April these had a market value of Rs. 4 each.

**Required**

State what would happen to the share price of the company if the stock market:

- (i) has weak form efficiency
- (ii) has semi-strong form efficiency
- (iii) has strong-form efficiency.

**13.15 X PLC AND Y PLC**

The following information relate to X Plc. and Y Plc. each having 30,000,000 and 80,000,000 ordinary shares in issue respectively:

**Day 1:** The price per share is Rs. 3 for X Plc and Rs. 6 for Y Plc.

**Day 2:** The management of Y Plc., at a private meeting, decided to make a takeover bid for X Plc at a price of Rs. 5 per share with settlement on day 20. The takeover will produce operating savings with a present value of Rs. 80,000,000.

**Day 5:** Y Plc. publicly announces an unconditional offer to purchase all shares of X Plc. at a price of Rs. 5 per share with settlement on day 20. Y Plc. does not announce nor make public, the operating savings of the takeover.

**Day 10:** Y Plc. announces details of the savings derivable from the takeover.

**Required**

Assuming that the details given are the only factors having effect on the share price of both companies, determine the day 2, day 5 and day 10 share price of X Plc and Y Plc if the capital market is

- (a) Semi-strong form efficient,
- (b) Strong form efficient;

given that:

- (i) The purchase consideration is cash as stated above.
- (ii) The purchase consideration, decided on day 2 and publicly announced on day 5, is five new shares of Y Plc. for six shares of X Plc.

Note: Ignore tax and time value of money.

## CHAPTER 14 – MERGERS AND ACQUISITIONS

### 14.1 ACQUISITION

Big Entity is considering a takeover bid for Little Entity, another company in the same industry. Little is expected to have earnings next year of Rs. 86,000.

If Big acquires Little, the expected results from Little will be as follows:

	Year after the acquisition		
	Year 1	Year 2	Year 3
	Rs.	Rs.	Rs.
Sales	200,000	280,000	320,000
Cash costs/expenses	120,000	160,000	180,000
Capital allowances	20,000	30,000	40,000
Interest charges	10,000	10,000	10,000
Cash flows to replace assets and finance growth	25,000	30,000	35,000

From Year 4 onwards, it is expected that the annual cash flows from Little will increase by 4% each year in perpetuity.

Tax is payable at the rate of 30%, and the tax is paid in the same year as the profits to which the tax relates.

If Big acquires Little, it estimates that its gearing after the acquisition will be 35% (measured as the value of its debt capital as a proportion of its total equity plus debt). Its cost of debt is 7.4% before tax. Big has an equity beta of 1.60.

The risk-free rate of return is 6% and the return on the market portfolio is 11%.

#### Required

- Suggest what the offer price for Little should be if Big chooses to value Little on a forward P/E multiple of 8.0 times.
- Calculate a cost of capital for Big.
- Suggest what the offer price for Little might be using a DCF-based valuation.

### 14.2 ADAM PLC

Adam Plc is considering acquiring Eve Plc. The summary of their most recent accounts is presented below:

Statement of financial position	Adam Plc	Eve Plc
	Rs.'m	Rs.'m
Net assets	3,150	946
Ordinary shares	1,000	500
Reserves	2,150	446
	3,150	946

Statement of profit or loss	Rs.'m	Rs.'m
Profit after tax	400	150
Dividend	(300)	(50)
Retained earnings	100	100

Both companies retain the same proportion of profits each year and are expected to do so in the future. Adam Plc's return on investment is 16%, while that of Eve Plc is 21%. After the acquisition in one year's time, Adam Plc will retain 60% of its earnings and expects to earn a return of 20% on new investment.

The dividends of both companies have been paid. The required rate of return of ordinary shareholders of Adam Plc is 12% and Eve Plc 18%. After the acquisition, this will become 16%.

### Required

- (a) If the acquisition is to proceed immediately, calculate the:
  - (i) pre-acquisition market values of the two companies.
  - (ii) maximum price Adam Plc will pay for Eve Plc.
- (b) Briefly explain the following actions a target company might take to prevent a hostile takeover bid:
  - (i) White knight
  - (ii) Shark repellants
  - (iii) Pac-man defence
  - (iv) Poison pill
  - (v) Golden parachute

## 14.3 D LIMITED

D Limited is a private company established about a decade ago to produce plastic bottles. The first six years of the company witnessed strong growth, generally facilitated by successful business operations and reduced competition.

As a result of the global economic meltdown and losses sustained in recent years, the directors and the entire management of the company became worried and were contemplating closing down the company for six months in the first instance. The concomitant effect of the proposed closure would be further loss of sales and profits. For how long will this continue? This was the question being asked by the chairman and chief executive of the company.

In an attempt to avert the problem, the management held an emergency meeting where various suggestions were put forward but none of them seems to proffer solutions to the problem. The chairman and chief executive thought of outright sale of the company to a willing competitor, F Limited, but this idea was not acceptable to the board of directors as this could lead to the extinction of the company.

Following deliberations and resolutions as to ways of taking the company out of the current predicament, negotiations between the two boards of directors began. The most recent information relating to each of the two businesses is set out below:

	<b>D Limited Ltd</b>	<b>F Limited Ltd</b>
Current earnings	Rs. 20,000,000	Rs. 9,000,000
Number of shares in issue	4,000,000	3,000,000
Earnings per share	Rs. 5	Rs. 3
Price per share	Rs. 80	Rs. 30
Price earnings ratio	16 Times	10 Times

If negotiations are successful, F Limited would be willing to accept an offer of Rs. 40.00 per share in exchange for a share of D Limited.

### Required

- From the strategic financial management perspective, what options would you advise management of D Limited to explore in order to prevent a shut-down or outright discontinuation of business?
- If merger option is adopted, what are the likely financial effects on the shareholders of the two companies?

## 14.4 CLOONEY PLC AND PITT PLC

Clooney Plc made an offer of 1 of its ordinary shares for every 2 shares in Pitt Plc on 5 June 2016. If the offer was successful Clooney Plc will use Pitt Plc's distribution facilities to expand its sales of fertilizers to farmers and this would result in an increased cash flow of Rs. 4.5million per year after tax. Clooney Plc's financial analyst estimate that the capitalized value of the cash flow is Rs. 45 million.

Extract from the accounts of the two companies are given below.

### STATEMENT OF FINANCIAL POSITION AS AT 31 DECEMBER 2015

	<b>Clooney Plc Rs.'m</b>	<b>Pitt Plc Rs.'m</b>
Non-current assets	750	360
Current assets	900	210
Less current liabilities	(600)	(210)
Total assets less current liabilities	1,050	360
Less long term loans	(300)	(180)
	<b>750</b>	<b>180</b>
Issued share capital and reserves:		
Share capital		
Rs. 1 each	-	150
0.5 rupees each	300	-
Reserves	450	30
	<b>750</b>	<b>180</b>
<b>Note:</b> Current assets include stock of	300	150
	<b>Clooney Plc Rs.'m</b>	<b>Pitt Plc Rs.'m</b>

Statement of profit or loss for the year ended 31/12/2015

	Rs.'m	Rs.'m
Profit after taxation	150	30
Dividends	60	21
Retained profit	<u>90</u>	<u>9</u>

Price per share of Clooney Plc is Rs. 5 while that of Pitt Plc is Rs. 2.

### Required

- Calculate the price earnings ratios of Clooney Plc and Pitt Plc before the merger.
- Determine what the price earnings ratio of the group will be if the value of Clooney Plc's shares increases by Rs.0.5 after the merger.
- Calculate the market capitalization of Clooney Plc after the merger assuming that the stock market is rational and that there are no events other than those which would influence the share price. Ignore the Rs.0.5 increase in Clooney Plc's share price mentioned in (b) above.
- Calculate the net dividend income the holder of 1 share in Pitt Plc would receive before and after the merger assuming that Clooney Plc maintains the same dividend per share as before the merger.

## 14.5 NELSON PLC

Nelson Plc is considering making an offer for Drake Plc. The offer is in the form of merger where the shares in both companies will be swapped for shares in Nelson Plc. Extract of the latest accounts of the two companies are as follows:

Statements of financial position:	Nelson Plc	Drake Plc
	Rs.	Rs.
Net Assets	1,419,000	4,725,000
Ordinary shares	750,000	1,500,000
Reserves	669,000	3,225,000
	<u>1,419,000</u>	<u>4,725,000</u>

Statements of profit or loss	Rs.	Rs.
Profit after tax	225,000	600,000
Dividend	(75,000)	(450,000)
Retained Profit	<u>150,000</u>	<u>150,000</u>

The two companies retain the same proportion of profits each year and this is expected to continue indefinitely. Nelson Plc earns a return of 21% on new investments while Drake Plc earns 16%. After the merger, Nelson Plc is expected to retain 60% of its earnings and earn a return of 20% on investment.

The dividends of both companies have been paid. Ordinary shareholders of Nelson Plc require 18% rate of return and those of Drake Plc expect 12%. This will rise to 16% after the merger.

**Required**

Determine the

- Market value of each of the **TWO** companies before the merger.
- Maximum price Nelson Plc should pay for Drake Plc

**14.6 HALI LTD**

Hali Ltd. (HL) is listed on the stock exchange of Country X and has its operations in Country X and Country Y. The functional currency of both the countries is Rupee (Rs.). In the latest statement of financial position of the company, net assets were represented by the following:

	Rupees in
Ordinary share capital of Rs. 10 each	50
Retained earnings	170
	<u>220</u>
10% Debentures	30
10% Long term loans	40
	<u>290</u>

The current market price of ordinary shares and debentures are Rs. 90 per share and Rs. 130 per certificate respectively. In view of various legal and taxation issues, HL is considering a demerger scheme whereby two different companies, HX and HY will be formed. Each company would handle the operations of the respective country. Mr. Bader, a director of HL, has proposed the following demerger scheme:

- The existing equity would be split equally between HX and HY. New ordinary shares would be issued to replace the existing shares.
- The debentures which are redeemable at par value of Rs. 100 in 2012, would be transferred to HX as these were issued in Country X.
- The long term loan was obtained in Country Y and will be taken over by HY.

Demerger would require a one time cost of Rs. 17 million in year one, which would be split between the two companies equally. The finance director has submitted the following projections in respect of the demerged companies:

	HX			HY		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
	Rupees in million					
Profit before tax and depreciation	39	42	44	26	34	36
Depreciation	12	11	13	9	10	11

The projections for year 3 are expected to continue till perpetuity.

Accounting depreciation is equivalent to tax depreciation and therefore it is allowable for tax purposes. HX and HY will be subject to corporate tax at the rate of 30% and 25% respectively. Over the next few years, the rate of inflation in Country X and Country Y is expected to be 5% and 7% respectively.

**Required**

Assuming your name is XYZ and HL's weighted average cost of capital is 18%, prepare a brief report for the Board of Directors discussing:

- (a) the feasibility of the demerger scheme for the equity shareholders of Hali Limited, based on discounted cash flow technique. Your answer should be supported by all necessary workings.
- (b) the additional information and analysis which could assist the Board of Directors in the process of decision making.

**14.7 URD PAKISTAN LIMITED**

URD Pakistan Limited, a listed company, is presently considering to acquire 100% shareholdings of CHI Limited, an unlisted company, which is engaged in the same business.

The following information has been extracted from the latest audited financial statements of the two companies:

	URD	CHI
	Rs. in million	
Non-current liabilities – Term Finance Certificates	1,500	-
Share capital (Rs. 10 each)	400	200
Retained earnings	100	100
Net profit after tax	300	250

Tax rate applicable to both the companies is 35%.

The directors of URD believe that a cash offer for the shares of CHI would have the best chance of success. They are considering various options to finance this acquisition. The initial negotiations suggest that interest rate on debt financing would depend upon the debt equity ratio of the company as shown below:

Debt equity ratio (up to)	40:60	50:50	60:40	70:30
Interest rate	16%	17%	18%	20%

The shares of URD are currently traded at Rs. 52.50. According to the prevailing practice in the market, price earning ratios of unlisted companies are 10% less than those of listed companies.

**Required**

Write a report to the Board of Directors, on behalf of Mr. Shah Rukh, the Chief Financial Officer of the company, discussing the following:

- (a) Which of the following financing option should the company adopt?
  - (i) The acquisition of CHI Limited is entirely financed by debt.
  - (ii) The acquisition is financed by issue of debt and equity in the ratio of 60:40. The equity is to be generated by the issue of right shares at Rs. 45 per share.
- (b) What other matters should be considered and what impact these may have on the decision arrived in (a) above?



## 14.8 FF INTERNATIONAL

FF International (FFI) is considering the opportunity to acquire CS Limited (CSL). You have been appointed as a consultant to advise the FFI's management on the financial aspects of the bid.

The latest summarized annual financial statements of CSL are given below:

### Summarised Statement of Financial Position

	Rs. in million
Total assets	5,000
Share capital	2,000
Accumulated profit	150
Long term loan	700
Short term loan	1,300
Other current liabilities	850
	5,000

### Summarised Statement of profit or loss

	Rs. in million
Sales	1,000
Less: Cost of sales	(430)
Gross profit	570
Selling and administration expenses	(250)
Financial charges	(280)
Profit before taxation	40
Taxation	(14)
Profit after taxation	26

You have also gathered the following information:

- (i) CSL produces a single product X-201 and has a market share of 30%. A market survey conducted to identify the impact of increase or decrease in price has revealed the following relationship between price of X-201 and market share:

Increase / (decrease) in price	Market share
(10%)	45%
5%	23%
10%	20%

- (ii) In order to increase production, CSL would have to invest Rs. 150 million in plant and machinery which would be financed through long term loan on terms and conditions similar to those of the existing long term loan, as specified in point (v) below.
- (iii) Fixed production costs amount to Rs. 100 million which include depreciation of Rs. 75 million.

- (iv) 80% of selling and administration expenses are fixed. Fixed costs include depreciation of Rs. 25 million and salaries of Rs. 160 million. After acquisition, FFI expects to reduce the staff in sales and administration by making one-time payment of Rs. 100 million. It would reduce the department's salaries by 25% and the remaining fixed costs by 30%.
- (v) Long term loan carries mark- up @ 15% per annum. The balance amount of principal is repayable in five equal annual instalments payable in arrears.
- (vi) Mark up on short term loan is 14% per annum. CSL has failed to meet certain debt covenants and therefore its bankers have advised CSL to reduce the short term loan to Rs. 1,000 million.
- (vii) It is the policy of the company to depreciate plant and machinery at 20% per annum using straight line method. Accounting depreciation may be assumed to be equal to tax depreciation. (viii) Working capital would vary at the rate of 40% of increase / decrease in sales.
- (ix) Tax rate applicable to both companies is 30% and tax is payable in the same year. CSL has unutilized carry forward tax losses of Rs. 80 million.
- (x) All costs as well as sales are expected to increase by 10% per annum.
- (xi) Free cash flows of CSL are expected to grow at 5% per annum after Year 5.
- (xii) Based on the risk analysis of this investment, the discounting rate is estimated at 18%.

**Required**

- (a) Discuss any **two** advantages and disadvantages of growth through acquisition.
- (b) Determine the following:
  - ☐ Optimal sales level at which CSL's profit would be maximised.
  - ☐ Amount of cash flow gap at optimal level of sales during the first five years of acquisition.
- (c) Calculate the bid price that FFI may offer for the acquisition of CSL assuming that cash flow gap identified in (b) above would have to be filled by FFI by way of an interest free loan.

## CHAPTER 15 – FOREIGN EXCHANGE RATES

### 15.1 INTEREST RATE PARITY

The following are spot exchange rates.

US\$/£1: 1.8000 (i.e. \$1.8 will buy £1)

€/£1: 1.5000 (i.e. €1.5 will buy £1)

US\$/€1: 1.2000 (i.e. \$1.2 will buy €1)

The rates of interest for the next three years are 2.5% on the euro, 3.5% on the US dollar and 5% on sterling.

#### Required

If the interest rate parity theory applies, what will the spot exchange rates be:

- (a) after one year
- (b) after three years?

## CHAPTER 16 – INTERNATIONAL INVESTMENT DECISIONS

### 16.1 CASH FLOWS FROM A FOREIGN PROJECT

A UK company intends to invest in a foreign country, Frankland. The cost of the investment will be 45 million francs, which is £9 million in sterling at the current exchange rate. The entire cost of the investment will be paid at the beginning of the project.

A DCF analysis has been carried out on the project's expected cash flows in Frankland, and the NPV is positive.

The project is expected to generate the following dividend payments to the company in the UK:

Year	Francs
1	10 million
2	20 million
3	25 million
4	10 million

The current exchange rate is £1 = 5 francs. The expected annual rate of inflation in the UK for the next four years is 3% and in Frankland it is 5%.

Tax in the UK is 30%, and will be payable one year in arrears of dividend receipts. The company's weighted average cost of capital is 9%.

#### Required

Calculate the NPV of the company's expected sterling cash flows, to decide whether the project should be undertaken.

### 16.2 LAHORE PHARMA PLC

Lahore Pharma Plc is planning an investment project in Malaysia where the currency is the ringgit. The expected cash flows from the project are as follows:

Year	Ringgit (Million)
0	160
1	80
2	96
3	64

The ringgit/rupee spot rate is Rs. 22 = 1 ringgit. The ringgit is expected to appreciate by 2% per annum. A similar project based in Pakistan would be expected to earn a minimum required rate of return of 10 percent.

#### Required

- Appraise the viability of the project, discounting the foreign cash flows at the foreign cost of capital
- State **FIVE** reasons why business organisations engage in cross-border investments

### 16.3 FOREIGN INVESTMENT

Green Limited is a company whose domestic currency is dollars. It is considering an investment in a country, Francia, where the domestic currency is Francs (FR).

The investment will involve buying equipment in the foreign country at a cost of 1,000,000 Francs. The currency to make the purchase will be bought spot in the FX market.

The equipment and the project will have a four-year life. At the end of this time, the equipment will have no residual value. The equipment will attract an allowance for tax purposes of 25% of its cost each year. The first capital allowance will be claimed against profits in Year 1.

The cash profits from the project will be 500,000 Francs in each of the four years. Tax is payable at 40% and is paid one year in arrears of the profits to which they relate.

There are foreign exchange restrictions in the country, and only 50% of the profits after tax each year can be paid to any shareholder in another country. The balance of the profits from the project can be paid out as a dividend to Green Limited at the end of Year 5.

Green Limited has a cost of capital of 10%, but a cost of capital of 16% is considered appropriate for evaluating the investment cash flows.

The current exchange rate is \$1 = FR3.00. However, the rate of inflation is expected to be 10% in each year in the Francia and 4% each year in Green Limited's country.

#### Required

- (a) Calculate the NPV of the project in the currency of the investment, using a discount rate appropriate to the investment.
- (b) Calculate the expected annual dividend payments, in Francs.
- (c) Calculate the dollar value of the expected annual dividend payments.
- (d) Evaluate the NPV of the investment in dollars, using an appropriate discount rate.

### 16.4 GOLD LIMITED

Gold Limited (GL) manufactures textile machinery. The management has explored opportunities in various South Asian countries and is optimistic that there is considerable demand for GL's machines in the region. However, exports from Pakistan are not financially viable on account of higher input costs. Therefore, GL intends to establish a subsidiary either in Bangladesh or in Sri Lanka. Based on initial studies, the management projections, **at current prices**, are as follows:

#### Alternative 1: Subsidiary in Bangladesh (SIB)

- (i) SIB would require immediate outlay of BDT 110 million for the construction of a new factory, i.e. BDT 80 million for acquisition of land and BDT 30 million as advance payment for construction of factory. Balance payment of BDT 75 million would be made in year 1.

- (ii) The installation and commissioning of plant and machinery would be completed in year 1 at a cost of BDT 115 million.
- (iii) The estimated working capital requirement in year 1 and year 2 is BDT 20 million and BDT 110 million respectively.
- (iv) Production and sales in year 2 are estimated at 3,000 units and in years 3-5 at 4,000 units per annum. The average price in year 2 is estimated at BDT 300,000 per unit.
- (v) Total variable costs in year 2 are expected to be BDT 165,000 per unit.
- (vi) Fixed overhead costs excluding depreciation, in year 2 are estimated at BDT 350 million.
- (vii) Allowable tax depreciation on all fixed assets except land is 20% per annum on a reducing balance method.
- (viii) Applicable tax rate on SIB is 35%.

#### **Alternative 2: Subsidiary in Sri Lanka (SISL)**

- (i) The investment would involve the purchase of an existing factory via a takeover bid. The estimated cost of acquisition is LKR 90 million.
- (ii) Additional investment of LKR 18 million in new plant and machinery and LKR 36 million in working capital would be required immediately after the acquisition.
- (iii) Pre-tax net cash flows (including tax savings from depreciation) are estimated at LKR 27 million in year 1 and LKR 35 million in year 2.
- (iv) Applicable tax rate on SISL is 25%.

All the above projections are based on current prices and are expected to increase annually at the current rate of inflation. Inflation rates for each of the next five years in Pakistan, Bangladesh and Sri Lanka are expected to be 12%, 10% and 8% respectively.

The after-tax realizable value of the investment at the prices prevailing in year 5, is estimated at BDT 145 million and LKR 115 million in case of Bangladesh and Sri Lanka respectively.

Current exchange rates are as follows:

BDT /PKR	Rs. 0.83 – Rs. 0.85
LKR/PKR	Rs. 1.31 – Rs. 1.34

GL's cost of equity is 18%. It would finance the investment by borrowing at 12% per annum in

Pakistan after which its debt equity ratio would be approximately 30:70.

The tax rate applicable to GL in Pakistan is 30%. Pakistan has double taxation treaty agreements with both the countries.

**Required**

Evaluate which of the two subsidiaries (if any) should be established by GL.  
***(Assume that tax in all countries is payable in the same year and that all cash flows arise at the end of the year)***

**16.5****GHAZALI LIMITED**

Ghazali Limited (GL) operates a chain of large retail stores in country X where the functional currency is CX. The company is considering expanding its business by establishing similar retail stores in country Y where functional currency is CY. As a policy, GL evaluates all investments using nominal cash flows and a nominal discount rate.

The required investments and the estimated cash flows are as follows:

**(i) Investment in country X**

CX 7 million would be required to establish warehouse facilities which would stock inventories for supply to the retail stores in country Y at cost. At current prices, the annual expenditure on these facilities would amount to CX 0.5 million in Year 1 and would grow @ 5% per annum in perpetuity.

**Investment in country Y**

Investment of CY 800 million would be made for establishing retail stores in country Y. At current prices, the net cash inflows for the first three years would be CY 170 million, 250 million and 290 million respectively. After Year 3, the net cash inflows would grow at the rate of 5% per annum, in perpetuity.

- (ii)** Inflation in country X and Y is 7% and 20% per annum respectively and are likely to remain the same, in the foreseeable future. Presently, country Y is experiencing economic difficulties and consequently GL may face problems like increase in local taxes and imposition of exchange controls.
- (iii)** The current exchange rate is CX 1 = CY 45.
- (iv)** GL's shareholders expect a return of 22% on their investments. GL uses this rate to evaluate all its investment decisions.

**Required**

Prepare a report to the Board of Directors evaluating the feasibility of the proposed investment. Your report should include the following:

- (a)** Computation of net present value of the project and a recommendation about the viability of the project.
- (b)** Identification of the risk and uncertainties involved.
- (c)** Brief discussions on management strategies which may be adopted to counter the risks of increase in local taxes and imposition of exchange controls.

## CHAPTER 17 – MANAGING FOREIGN EXCHANGE RISK (I)

### 17.1 FOREIGN EXCHANGE

- (a) A UK company expects to pay \$750,000 to a supplier in three months' time. The following exchange rates are available for the dollar against sterling (GBP/USD):

Spot	1.8570	–	1.8580
3 months forward	1.8535	–	1.8543

The company is concerned about a possible increase in the value of the dollar during the next three months, and would like to hedge its FX risk.

#### Required

Explain how the exposure to currency risk might be hedged, and the amount that the UK company will have to pay in sterling in three months' time to settle its liability.

- (b) A German company expects to receive US\$450,000 from a customer in two months' time. It is concerned about the risk of a fall in the value of the dollar in the next two months, and would like to hedge the currency risk using a forward contract.

The following rates are available for the dollar against the euro (EUR/USD):

Spot	1.3015	–	1.3025
2 months forward	25c	–	18c Premium

Calculate the company's income in euros from settlement of the forward contract in two months' time.

- (c) A US company must pay £750,000 to a UK supplier in four months' time. It is concerned about the risk of a fall in the value of the dollar in the next two months, and would like to hedge the currency risk using a forward contract.

The following rates are available for the dollar against sterling (\$ per £1):

Spot	1.9820	±	0.002
4 months forward	1.9760	±	0.003

Calculate the cost to the US company of hedging its currency exposure with a forward contract.

### 17.2 MONEY MARKET HEDGE

A UK company expects to receive \$600,000 in six months' time from a customer. It intends to convert these dollars into sterling.

The current spot rate for the dollar against sterling (GBP/USD) is 1.8800. The six-month interest rates are 5% per year for sterling and 3.5% per year for the US dollar.



**Required**

- (a) Show how the company can create a money market hedge for its exposure to a fall in the value of the dollar.
- (b) Estimate what the exchange rate should be for a six-month forward contract, GBP/USD.

**17.3 DUNBORGEN**

The treasurer of Dunborgen Company wants to hedge an exposure to currency risk. Dunborgen is a company whose domestic currency is the euro, and the company must make a payment of US\$500,000 to a US supplier in six months' time.

The following market rates are available:

**Exchange rates: \$ per €1**

Spot	1.604 ± 0.002
6 months forward	1.570 ± 0.004

Six month interest rates	Borrowing	Deposits
Euro	4.8%	4.4%
US dollar	2.5%	2.0%

(These interest rates are expressed as an annual rate of interest.)

**Required**

Compare the cost of hedging the currency risk exposure with:

- (a) a forward exchange contract
- (b) a money market hedge.

Recommend which method of hedging would be preferable in this situation.

**17.4 CURRENCY SWAP**

Small Company, a UK company, has an opportunity to invest in Zantland for three years, by setting up and operating an operations centre on behalf of the Zantland government. The cost of establishing the centre will be 3 million zants. At the end of the three years, the Zantland government will pay 6 million zants to purchase the centre from Small Company and take over the operations. During the three years that Small Company will operate the centre, the Zantland government will pay an annual fee of 200,000 zants. The entire operation will be free from tax.

The current exchange rate is £1 = 9.00 zants spot. There is no forward market in zants. Economic conditions in Zantland are unstable, and the expected inflation rate in the country over the next three years could be anywhere between 10% and 50%. Inflation is expected to be negligible in the UK.

A bank in Zantland has identified a Zantland company that would be interested in entering a currency swap with Small Company. The swap would involve the exchange of 3 million zants at the current spot rate, at the beginning and the end of the swap. An opportunity for credit arbitrage exists, because the rates at which Small company and the Zantland swap counterparty can borrow directly for three years are as follows.

	<b>Sterling</b>	<b>Zants</b>
Small Company	6.5%	ZIBOR + 2%
Zantland counterparty	8.5%	ZIBOR + 1.5%

ZIBOR is the Zantland inter-bank offered rate, which is usually set very close to the inflation rate in Zantland.

The bank would take an annual fee of 0.5% in sterling for arranging the swap, and Small Company would receive 75% of the net arbitrage benefit from the swap.

### Required

- Suggest how a currency swap might be arranged between the counterparties, and indicate whether Small Company would arrange the swap if it decides to invest in the project.
- Making whatever assumptions you consider necessary and using a discount rate of 15%, recommend whether Small Company should undertake the project.

## 17.5 MOMIN INDUSTRIES LIMITED

Momin Industries Limited (MIL) is engaged in the business of export of superior quality basmati rice to USA and EU countries. On May 15, 2016, MIL negotiated an order from TLI Inc. (TLI), a USA based company, for the supply of 10,000 tons of rice at the rate of US\$ 2,000 per ton. Immediately after acceptance of the order by MIL, the Government imposed a ban on the export of rice. In view of the long standing relationship, MIL has offered to supply rice through Thailand which has been accepted by TLI. After due consultation with the Thai Company, MIL and TLI agreed to the following terms and conditions on May 31, 2016:

- ☐ The quantity and price per ton will remain unchanged.
- ☐ First consignment of 4,000 tons will be shipped in the last week of June 2016 and the balance will be shipped during the last week of July 2016.
- ☐ Shipment will be made directly to TLI.
- ☐ TLI will make payment to MIL after one month of shipment.

It was agreed with the Thai Company that MIL shall make the payment on shipment, at the rate of Thai Bhat 50,000 per ton.

MIL has a policy to hedge all foreign currency transactions in excess of Rs. 25 million by obtaining forward cover. MIL's bank has arranged the forward cover and advised the following exchange rates on May 31, 2016:

	Thai Bhat		US \$	
	Buy	Sell	Buy	Sell
Spot	Rs. 2.33	Rs. 2.36	Rs. 65.12	Rs. 65.24
1 month forward	Rs. 2.30	Rs. 2.33	Rs. 65.45	Rs. 65.57
2 months forward	Rs. 2.28	Rs. 2.31	Rs. 65.77	Rs. 65.89
3 months forward	Rs. 2.26	Rs. 2.29	Rs. 66.10	Rs. 66.22

The bank charges a commission of 0.01% on each transaction.

### Required

Calculate the profit or loss on the above transaction under each of the following options:

- the shipments are made according to the agreed schedule;
- on July 31, 2016, the parties agree to delay the second shipment for a period of two months. The rates expected to prevail on July 31, 2016 are as follows:

	Thai Bhat		US\$	
Spot – July 31, 2016	Rs. 2.29	Rs. 2.32	Rs. 65.61	Rs. 65.73
1 months forward	Rs. 2.27	Rs. 2.30	Rs. 65.84	Rs. 65.96
2 months forward	Rs. 2.25	Rs. 2.28	Rs. 66.16	Rs. 66.28
3 months forward	Rs. 2.23	Rs. 2.26	Rs. 66.38	Rs. 66.50

- the second shipment is cancelled on July 31, 2016. The exchange rates are expected to be the same as in (b) above.

## 17.6 QALAT INDUSTRIES LIMITED

Qalat Industries Limited (QIL) is a medium sized company which carries out extensive trading (imports as well as exports) with various German companies. The management of QIL is concerned about the recent fluctuations in the exchange rate parity between Pak Rupee (Rs.) and Euro (€) and is considering to hedge the following transactions which it expects to undertake, on December 15, 2016:

Nature of transaction	Amount	Due date of payment/receipt
(i) Import of IT equipment	€ 223,500	Jun. 15, 2017
(ii) Export of sports goods	€ 98,500	Mar.15, 2017
(iii) Export of medical instruments	€ 77,000	Jun. 15, 2017
(iv) Import of machinery	Rs. 22,500,000	Mar.15, 2017

Other relevant information is as follows:

- (i) According to QIL's bank the following exchange rates are expected to prevail on December 15, 2016:

	€1	
	Buy	Sell
Spot	Rs. 124.22	Rs. 124.52
3 months forward	Rs. 123.62	Rs. 123.96
6 months forward	Rs. 123.21	Rs. 123.54

- (ii) Interest rate on borrowing and lending in respective currencies are as follows:

	Rs.	€
3-months / 6 months borrowing	11%	5%
3-months / 6 months lending	6.5%	3%

### Required

- (a) Calculate the net rupee receipts/payments that QIL should expect from the above transactions under each of the following alternatives:
- Hedging through forward cover
  - Hedging through money market
- (b) Determine which would be the better alternative for QIL.  
(Ignore transaction costs)

## 17.7 SILVER LIMITED

Silver Limited (SL) is a large manufacturing concern in Malaysia. It deals in four major product lines. As the financial controller of the company, you are faced with the following situations:

- (i) SL has made arrangements to export leather shoes to a major customer in USA. It has been agreed that one consignment would be shipped in each quarter and payment thereof would be made at the end of the quarter. SL's sole supplier of leather is in Pakistan and it has also agreed to supply on 3 months credit. The estimated sales and purchases for the first two quarters of 2016 are as follows:

	Sales to US Customer	Purchases from Pakistani Supplier
First quarter ending March 31, 2016	USD 1,020,000	USD 775,000
Second quarter ending June 30, 2016	USD 1,224,000	USD 1,347,000

The management is considering to hedge the foreign currency transactions. In this regard SL's bank has provided the following information:

Exchange Rates	USD 1	
	Buy	Sell
Spot rate	MYR 3.030	MYR 3.110
3 months forward rates premium	MYR 0.071	MYR 0.073
6 months forward rates premium	MYR 0.160	MYR 0.164

Interest Rates	Lending	Borrowing
MYR	6.6% p.a.	7.9% p.a.
USD	5.8% p.a.	7.2% p.a.

- (II) SL has sold one of its product lines for MYR 15 million. The proceeds are expected to be received at the end of February, 2016. SL plans to use these funds in September, 2016 for one of its major expansion project. Consequently, the management wants to invest this amount in a fixed deposit account for a period of six months at 6% per annum.

The management is considering to hedge the interest rate risk by using interest rate futures. The current price of March six months' futures is 95.50 whereas the standard contract size is MYR 3 million.

### Required

- (a) Determine which of the following options would be more beneficial to the company:
- Hedging through forward cover
  - Hedging through money market
- (b) Determine how beneficial would it be for SL to use interest rate futures to hedge the interest rate risk if at the end of February, 2016 interest rates:
- fall by 0.75% and future price moves by 1%; or
  - rise by 1% and future price moves by 1%.

**Ignore transaction costs.**

## 17.8 KHALDUN CORPORATION

Khaldun Corporation (KC) is a Pakistan based multinational company and has number of inter- group transactions with its two foreign subsidiaries KA and KB, which are located in USA and UK respectively. Details of receipts and payments which are due after approximately three months are as follows.

Paying Company	Receiving Company		
	KC (Pak)	KA (USA)	KB (UK)
	in million		
KC (Pak)	-	Rs. 131	£ 5.10
KA (USA)	US \$ 1.50	-	US \$ 4.50
KB (UK)	£ 4.00	£ 1.80	-

The current exchange rates and interest rates are as follows:

	Exchange Rates			
	US \$ 1		UK £ 1	
	Buy	Sell	Buy	Sell
Spot	Rs. 86.56	Rs. 86.80	Rs. 134.79	Rs. 135.13
3 months forward	Rs. 87.00	Rs. 87.20	Rs. 135.87	Rs. 136.18

	Interest Rates	
	Borrowing	Lending
KC (Pak)	10.50%	8.50%
KA (USA)	5.20%	4.40%
KB (UK)	5.90%	5.00%

### Required

- (a) Calculate the net rupee receipts/payment that KC (Pak) should expect from the above transactions under each of the following alternatives:
  - ☐ Hedging through forward contract
  - ☐ Hedging through money market
- (b) Demonstrate how multilateral netting might be of benefit to Khaldun Corporation.

## CHAPTER 18 – MANAGING FOREIGN EXCHANGE RISK (II): CURRENCY FUTURES

### 18.1 CURRENCY FUTURES

The euro/US dollar currency future is a contract for €125,000. It is priced in US dollars, and the tick size is \$0.0001.

Currency futures are not normally used by companies to hedge currency risks. However, assume that a French company intends to use currency futures to hedge the following currency exposure.

It is now February. The French company has to make a payment of US\$640,000 in May to a supplier.

The price of June euro/US dollar futures is currently 1.2800.

The company is concerned that the value of the dollar will increase in the next few months, and it therefore decides to use futures to hedge the exposure to currency risk.

#### Required

- (a) How should the company hedge its currency risk with futures?
- (b) Suppose that in May when the company must make the payment in dollars, the June futures price is 1.2690 and the spot rate (US\$/€1) is 1.2710.

Show what will happen when the futures position is closed, and calculate the effective exchange rate that the company has obtained for the US\$640,000.

### 18.2 MORE CURRENCY FUTURES

The sterling/US dollar currency future is a contract for £62,500. It is priced in US dollars, and the tick size is \$0.0001.

Currency futures are not normally used by companies to hedge currency risks. However, assume that a US company intends to use currency futures to hedge the following currency exposure.

It is now October. The US company expects to receive £400,000 in January from a customer.

The price of March sterling/US dollar futures is currently 1.8600.

The company is concerned that the value of sterling will fall in the next few months, and it therefore decides to use futures to hedge the exposure to currency risk.

#### Required

- (a) How should the company hedge its currency risk with futures?
- (b) Suppose that in January when the company receives the sterling payment, the March futures price is 1.8420 and the spot rate (US\$/£1) is 1.8450.

Show what will happen when the futures position is closed, and calculate the effective exchange rate that the company has obtained for the £400,000.

### 18.3 BASIS

It is 1st March. The current spot exchange rate for dollars against sterling (US\$/£1) is 1.8540. The exchange rate is volatile, and the June futures price for sterling/US dollar futures is 1.8760.

Assume that the settlement date for the June futures contract is 30th June.

A company has used sterling/US dollar futures to hedge two currency exposures, one relating to a cash payment on 1st May and the other relating to a cash payment in mid-June.

Required

Calculate the expected futures price for June futures:

- (a) at the end of the day's trading on 30th April, if the spot sterling/dollar rate is 1.8610
- (b) at the end of the day's trading on 15th June, if the spot sterling/dollar rate is 1.8690.

### 18.4 IMPERFECT HEDGE AND BASIS

It is 20th April. A US company expects to receive £625,000 in three months' time, in July and it wants to hedge its exposure to the risk of a fall in the value of the dollar by hedging with US dollar/sterling futures.

A dollar/sterling futures contract is for £62,500 and the value of a tick is £6.25.

On 20th April, the spot exchange rate is \$1.8050/£1. The company deals in the September futures contracts at a price of 1.7800. Settlement date for the September futures is in five months' time exactly.

The US company receives the £625,000 on 20th July and immediately closes its futures position. The spot rate on 20th July is 1.7700 and the futures price is 1.7600.

Required

- (a) To what extent does the futures position provide a hedge for the company against currency risk, between 20th April and 20th July? To do this, compare the gain or loss on the underlying currency exposure with the gain or loss on the futures position.
- (b) Explain why the hedge is imperfect.

### 18.5 CURRENCY HEDGE

It is now the end of July. A UK company expects the following receipts and payments in euros at the end of the month in three months' time (at the end of October):

Receipts	€540,000
Payments	€2,650,000

The company is concerned about the exposure to a risk of a movement in the sterling/euro exchange rate, and it has decided to hedge the exposure.



It is considering three methods of hedging the exposure:

- (a) with a forward exchange contract
- (b) using a money market hedge
- (c) using currency futures.

Relevant data is as follows:

**FX rates, €/£1**

Spot	1.4537	–	1.4542
3 months forward	1.4443	–	1.4448

3-month interest rates	Borrow	Invest
Sterling (UK)	6.2%	5.6%
Euro	3.8%	3.4%

Currency futures

Currency futures for sterling/euro are each for €100,000 and are priced in sterling.

Assume that the futures contracts mature at the end of the month.

Assume for the purpose of this question that when the futures position is closed at the end of October, the basis is 0.

**Futures prices as at end of July**

September futures	0.6890
December futures	0.6929

**Required**

Calculate the net cost in sterling of hedging the currency risk:

- (a) with a forward exchange contract
- (b) using a money market hedge
- (c) using currency futures.

## CHAPTER 19 – MANAGING FOREIGN EXCHANGE RISK (III): OPTIONS

### 19.1 TRADED EQUITY OPTIONS

It is mid-February. A UK investor believes that in the next few weeks, the share price of company TBA will fall by a substantial amount. The share price is currently 982.

The investor has decided to speculate on a fall in the share price using equity options, and is prepared to invest up to £12,000 in an options transaction.

On the LIFFE exchange, traded options are for 2,000 shares in a company, and the following option prices (in pence) are currently available for TBA shares:

Strike price	March	
	Calls	Puts
pence		
950	40	15
1,000	10	50

#### Required

- Explain how this investor might use options to speculate on a fall in the TBA.
- Assuming that the investor purchased options with the lowest strike price show what would happen when the options expire if the TBA share price is 910.

### 19.2 CURRENCY OPTIONS

A UK company will receive US\$2 million in six months' time. It is now 20th March. The company is not sure whether the US dollar will rise or fall in value against sterling over the next few months, and it has decided to hedge its exposure to currency risk using traded currency options.

On the Philadelphia Stock Exchange, traded currency options are available in a contract size of £31,250. Options are priced in cents per £1. Assume that option contracts expire on 20th of each month.

The following option prices are currently available:

Exercise price	Calls		Puts	
	June	September	June	September
1.8500	1.4	1.9	4.0	5.1

The current spot exchange rate (US\$/£1) is 1.8325 – 1.8375.

#### Required

- Explain how the company's currency exposure could be hedged using traded currency options.
- Show what would happen if the options are still held by the company at expiry and the spot exchange rate is \$1.9150 – 1.9200.

### 19.3 DEF SECURITIES LIMITED

DEF Securities Limited (DEF) is a medium size investment company. During the month of February 2016, the Research Department of DEF forecasted an increase in oil prices by June 2016 which would have a positive impact on the share prices of oil marketing companies and negative impact on the share prices of power generation companies. Based on this research, the company entered into the following transactions on April 1, 2016:

- (I) Purchased a three month American call option of 100,000 shares of Silver Petroleum Limited (SPL), an oil marketing company, at Rs. 3 per share. The exercise price is Rs. 155 per share.
- (II) Purchased a three month European put option of 5,000,000 shares of Diamond Electric Supply Corporation Limited (DESC), a power generation company, at Re. 0.50 per share. The exercise price is Rs. 3.50 per share.

However, when the price of oil actually increased on May 21, 2016, DESC revised its power tariff upward while due to tough competition SPL's margins are expected to decline. As a result, the company feels that it is now advisable to reconsider the situation. While evaluating various options, the management has gathered the following information:

- (i) As of June 1, 2016, the ready market price per share and one month future price per share were as follows:

	Ready market prices	1-month future prices
SPL	Rs. 170 per share	Rs. 173 per share
DESC	Rs. 4.25 per share	Rs. 4.35 per share

- (ii) DEF can obtain finances at the rate of KIBOR plus 2%. Presently, the rate of KIBOR is 12.5%.
- (iii) Transaction costs are immaterial.

#### Required

Based on the available information, recommend the best strategy to the management.

### 19.4 ALPHA AUTOMOBILES LIMITED

Assume that the date today is 1 July 2016. Alpha Automobiles Limited (AAL) has imported CNG kits from Japan and has to repay an amount of JPY 175 million in three months' time.

AAL intends to hedge the contract against adverse movements in foreign exchange rates and its foreign exchange exposures. The following data are available:

**Exchange rates quoted on 1 July 2016**

<b>JPY 1</b>		
	<b>Buy</b>	<b>Sell</b>
Spot rate	Rs. 1.9223	Rs. 1.9339
One month forward rate	Rs. 1.9335	Rs. 1.9451
Three month forward rate	Rs. 1.9410	Rs. 1.9493

**Interest rates available to AAL**

	<b>Borrowing</b>	<b>Investing</b>
Japan	5%	3%
Pakistan	8%	5%

**JPY currency futures**

Futures have a contract size of JPY 100,000 and the margin required is Rs. 1,000 per contract.

Contract prices (Rupee per JPY) are as follows:

<b>JPY 1</b>	
July 2016	Rs. 1.9365
October 2016	Rs. 1.9421
January 2017	Rs. 1.9490

The contracts can mature at the end of the above months only.

**Currency options**

Options have a contract size of JPY 250,000. The premiums (paisa per Rupee) payable on various options and the corresponding strike prices are shown below:

<b>Calls</b>			<b>Puts</b>	
<b>Strike price</b>	<b>31 July 2016</b>	<b>31 October 2016</b>	<b>31 July 2016</b>	<b>31 October 2016</b>
<b>Rs.</b>	<b>Paisas</b>			
1.90	2.88	3.55	0.15	0.28
1.91	1.59	2.32	1.00	1.85
1.92	0.96	1.15	2.05	2.95

Options are exercisable at the end of relevant month only.

**Required**

Illustrate **four** methods by which Alpha Automobiles Limited might hedge its currency exposure. Recommend which method should be selected.

## CHAPTER 20 – MANAGING INTEREST RATE RISK

### 20.1 FRA

A company will need to borrow \$5 million for six months in three months' time. It can borrow at LIBOR + 0.50%. It expects interest rates to rise before it borrows the money, and so has decided to use an FRA to hedge the risk.

The following FRA rates are available:

2v5	3.82	–	3.77
3v6	3.85	–	3.80
3v9	3.97	–	3.91
6v9	3.92	–	3.87

#### Required

- How would the company use an FRA to hedge its interest rate risk, and what effective interest rate would be obtained by the hedge.
- What is the difference between an FRA and an interest rate coupon swap?

### 20.2 SWAP

A company has a bank loan of \$8,000,000 on which it pays a floating rate of US LIBOR plus 1.25%. The company believes that interest rates will soon increase and remain high for the foreseeable future, and it would therefore like to switch its debt liabilities from floating rate to fixed rate.

The loan has four years remaining to maturity. A bank has quoted the following rates for four-year interest rate swaps in dollars:

5.20% - 5.25%

#### Required

Show how an interest rate swap can be used to switch from floating rate to fixed rate liabilities, and calculate what the effective fixed rate would be.

### 20.3 CREDIT ARBITRAGE

Entity A has an AA credit rating and Entity B has a BBB- credit rating. Both companies want to raise the same amount of long-term debt capital. Entity A wants to borrow at a floating rate of interest and Entity B wants to borrow at a fixed rate.

They are able to borrow at the following rates:

	Fixed rate	Floating rate
Entity A	6.35%	LIBOR + 0.75%
Entity B	7.25%	LIBOR + 1.25%

A bank has identified an opportunity to arrange interest rate swaps with the companies. It would expect to receive a profit margin on the arrangement of 0.10% of the notional principal amount in the swap. The remaining benefits of the credit arbitrage should be shared equally between the two entities.

**Required**

Explain how the interest rate swaps might be arranged, and show the effective interest rate that will be paid by each entity as a result of the swap.

**20.4 CREDIT ARBITRAGE**

Company X can borrow for six years at a fixed rate of 7.25% or a variable rate of LIBOR plus 1.25%. Company Y can borrow for six years at a fixed rate of 8.00% or a variable rate of LIBOR plus 1.50%.

Company X wants to borrow at a floating rate and company Y wants to borrow at a fixed rate.

The rates available on six-year swaps are 6.27 – 6.30.

**Required**

Show how an interest rate swap can be used by both companies to reduce their borrowing costs.

**20.5 HEDGING WITH STIRS**

It is now December.

A UK company wants to borrow £4.5 million in two months for a period of five months. The loan period will be from a date in February to a date in July.

It wants to use short-term interest rate futures to create a hedge against a rise in short-term interest rates within the next two months.

Short sterling futures are for notional three-month deposits of £500,000.

**Required**

State how futures should be used as a hedge for the exposure to interest rate risk.

**20.6 MORE HEDGING WITH STIRS**

It is now 31st October.

A company must borrow US\$12 million in three months' time, on the first day of February, for a period of four months. It can borrow at US dollar LIBOR + 1%.

The company is concerned about the risk of an increase in short-term interest rates before February, and has decided to hedge the risk with short-term interest rate futures.

Eurodollar futures are for three-month notional deposits of \$1,000,000.

The current three-month LIBOR rate at the end of October is 5.5%.

The following futures prices are available at the end of October:

**Futures prices as at end of July**

December futures	94.20
March futures	93.70

Assume that the settlement date for futures is the last day of the relevant month.

**Required**

- (a) State how a hedge would be created using eurodollar futures.
- (b) Suppose that at the beginning of February, three-month interest rates for the dollar (spot) have risen by 2% to 7.5%.

Allowing for basis risk, state what the effective interest rate for borrowing should be when the futures position is closed.

## 20.7 FRAS AND FUTURES

It is now 1st April. Your company will receive £8.2 million from a customer in four months' time, and it will invest this money for five months until the end of December, when it will be needed for spending on a planned capital project. The company treasurer intends to put the money on deposit for five months when it is received, and expects to be able to invest short term to earn LIBOR plus 0.40%.

The treasurer is worried about the risk of a fall in interest rates and wants to secure an effective interest rate for the investment of the £8.2 million for the five-month period.

The following information is available:

LIFFE £500,000 3 month sterling futures

Tick size (0.0001) £12.50

September: 95.35

December: 95.70

Futures contracts mature at the end of the relevant month.

The current three-month LIBOR rate is 5%.

FRA prices

4v5: 4.75 – 4.70

4v9: 4.57 – 4.52

5v9: 4.49 – 4.44

**Required**

- (a) Explain how you would lock in an effective interest rate for the income from investing the £8.2 million, using:
  - (1) FRAs
  - (2) Interest rate futures

- (b) Show what will happen at the end of July if the three-month LIBOR rate is 4.25% and the interest rate exposure had been hedged as indicated in part (a) of the answer, using:
- (1) FRAs
  - (2) Interest rate futures

## 20.8 INTEREST RATE HEDGE

A UK company will need to borrow £21 million for two months, starting in three months' time. It is now mid-March. The current LIBOR rate is 5% and the company can borrow at LIBOR + 0.75%.

The company is concerned about the possibility of an increase in short-term interest rates during the next two months, and it is looking at methods of hedging its exposure to the risk. The three methods it is considering are interest rate futures, options on interest rate futures and an FRA.

Current prices for futures, options and FRAs are as follows. (Note: Assume that all exchange-traded derivatives reach settlement on the last day of the relevant month).

### Interest rate futures

Notional three-month deposit £500,000

Value of 1 tick = £12.50

March	94.740
June	94.610
September	94.500

### Options on interest rate futures

Premium cost expressed as an annual interest rate %

Strike price	Calls			Puts		
	March	June	September	March	June	September
94750	0.140	0.200	0.280	0.320	0.390	0.500
95000	0.124	0.080	0.120	0.470	0.560	0.850

## 20.9 DEFINITIONS

Briefly describe each of the following financial instruments:

- (a) Interest rate swaps
- (b) Forwards
- (c) Futures
- (d) Options
- (e) Caps, collars and floors



**20.10 IMRAN LIMITED**

Imran Limited wants to borrow Rs. 70 million for two years with interest payable at six monthly intervals. Due to recent hike in inflation, the company expects that the rate of interest is likely to rise over the next 2 years. The company can borrow this amount from a local bank at a floating rate of KIBOR plus 2% but wants to explore the use of swap to protect it from any interest rate increase, during the next two years.

Another bank has offered the company that it will be willing to receive a fixed rate of 11% in exchange for payments of six month KIBOR.

**Required**

- (a) Calculate the six monthly interest payments if the swap arrangement is in place.
- (b) Calculate the net amount receivable/payable by each party to the swap at the end of the first 6 months if:
  - ☐ KIBOR is 13.5%.
  - ☐ KIBOR is 9%.



## Answers

### CHAPTER 1 – AN INTRODUCTION TO STRATEGIC FINANCIAL MANAGEMENT

#### 1.1 COMPANY OBJECTIVES

- (a) Financial management is concerned with making decisions about the provisions and use of a firm's finances. A rational approach to decision-making necessitates a fairly clear idea of what the objectives of the decision maker are or, more importantly, of what are the objectives of those on behalf of whom the decisions are being made.

There is little agreement in the literature as to what objectives of firms are or even what they ought to be. However, most financial management textbooks make the assumption that the objective of a limited company is to maximise the wealth of its shareholders. This assumption is normally justified in terms of classical economic theory. In a market economy, firms that achieve the highest returns for their investors will be the firms that are providing customers with what they require. In turn these companies, because they provide high returns to investors, will also find it easiest to raise new finance. Hence the so-called 'invisible hand' theory will ensure optimal resource allocation and this should automatically maximise the overall economic welfare of the nation.

This argument can be criticised on several grounds. Firstly it ignores market imperfections. For example it might not be in the public interest to allow monopolies to maximise profits. Secondly it ignores social needs like health, police, defence etc.

From a more practical point of view directors have a legal duty to run the company on behalf of their shareholders. This however begs the question as to what do shareholders actually require from firms.

Another justification from the individual firm's point of view is to argue that it is in competition with other firms for further capital and it therefore needs to provide returns at least as good as the competition. If it does not it will lose the support of existing shareholders and will find it difficult to raise funds in the future, as well as being vulnerable to potential take-over bids.

Against the traditional and 'legal' view that the firm is run in order to maximise the wealth of ordinary shareholders, there is an alternative view that the firm is a coalition of different groups: equity shareholders, preference shareholders and lenders, employees, customers and suppliers. Each of these groups must be paid a minimum 'return' to encourage them to participate in the firm. Any excess wealth created by the firm should be and is the subject of bargaining between these groups.

At first sight this seems an easy way out of the 'objectives' problem. The directors of a company could say 'Let's just make the profits first, then we'll argue about who gets them at a later stage'. In other words, maximising profits leads to the largest pool of benefits to be distributed among the participants in the bargaining process. However, it does imply that all such participants must value profits in the same way and that they are all willing to take the same risks.

In fact the real risk position and the attitude to risk of ordinary shareholders, loan creditors and employees are likely to be very different. For instance, a shareholder who has a diversified portfolio is likely not to be so worried by the bankruptcy of one of his companies as will an employee of that company, or a supplier whose main customer is that company. The problem of risk is one major reason why there cannot be a single simple objective which is common to all companies.

- (b) Separate from the problem of which goal a company ought to pursue are the *questions* of which goals companies claim to pursue and which goals they actually pursue. Many objectives are quoted by large companies and sometimes are included in their annual accounts. Examples are:

- ☐ to produce an adequate return for shareholders
- ☐ to grow and survive autonomously
- ☐ to improve liquidity
- ☐ to improve productivity
- ☐ to give the highest quality service to customers
- ☐ to maintain a contented workforce
- ☐ to be technical leaders in their field
- ☐ to be market leaders
- ☐ to acknowledge their social responsibilities.

Some of these stated objectives are probably a form of public relations exercise. At any rate, it is possible to classify most of them into four categories which are related to profitability:

- (i) pure profitability goals e.g. adequate return for shareholders
- (ii) 'surrogate' goals of profitability e.g. improving productivity, happy workforce
- (iii) constraints on profitability e.g. acknowledging social responsibilities, no pollution, etc.
- (iv) 'dysfunctional' goals.

The last category is goals which should not be followed because they do not benefit in the long run. Examples here include the pursuit of market leadership at any cost, even profitability. This may arise because management assumes that high sales equal high profits which is not necessarily so.

In practice, the goals which a company actually pursues are affected to a large extent by the management. As a last resort, the directors may always be removed by the shareholders or the shareholders could vote for a take-over bid, but in large companies individual shareholders lack voting power and information. These companies can, therefore, be dominated by the management.

There are two levels of argument here. Firstly, if the management do attempt to maximise profits, then they are in a much more powerful position to decide how the profits are 'carved up' than are the shareholders.

Secondly, the management may actually be seeking 'prestige' goals rather than profit maximisation. Such goals might include growth for its own sake, including empire building or maximising turnover for its own sake, or becoming leaders in the technical field for no reason other than general prestige. Such goals are usually 'dysfunctional'.

The dominance of management depends on individual shareholders having no real voting power, and in this respect institutions have usually preferred to sell their shares rather than interfere with the management of companies. There is some evidence, however, that they are now taking a more active role in major company decisions.

From all that has been said above, it appears that each company should have its own unique decision model. For example, it is possible to construct models where the objective is to maximise profit subject to first fulfilling the target levels of other goals. However, it is not possible to develop the general theory of financial management very far without making an initial simplifying assumption about objectives. The objective of maximising the wealth of equity shareholders seems the least objectionable.

## 1.2 POSSIBLE CONFLICTS

Achievement of the objective of maximisation of the value of a firm might be compromised by conflicts which may arise between the managers and the other stakeholders in an organisation. Such conflicts include:

- (i) Managers might not work industriously to maximise shareholders' wealth if they feel that they will not have a fair share in the benefits of their labour.
- (ii) There might be little incentive for managers to undertake significant creative activities, including looking for profitable new ventures or developing new technology.
- (iii) Managers might be giving themselves high salaries and perks.
- (iv) Managers might be providing themselves with larger empires, through merger and organic growth, thus increasing their opportunity for promotion and social status.

- (v) Reducing risk through diversification which may not necessarily benefit shareholders, but may well improve the managers' security and status.
- (vi) Managers might take a more short-term view of the firm's performance than the shareholders would wish.
- (vii) Management acting on behalf of shareholders, might also reduce the wealth e.g. by selling off assets of the company.
- viii) Since senior managers do not own the business, they may be more concerned with their benefits rather than maximizing the wealth of shareholders.

### 1.3 OWNERSHIP

- (a) A publicly quoted company seeks to know the detailed composition of its shareholders and their objectives in investing in the company for the following reasons:
  - (i) To enable it take various decisions in accordance with the preferences of such shareholders.
  - (ii) To prevent the occurrence of conflict of interest as related to principal and agents.
- (b) Advantages that may accrue to the corporate finance manager include the following:
  - (i) **Dividend Policy** - The knowledge of shareholders' preferences with regards to dividends or capital appreciation and marginal tax rates will assist in the determination of the company's optimal dividend policy.
  - (ii) **Risky Investment** - Shareholders' preferences may assist corporate management when making decisions concerning risky capital investments. Depending on their attitude to risk and their specific circumstances, they may dislike, or prefer the company to undertake risky investments with the possibility of a higher return.
  - (iii) **Financing Decisions** – With respect to the level of debt to employ, the risk attitude of shareholders can again be useful; generally speaking, a risky approach is to employ more and more debt, since in the event of default, the shareholders are paid last. However, a high level of risk is matched by a high potential return to equity holders.
  - (iv) **Rebuffing a take-over:** A company whose shares are held by a few may find an unwanted take-over bid less easy to rebuff as the bidder needs to convince only a few shareholders for the bid to be successful. However, if shares are held by a few key shareholders, it may be easier to provide these shareholders with the type of return they require with a possible reduction in their likely acceptance of any take-over.
  - (v) **Measurement of performance:** Ascertaining how shareholders judge performance may enable management to optimise this measure or measures, when making decisions, although this measure may not be in the prime interest of the company in terms of value maximisation.

- (vi) **Religious belief:** Knowing the religious belief of the shareholders will assist in deciding the type of business to be involved in. For example, Islam forbids investment in businesses involved in the manufacture and sale of alcohol. Such information will enable corporate finance managers to tailor their performance to satisfy the expectations of the shareholders.

## CHAPTER 3 – DISCOUNTED CASH FLOW

### 3.1 BADGER

#### Cash Flows

	01/01/17	31/12/17	31/12/18	31/12/19	31/12/20
	Rs. m	Rs. m	Rs. m	Rs. m	Rs. m
	0	1	2	3	4
Machine	(180)				25
Existing machine	2				(1)
<b>Operating flows</b>					
Sales <b>W1</b>		79	103	175	179
Purchases <b>W2</b>		(32)	(48)	(57)	(73)
Payments to subcontractors		(6)	(9)	(8)	(8)
Fixed overhead		(13)	(10)	(9)	(10)
Labour costs:					
Promotion		(3)	(3)	(3)	(3)
Redundancy			(6)		
Material					
X	2				
Y	(3)				
Net operating flows	(1)	25	27	98	109
	(179)	25	27	98	109
Discount factor (10%)	1.000	0.909	0.826	0.751	0.683
	(179)	23	22	74	74

#### NPV

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#### WORKINGS

##### (1) Sales

	2016	2017	2018	2019	2020
	Rs. m	Rs. m	Rs. m	Rs. m	Rs. m
Market size	1,100	1,122	1,144	1,167	1,191
Market share		0.07	0.09	0.15	0.15
Sales		79	103	175	179

##### (2) Purchases

	2017	2018	2019	2020
Opening payables	-	8	10	11
Add purchases	40	50	58	62
Less closing payables	(8)	(10)	(11)	-
Cash for purchases	32	48	57	73



### 3.2 HASAN AND SONS LIMITED

#### (a) Calculation of the annual repayment

$$\begin{aligned}
 A &= \frac{[1 - (1+r)^{-n}]}{r} \\
 &= \frac{1 - (1.12)^{-20}}{0.12} \\
 &= 7.4694
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Annual repayment} &= \frac{\text{Rs. } 2,5000,000}{7.4694} \\
 &= \text{Rs. } 334,698.90
 \end{aligned}$$

#### (b) Calculation of the NPV of the machine

Year	Cash flow (Rs.)	DF@ 12%	PV (Rs.)
0	(3,000,000)	1.0000	(3,000,000)
0	(250,000)	1.0000	(250,000)
1-5	540,000	3.6048	1,946,592
5	250,000	0.5674	141,850
<b>NPV</b>			<b>(1,161,558)</b>

#### Advice:

The machine should not be bought, as its purchase would result in the reduction of the shareholders' wealth by Rs. 1,161,558.

### 3.3 DCF AND RELEVANT COSTS

Year	0	1	2	3	4	5
	Rs.000	Rs.000	Rs.000	Rs.00	Rs.000	Rs.000
Sales			7,400	8,300	9,800	5,800
Wages			(550)	(580)	(620)	(520)
Materials			(340)	(360)	(410)	(370)
Licence fee	(300)	(300)	(300)	(300)	(300)	
Overheads			(100)	(100)	(100)	(100)
Equipment	(5,200)	(5,200)				2,000
Specialised equipment			(150)			
Working capital		(650)				650
	(5,500)	(6,150)	5,960	6,960	8,370	7,460
Discount factor at 10%	1.000	0.909	0.826	0.751	0.683	0.621
Present value	(5,500)	(5,590)	4,923	5,227	5,717	4,633

**NPV = + Rs. 9,409,000**

The project has a positive NPV. The project should be undertaken because it will increase the value of the company and the wealth of its shareholders.

### 3.4 SADEEQ ENERGY PLC

- (a) The difference between mutually exclusive investments and independent investments is that for mutually exclusive investments, once one project is selected another must be forgone because the projects are in competition, whereas for independent investments/projects, the selection of one project does not foreclose the selection of others.
- (b) (i) Investment decision is important to organisations as it involves the identification of viable projects. It deals with the appraisal of projects using various techniques to determine those that are viable.
- (ii) Techniques that can be used to ensure optimal investments include Net Present Value (NPV) Internal Rate of Return (IRR), Pay Back Period and Accounting Rate of Return (ARR).
- (c) Using payback period:

Year	Cash flows	
	Rs.'000	
0	(260,000)	
1-12	480,000	i.e. 40m x 12
13 - 20	272,000	i.e. 34m x 8
Payback period	=	$\frac{\text{Rs. } 260,000,000}{\text{Rs. } 40,000,000}$ years
	=	6.5 years

The project should be accepted because its payback period is less than the projects' life.

- (d) NPV and IRR

Year	Cash flow Rs.'000	DF(15%)	Present Value Rs.'000
0	(260,000)	1.0000	(260,000)
1 – 12	40,000	5.4206	216,824
13 – 20	34,000	0.8387	28,516
Net Present Value			(14,660)

Using internal rate of return (IRR)

Try 12% discount factor

Year	Cashflow Rs.'000	DF(12%)	Present Value Rs.'000
0	(260,000)	1.0000	(260,000)
1 – 12	40,000	6.1944	247,776
13 – 20	34,000	1.2750	43,350
Net Present Value			31,126

$$\begin{aligned}
 IRR &= DF_p + \left( \frac{NPV_p(DF_n - DF_p)}{NPV_p + NPV_p} \right) \\
 &= 12\% + \left( \frac{31,126 \times (15 - 12)}{31,126 - (14,660)} \right) \\
 &= 12\% + 2.039\% \\
 &= 14.039\%
 \end{aligned}$$

### 3.5 BETA LIMITED

(a) The summary of investment appraisal results are as follows:

	Option I	Option II
Net present value (Rs. in million)	82	107.41 (W1)
Payback period (years)	3.10	3.83 (W2)
Internal rate of return	10.50%	15.11% (W3)
Modified internal rate of return	13.20%	14.30% (W4)

On financial ground, the project to be accepted should be the one with the higher NPV, i.e. Option 2. NPV shows the absolute amount by which the project is forecast to increase shareholders' wealth and is theoretically more sound than the IRR and MIRR. However, In this case, both IRR and MIRR back up the NPV.

The discounted payback period shows that Option II is more risky as it takes longer to recover the present value.

#### WORKINGS

W1: Net present value	Year 0	Year 1	Year 2	Year 3	Year 4
	Rs. in million				
Outside Pak nominal cash flows (W1.1)	(2,252.25)	244.23	308.25	348.35	357.65
Pak nominal cash flows (10% inflation)	-	366.30	423.50	551.03	658.85
Total nominal cash flows	(2,252.25)	610.53	731.75	899.38	1,016.50
Discount factor at 13%	1.000	0.885	0.783	0.693	0.613
Present value	(2,252.25)	540.32	572.96	623.27	623.11
Net present value	<b>107.41</b>				

**W1.1: US\$ nominal cash flows in Rupees**

		Year 0	Year 1	Year 2	Year 3	Year 4
Exchange rate forecast (PY × 1.03 ÷ 1.10)	A	0.0111	0.0104	0.0097	0.0091	0.0085
in million						
US\$ net cash flows at current prices		(25.00)	2.47	2.82	2.90	2.70
US \$ net nominal cash flows (3% inflation)	B	(25.00)	2.54	2.99	3.17	3.04
US\$ nominal cash flows (Rs.)	B ÷ A	(2,252.25)	244.23	308.25	348.35	357.65

**W2 : Discounted payback period**

	Year 0	Year 1	Year 2	Year 3	Year 4
Present value of cash flow (Rs. in m)	(2,252.25)	540.32	572.96	623.27	623.11
Cumulative discounted cash flows	(2,252.25)	(1,711.93)	(1,138.97)	( 515.70)	107.41

Discounted payback period

$$= \text{Year before full recovery(3)} + \frac{\text{Unrecovered cost at start of the year (515.70)}}{\text{Cash flows during the year (623.11)}}$$

Discounted payback period = 3.83 years

**W4 : Internal rate of return**

	Year 0	Year 1	Year 2	Year 3	Year 4
in million					
Nominal cash flows in million Rs.	(2,252.25)	610.53	731.75	899.38	1,016.50
Discount factor at 16%	1.000	0.862	0.743	0.641	0.552
Present value	(2,252.25)	526.28	543.69	576.50	561.11
Net present value	(44.67)				

By Interpolation, the IRR is : 15.11% per annum

**W3 : Modified Internal rate of return**

$$\text{MIRR} = \left( \frac{\text{PV}_r}{\text{PV}_i} \right)^{1/n} (1 - r_e) - 1$$

where,

PV<sub>r</sub> (return phase) (Years 1 - 4) 2,359.66PV<sub>i</sub> (investment phase) (Year 0) 2,252.25r<sub>e</sub> 13%

MIRR = 14.3%

## CHAPTER 4 – DCF: TAXATION AND INFLATION

### 4.1 MORE INVESTMENT APPRAISAL AND TAX

#### Tax allowances on the investment

Year of claim		Rs.	Tax saving (35% of allowance) Rs.	Cash flow year
0	Cost	600,000		
	Allowance (25%)	(150,000)	52,500	1
1		450,000		
	Allowance (25%)	(112,500)	39,375	2
2		337,500		
	Allowance (25%)	(84,375)	29,531	3
3		253,125		
	Allowance (25%)	(63,281)	22,148	4
4		189,844		
	Allowance (25%)	(47,461)	16,611	5
5		142,383		
	Disposal	0		
		142,383	49,834	6

Note: It is assumed that the company has taxable profits against which it can claim an allowance in Year 0 (or early in Year 1).

Year	0	1	2	3	4	5	6
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Sales		250	250	300	350	400	
Materials		(50)	(55)	(58)	(64)	(70)	
Labour		(25)	(25)	(30)	(30)	(35)	
Cash profits		175	170	212	256	295	
Tax at 35%			(61)	(60)	(74)	(90)	(103)
Capital equipment	(600)						
Cash effect of allowances		53	39	30	22	17	50
Net cash flow	(600)	228	148	182	204	222	(53)
DCF factor at 15%	1.000	0.870	0.756	0.658	0.572	0.497	0.432
PV of cash flow	(600)	198	112	120	117	110	(23)
NPV	34						

The project is just worthwhile, because the NPV is + Rs. 34,000. However, the NPV is quite small in relation to the size of the capital investment, and in view of the fact that it is a five-year project.

It might be appropriate to carry out some risk and uncertainty analysis on the project, before deciding whether or not to undertake it.

## 4.2 INVESTMENT APPRAISAL AND TAX

### Workings

Tax allowances on the investment

Year of claim		Rs.	Tax saving (35% of allowance) Rs.	Cash flow year
0	Cost	250,000		
	Allowance (25%)	(62,500)	21,875	1
1	Allowance (25%)	187,500 (46,875)	16,406	2
2	Allowance (25%)	140,625 (35,156)	12,305	3
3	Allowance (25%)	105,469 (26,367)	9,228	4
4	Disposal	79,102 100,000		
		(20,898)	(7,314)	5

NPV calculation

Year	0	1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Capital equipment	(250,000)				100,000	
Working capital	(38,000)	(12,000)			50,000	
Cash profits before tax		120,000	120,000	120,000	120,000	
Tax on profits (35%)			(42,000)	(42,000)	(42,000)	(42,000)
Cash effect of allowances		21,875	16,406	12,305	9,228	(7,314)
Net cash flow	(288,000)	129,875	94,406	90,305	237,228	(49,314)
DCF factor at 10%	1.000	0.909	0.826	0.751	0.683	0.621
PV of cash flow	(288,000)	118,056	77,979	67,819	162,027	(30,624)
NPV	+ 107,257					

The NPV is + Rs. 107,257. This indicates that the project should be undertaken.

### 4.3 ALAWADA LIMITED

(a) Calculation of net present value (NPV)

Year	CF	DF @ 10%	PV
	Rs.		Rs.
1	800,000	0.9091	727,280
2	640,000	0.8264	528,896
3	466,000	0.7513	350,106
4	836,700	0.6830	571,466
5	630,675	0.6209	391,586
			<u>2,569,334</u>
Less: Initial outlay			<u>(3,000,000)</u>
Net present value			<u>(430,666)</u>

The project is not viable since the NPV shows a negative figure of Rs. 430,666.

#### Workings

Year	1	2	3	4	5
Sales (Rs.)	2,800,000	2,800,000	2,800,000	3,360,000	3,360,000
Less:					
Materials	(800,000)	(840,000)	(882,000)	(926,100)	(927,405)
Labour	(1,200,000)	(1,320,000)	(1,452,000)	(1,597,200)	(1,756,920)
Net MCF	<u>800,000</u>	<u>640,000</u>	<u>466,000</u>	<u>836,700</u>	<u>630,675</u>

(b) Features of capital budgeting decisions include the following:

- (i) They involve large outlay.
  - (ii) The benefits will accrue over a long period of time, usually well over one year and often much longer, so that the benefits cannot all be set off against costs in the current year's Statement of profit or loss.
  - (iii) They are very risky.
  - (iv) They involve irreversible decision.
- (c)
- (i) The continued existence of any company is not predicated on its investment on short-term basis but rather on its long-term investment strategies.
  - (ii) Investment decisions facilitate the identification of viable projects in order to maximise the wealth of the shareholders.
  - (iii) Companies need to undertake long-term investments which are the pre-requisite to the concept of "on-going concern" basis.
  - (iv) Capital budgeting ensures that the management team does not mortgage the future of the company for their personal individual financial gains through short-term investments.
  - (v) It assists the streamlining of the projects being executed by the organisation.

## 4.4 KOHAT LIMITED

	Inflation factor	Years					
		0	1	2	3	4	5
		Rs. in million					
Investment		(15,000)					
Revenue (Rs. 8,000×1 million)	5%		8,000	8,400	8,820	9,261	9,724
Operating costs(excluding wages) <b>(W1)</b>	10.34%		(2,000)	(2,207)	(2,435)	(2,686)	(2,965)
Wages <b>(W2)</b>	11.73%		(1,000)	(1,117)	(1,248)	(1,395)	(1,558)
Profit before taxation			5,000	5,076	5,137	5,180	5,201
Residual value (Rs. 15,000×20%)							3,000
Tax @ 30 % <b>(W3)</b>			(600)	(803)	(965)	(1,093)	(617)
Net inflows		(15,000)	4,400	4,273	4,172	4,087	7,584
Discount factor <b>(W4)</b>		1	0.850	0.722	0.614	0.522	0.444
		(15,000)	3,740	3,085	2,562	2,125	3,367
Net present value		(121)					

**Conclusion:** The projective has a negative NPV. KL should not invest in the project.

### W1: Compound annual growth rate for CPI

$$\text{CAGR for CPI} = \frac{175}{107} = (1+i)^5$$

$$(1.6355)^{1/5} = 1 + i$$

$$1 + i = 1.1034$$

$$i = 10.34\%$$

### W2: Compound annual growth rate for PPI

$$\text{CAGR for SPI} = \frac{195}{112} = (1+i)^5$$

$$(1.7411)^{1/5} = 1 + i$$

$$1 + i = 1.1173$$

$$i = 11.73\%$$



**W3: Tax Computation:**

	YEARS				
	1	2	3	4	5
Profit before taxation	5,000	5,076	5,137	5,180	5,201
Depreciation	(3000)	(2400)	(1920)	(1536)	(1229)
Loss on disposal					(1,915)
Taxable profit/loss	2,000	2,676	3,217	3,644	2,057
Tax@ 30%	600	803	965	1,093	617

**W4: Nominal return**

Discount Rate = Required return nominal

$1 + \text{nominal return} = (1 + \text{real return}) \times (1 + \text{inflation}) = 106\% \times 111\% = 117.7\%$

Therefore, the nominal return = 17.7%

**4.5 JAP RECREATION CLUB**

	2016	2017	2018 Rupees	2019	2020
Initial investment	(7,000,000)				
Residual value					510,000
<sup>1</sup> Restaurant contribution		5,040,000	5,544,000	6,098,400	6,708,240
Lost contribution from snack bar (W4)		(2,025,000)	(1,991,250)	(1,942,313)	(1,876,079)
Salaries		(800,000)	(800,000)	(1,000,000)	(1,000,000)
Additional overheads		(595,000)	(595,000)	(595,000)	(595,000)
Net cash flows	(7,000,000)	1,620,000	2,157,750	2,561,087	3,747,161
Tax payment (W1)	-	45,500	(295,838)	(551,849)	(456,413)
Net cash flow after tax	(7,000,000)	1,665,500	1,861,912	2,009,238	3,290,748
Discount factor (W3)	1	0.940	0.884	0.831	0.781
Present value	(7,000,000)	1,565,570	1,645,930	1,669,677	2,570,074
<b>Net present value</b>					<b>451,251</b>

**Conclusion:**

The company should invest in the project as it would generate higher net cash flows as compare to existing business.

**W1: Tax payments**

	2017	2018	2019	2020
	<b>Rupees</b>			
Net cash flows	1,620,000	2,157,750	2,561,087	3,747,161
Less: Depreciation for the year (W2)	(1,750,000)	(1,312,500)	(984,375)	(2,443,125)
Taxable profit	4,595,000	5,806,500	6,786,025	6,773,815
<b>Tax payments (Taxable profit x 35%)</b>	<b>(45,500)</b>	<b>295,838</b>	<b>551,849</b>	<b>456,413</b>

**W2 : Depreciation for the year**

Opening WDV of equipment	7,000,000	5,250,000	3,937,500	2,953,125
<b>Less: Depreciation for the year (WDV x 25%)</b>	<b>(1,750,000)</b>	<b>(1,312,500)</b>	<b>(984,375)</b>	<b>*(2,443,125)</b>
Closing WDV of equipment	5,250,000	3,937,500	2,953,125	510,000

**\* Loss on disposal****W3: Adjustment of inflation in cost of capital**

$$\begin{aligned}\text{Real discount rate} &= ((1+\text{nominal discount rate})/(1+\text{inflation rate}))-1 \\ &= 6.36\%\end{aligned}$$

**W4: Lost snack bar contribution**

Years	0	1	2	3	4
No. of members without restaurant	250	263	276	289	304
No. of members with restaurant		150	165	181.5	199.65
Lost members/day		113	111	108	104
Rate (×)		50	50	50	50
No. of days (×)		360	360	360	360
		2,025,000	1,991,250	1,942,313	1,876,078

## 4.6 ARG COMPANY

(a) NPV calculation for Alpha and Beta

Year	1	2	3	4
	\$	\$	\$	\$
Sales revenue	3,585,000	6,769,675	6,339,000	1,958,775
Material cost	(1,395,000)	(2,634,225)	(2,466,750)	(761,925)
Fixed costs	(1,000,000)	(1,050,000)	(1,102,500)	(1,157,625)
Advertising	(500,000)	(200,000)	(200,000)	-
Taxable profit	690,000	2,885,450	2,569,750	39,225
Tax (25%)	(172,500)	(721,362)	(642,438)	(9,806)
Capital allowance tax benefit	250,000			
Non-current asset sale				1,200,000
Recovery of working capital				1,000,000
	767,500	2,164,088	1,927,312	2,229,419
Discount factors	0.885	0.783	0.693	0.613
Present values	679,237	1,694,481	1,335,626	1,366,634
		\$		
Sum of present values		5,075,978		
Initial investment		3,000,000		
Net present value		2,075,978		

The positive NPV indicates that the investment is financially acceptable.

### Workings

Year	1	2	3	4
<b>Alpha sales revenue</b>				
Selling price (\$/unit)	31.00	31.93	32.89	33.88
Sales (units per year)	60,000	110,000	100,000	30,000
Sales revenue (\$/year)	1,860,000	3,512,300	3,289,000	1,016,400
<b>Beta sales revenue</b>				
Selling price (\$/unit)	23.00	23.69	24.40	25.13
Sales (units per year)	75,000	137,500	125,000	37,500
Sales revenue (\$/year)	1,725,000	3,257,375	3,050,000	942,375
<b>Total sales revenue</b>	<b>3,585,000</b>	<b>6,769,675</b>	<b>6,339,000</b>	<b>1,958,775</b>

Year	1	2	3	4
<b>Alpha materials cost</b>				
Unit cost (\$/unit)	12.00	12.36	12.73	13.11
Sales (units per year)	60,000	110,000	100,000	30,000
<b>Total cost (\$/year)</b>	<b>720,000</b>	<b>1,359,600</b>	<b>1,273,000</b>	<b>393,300</b>
<b>Beta materials cost</b>				
Unit cost (\$/unit)	9.00	9.27	9.55	9.83
Sales (units per year)	75,000	137,500	125,000	37,500
<b>Total cost (\$/year)</b>	<b>675,000</b>	<b>1,274,625</b>	<b>1,193,750</b>	<b>368,625</b>
<b>Total materials cost</b>	<b>1,395,000</b>	<b>2,634,225</b>	<b>2,466,750</b>	<b>761,925</b>

- (b) The evaluation assumes that several key variables will remain constant, such as the discount rate, inflation rates and the taxation rate. In practice this is unlikely.
- (1) The taxation rate is a matter of government policy and so may change due to political or economic necessity.
  - (2) Specific inflation rates are difficult to predict for more than a short distance into the future and in practice are found to be constantly changing. The range of inflation rates used in the evaluation is questionable, since over time one would expect the rates to converge. Given the uncertainty of future inflation rates, using a single average inflation rate might well be preferable to using specific inflation rates.
  - (3) The discount rate is likely to change as the company's capital structure changes. For example, issuing debentures with an interest rate of 9% is likely to decrease the average cost of capital.

Looking at the incremental fixed production costs, it seems unusual that nominal fixed production costs continue to increase even when sales are falling. It also seems unusual that incremental fixed production costs remain constant in real terms when production volumes are changing. It is possible that some of these fixed production costs are stepped, in which case they should decrease.

The forecasts of sales volume seem to be too precise, predicting as they do the growth, maturity and decline phases of the product life-cycle. In practice it is likely that improvements or redesign could extend the life of the two products beyond five years. The assumption of constant product mix seems unrealistic, as the products are substitutes and it is possible that one will be relatively more successful. The sales price has been raised in line with inflation, but a lower sales price could be used in the decline stage to encourage sales.

Net working capital is to remain constant in nominal terms. In practice, the level of working capital will depend on the working capital policies of the company, the value of goods, the credit offered to customers, the credit taken from suppliers and so on. It is unlikely that the constant real value will be maintained.

The net present value is heavily dependent on the terminal value derived from the sale of non-current assets after five years. It is unlikely that this value will be achieved in practice. It is also possible that the machinery can be used to produce other products, rather than be used solely to produce Alpha and Beta.

- (c) ARG Co currently has \$50m of non-current assets and long-term debt of \$10m. The issue of \$3m of 9% debentures, and investment in property and equipment of \$2m will increase non-current assets by \$2m. There seems to be ample security for the new issue.

Interest cover is currently 5.1 times ( $= 4,560/900$ ) which is less than the sector average, and this will fall to 3.9 times ( $= 4,560/(900 + 3m \times 9\%)$ ) following the debenture issue.

The new products will increase profit by \$440,000 ( $\$690,000 - \$250,000$  depreciation), increasing interest cover to 4.3 times ( $= 5,000/1,170$ ). Although on the low side and less than the sector average, this evaluation ignores any increase in profits from current activities. Interest cover may not be a cause for concern.

Current gearing of 32% (measured as debt/equity based on book values,  $= 10,000/30,900$ ) will rise to 42% ( $13,000/30,900$ ) after the debenture issue. Both values are less than the sector average and ignore any increase in reserves due to next year's profits.

Financial risk appears to be at an acceptable level and gearing does not appear to be a problem.

The debentures are convertible after eight years into 20 ordinary shares per \$100 of debentures. The current share price is \$4.00, giving a conversion value of \$80. For conversion to be likely, a minimum average annual growth rate of only 2.83% is needed ( $((5.00/4.00)^{0.125} - 1)$ ). This growth rate could well be exceeded, making conversion after eight years a likely prospect. This analysis assumes that the floor value on the conversion date is the par value of \$100: the actual floor value could well be different in eight years' time, depending on the prevailing cost of debt. Conversion of the debentures into ordinary shares will eliminate the need to redeem them, as well as reducing the company's gearing.

The current share price may be depressed by the ongoing recovery from the loss-making magazine publication venture. Annual share price growth may therefore be substantially in excess of 2.83%, making the conversion terms too generous (assuming a floor value equal to par value on the conversion date). On conversion, 600,000 new shares will be issued, representing 23% ( $= 0.6m/2.6m$ ) of share capital. The company must seek the views and approval of existing shareholders regarding this potential dilution of ownership and control.

The maturity of the debentures (12 years) does not match the product life-cycle (four years). This may be caution on the part of the company's managers, but a shorter period could be used.

It has been proposed that \$1 million of the debenture issue would be used to finance the working capital needs of the project. Financing all working capital from a long-term source is a very conservative approach to working capital financing. ARG Co might consider financing fluctuating current assets from a short-term source such as an overdraft. By linking the maturity of the finance to the maturity of the assets being financed, ARG Co would be applying the matching principle.

## 4.7 HAFEEZ LTD

### (a) Bid amount of annual fee

	Rupees
NPV of costs (W1)	50,074,626
Target NPV (Rs. 50 million x 15%)	7,500,000
NPV of fees	<u>57,574,626</u>
Annual Fees	$= \frac{\text{NPV of fees (W1)}}{\text{Cum disc factor}}$
	$= \frac{57,574,626}{3.433} = 16,770,937$

#### W1: NPV of Costs

Year	Capital Cost	Operating Costs	Tax Allowance on		Total Cash Outflows	Discount Factor (14%)	PV of Costs
			Depreciation and Disposal (W2)	Operating Costs			
	Rupees						(Rupees)
0	(50,000,000)				(50,000,000)	1.000	(50,000,000)
1		(6,000,000)	5,687,500	2,100,000	1,787,500	0.877	1,567,638
2		(6,600,000)	1,181,250	2,310,000	(3,108,750)	0.769	(2,390,629)
3		(7,260,000)	1,063,125	2,541,000	(3,655,875)	0.675	(2,467,716)
4		(7,986,000)	956,813	2,795,100	(4,234,087)	0.592	(2,506,580)
5	12,500,000	(8,784,600)	4,236,312	3,074,610	11,026,322	0.519	5,722,661
(50,074,626)							

#### W2: Tax Allowance

Year	WDV	Depreciation		Tax Allowance @35%	Tax Allowance on Disposal	Total Allowance
		Initial	Normal			
	Rupees					
1	50,000,000	12,500,000	3,750,000	5,687,500	-	5,687,500
2	33,750,000		3,375,000	1,181,250	-	1,181,250
3	30,375,000		3,037,500	1,063,125	-	1,063,125
4	27,337,500		2,733,750	956,813	-	956,813
5	24,603,750		2,460,375	861,131	3,375,181	4,236,312
(W3)						

**W3: Tax Allowance on Disposal**

	<b>Rupees</b>
Disposal value (Rs. 50,000,000 x 25%)	12,500,000
WDV	22,143,375
Loss on disposal	<u>(9,643,375)</u>
Tax allowance @ 35%	<u>(3,375,181)</u>

**(b) IRR of the Contract**

$$\text{IRR} = a + [(A/A-B) (b-a)]\%$$

$$a = 14\%$$

$$b = 20\%$$

$$A = 7,500,000$$

$$B = (426,261) \quad \textbf{(W5)}$$

$$\begin{aligned} \text{IRR} &= 14\% + [7,500,000 / [(7,500,000 + 426,261) (20\% - 14\%)]] \% \\ &= 19.7\% \end{aligned}$$

**W5**

Inflows/ (Outflows) excluding fee	Inflows from fee Rupees	Net Cash Flows Rupees	Disc Factor 20%	NPV Rupees
(50,000,000)		(50,000,000)	1.00	(50,000,000)
1,787,500	16,770,937	18,558,437	0.83	15,403,503
(3,108,750)	16,770,937	13,662,187	0.69	9,426,909
(3,655,875)	16,770,937	13,115,062	0.58	7,606,736
(4,234,087)	16,770,937	12,536,850	0.48	6,017,688
11,026,322	16,770,937	27,797,259	0.40	11,118,903
				<u>(426,261)</u>

## CHAPTER 5 – DCF: RISK AND UNCERTAINTY

### 5.1 RISK IN INVESTMENT APPRAISAL

(a) and (b)

#### Machine A

		2,000 demand	3,000 demand	5,000 demand
Year		Rs.	Rs.	Rs.
0		(15,000)	(15,000)	(15,000)
1	(Rs. 4 - Rs. 1)/unit	6,000	9,000	15,000
2		6,000	9,000	15,000
3		6,000	9,000	15,000
Discounted cash flows	Discount factor at 6%	PV	PV	PV
		Rs.	Rs.	Rs.
Year 0	1.000	(15,000)	(15,000)	(15,000)
1	0.943	5,658	8,487	14,145
2	0.890	5,340	8,010	13,350
3	0.840	5,040	7,560	12,600
NPV		1,038	9,057	25,095

**Expected value of NPV** =  $(0.2 \times 1,038) + (0.6 \times 9,057) + (0.2 \times 25,095) = \text{Rs. } 10,661$

#### Machine B

		2,000 demand	3,000 demand	5,000 demand
Year		Rs.	Rs.	Rs.
0		(20,000)	(20,000)	(20,000)
1	(Rs. 4 - Rs.0.5)/unit	7,000	10,500	17,500
2		7,000	10,500	17,500
3		7,000	10,500	17,500
Discounted cash flows	Discount factor at 6%	PV	PV	PV
		Rs.	Rs.	Rs.
Year 0	1.000	(20,000)	(20,000)	(20,000)
1	0.943	6,601	9,902	16,503
2	0.890	6,230	9,345	15,575
3	0.840	5,880	8,820	14,700
NPV		(1,289)	8,067	26,778



**Expected value of NPV** =  $(0.2 \times (1,289)) + (0.6 \times 8,067) + (0.2 \times 26,778) = \text{Rs. } 9,938$

Note: A quicker way of calculating expected values is to:

- ☐ calculate the EV of annual sales (which is 3,200 units)
- ☐ calculate the cash flows and NPV for annual sales of 3,200 units.

However, this approach makes it more difficult to carry out risk and uncertainty analysis.

On the basis of the figures, it would seem that Machine A should be purchased.

- ☐ It has a higher expected value of NPV.
- ☐ It is also a lower risk option, because the NPV will be positive even when sales are only 2,000 units each year. With machine B, the NPV would be negative if the annual sales are just 2,000 units.
- ☐ Machine A also gives a higher NPV if sales are 3,000 units, which is the most likely outcome.

(c) Sensitivity analysis on the Machine A investment.

- (i) The NPV is + Rs. 1,038 even when sales are 2,00 units each year. The probability of a negative NPV is 0%. (With machine B, the risk of a negative NPV is 20%).
- (ii) The project will achieve a 6% return if the NPV of annual cash profits is Rs. 15,000.

Discount factor at 6% for years 1 – 3 = 2.673

Annual cash profits to achieve a PV of Rs. 15,000 =  $\text{Rs. } 15,000 / 2.673 = \text{Rs. } 5,612$ .

The contribution per unit is Rs. 3.

Therefore minimum annual sales to achieve an NPV of Rs.0 =  $\text{Rs. } 5,612 / \text{Rs. } 3 \text{ per unit}$

= 1,871 units.

If annual sales exceed 1,871 units, the NPV with Machine A will be positive at a discount rate of 6%.

## 5.2 CALM PLC

Calculation of expected sales of the device is based on the probabilities determined by the analysis of previous experience as given in the question.

Expected sales are obtained as follows:

$$\begin{aligned} \text{Year 1} &= \text{Rs.}(240,000,000 \times 0.25) + (140,000,000 \times 0.60) + (50,000,000 \times 0.15) \\ &= \underline{\underline{\text{Rs. } 151,500,000}} \end{aligned}$$

$$\begin{aligned} \text{Year 2} &= \text{Rs.}(500,000,000 \times 0.25) + (340,000,000 \times 0.60) + (180,000,000 \times 0.15) \\ &= \text{Rs. } 125 \text{ million} + \text{Rs. } 204 \text{ million} + \text{Rs. } 27 \text{ million} \\ &= \underline{\underline{\text{Rs. } 356,000,000}} \end{aligned}$$

$$\begin{aligned}
 \text{Year 3} &= \text{Rs.}(160,000,000 \times 0.25) + (80,000,000 \times 0.60) + (50,000,000 \times 0.15) \\
 &\quad \text{Rs. 40 million} + \text{Rs. 48 million} + \text{Rs. 7.5 million} \\
 &= \underline{\text{Rs. 95,500,000}}
 \end{aligned}$$

### Expected value of rent forgone:

If the factory space is let at the beginning of year 2, rent of Rs. 16,000,000 each will be received in year 1 and Year 2 (rent is payable in advance). This has a probability of 0.6.

If it is not let in year 2 (probability of 0.4); it could be let at the beginning of year 3 (with a probability of 0.5). This will produce cashflow of Rs. 16 million in year 2. This event has a joint probability of  $(0.4 \times 0.5) = 0.2$ .

### Summary

		Probability	Year 1	Year 2	Year 3
		Rs.'m	Rs.'m	Rs.'m	Rs.'m
0.6	=	0.60	16	16	-
0.4 x 0.5	=	0.20	-	16	-
0.4 x 0.5	=	0.20	-	-	-
		<u>1.00</u>	<u>9.6</u>	<u>12.8</u>	<u>Nil</u>

Year	0	1	2	3	4
	Rs.'m	Rs.'m	Rs.'m	Rs.'m	Rs.'m
Initial Outlay	(190)	-	-	-	-
Advertisement	(30)	(20)	(10)	-	-
Fixed cost less depreciation	-	(10)	(10)	(10)	-
Scrap value	-	-	-	-	10
Rent Forgone		(9.6)	(12.8)	-	-
Contribution (70% of sales)		106.05	249.2	66.85	
Net Cash flow	(220)	66.45	216.4	56.85	10
DCF (20%)	1.00	0.83	0.69	0.58	0.48
PV	(220)	55.154	149.316	32.973	4.8

$$\begin{aligned}
 \text{ENPV} &= \text{Rs. 242,243,000} - \text{Rs. 220,000,000} \\
 &= \underline{\text{Rs. 22,243,000}}
 \end{aligned}$$

**DECISION:** Since the Expected Net Present Value is positive, the new product should be produced all things being equal.

### 5.3 OUTLOOK PLC

(a) Calculation of NPV

Year	Items	NCF (Rs.)	DF@ 15%	PV (Rs.)
0	Initial Outlay	(350,000)	1.0000	(350,000)
1 - 10	Relevant Fixed Cost	(25,000)	5.0188	(125,470)
1 - 10	Variable Cost	(300,000)	5.0188	(1,505,640)
1 - 10	Sales	400,000	5.0188	2,007,520
	<b>NPV</b>			<b>26,410</b>

**NOTE:**  $DF@ 15\% = (1 - (1 + r)^{-n}/r) = (1 - (1.15)^{-10}/0.15) = 5.0188$

$$\begin{aligned}
 \text{Contribution} &= \text{Sales} - \text{Variable Cost} \\
 &= \text{Rs. } 400,000 - \text{Rs. } 300,000 \\
 &= \text{Rs. } 100,000
 \end{aligned}$$

$$\begin{aligned}
 \text{PV of contribution is Rs. } 100,000 \times 5.0188 \\
 &= \text{Rs. } 501,880
 \end{aligned}$$

Sensitivity Analysis:

$$(i) \quad \text{Sales Price} = \frac{\text{NPV}}{\text{PV of Sales}} \times \frac{100}{1} = \frac{26,410}{2,007,520} \times \frac{100}{1} = 1.32\%$$

$$(ii) \quad \text{Initial Outlay} = \frac{\text{NPV}}{\text{PV of Outlay}} \times \frac{100}{1} = \frac{26,410}{350,000} \times \frac{100}{1} = 7.55\%$$

$$(iii) \quad \text{Sales Volume} = \frac{\text{NPV}}{\text{PV of Contribution}} \times \frac{100}{1} = \frac{26,410}{501,880} \times \frac{100}{1} = 5.26\%$$

$$(iv) \quad \text{Variable Cost} = \frac{\text{NPV}}{\text{PV of Variable Cost}} \times \frac{100}{1} = \frac{26,410}{1,505,640} \times \frac{100}{1} = 1.75\%$$

$$(v) \quad \text{Fixed Cost} = \frac{\text{NPV}}{\text{PV of FC}} \times \frac{100}{1} = \frac{26,410}{125,470} \times \frac{100}{1} = 21.05\%$$

(b) The two most sensitive variables are:

- (i) Sales price at 1.32%
- (ii) Variable Cost - 1.75%

These are derived from the sensitivity analysis workings above as these are the two least NPVs in terms of sensitivity.

The sales price must not fall by more than 1.32% and the variable cost must not increase by more than 1.75%.

## 5.4 ZAHEER LTD

### (a) Financial feasibility of the proposal

	Rupees
Capital cost	(20,000,000)
Present value of tax allowable depreciation (Rs. 1,200,000 (W1) × 3.352)	4,022,400
PV of net incremental profit for five years (7,000,000 (W1) × 3.352 (W2))	23,464,000
Net Present Value	<b>7,486,400</b>

#### Conclusion:

The proposal is financially feasible for the company as it has a positive net present value.

#### W1: Tax allowable depreciation

Annual allowance (Rs. 20,000,000 / 5 years)	4,000,000
Tax rate	30%
Tax saving (per annum)	<b>1,200,000</b>

#### W2: Profit for the year

	Rupees
Profit per unit (1,900 – 800 – 500 – 150 – 200)	250
No. of units	×40,000
Net Profit before tax (40,000 × 250)	10,000,000
Less: Taxation @ 30%	(3,000,000)
Net profit after tax	<b>7,000,000</b>

#### W3: Cumulative discount factor (15%)

$$= (1 - (1 + r)^{-n}/r) = (1 - (1.15)^{-5}/0.15) = 5.0188 \quad \text{3.352}$$

### (b) Sensitivity analysis

	Material costs	Labour costs
Cost per unit	800	500
Number of units	×40,000	×40,000
Total cost	32,000,000	20,000,000
Tax relief (30%)	(9,600,000)	(6,000,000)
Post-tax cost	22,400,000	14,000,000
Cumulative discount factor (5 years at 15%)	3.352	3.352
Present value	75,084,800	46,928,000

#### Sensitivity

NPV of project	7,486,400	7,486,400
PV of costs (see above)	÷75,084,800	÷46,928,000
	0.0997	0.1595
	9.97%	15.95%

	<b>Set-up cost</b>
Cost	20,000,000
PV of tax saving	(4,022,400)
Present value	<u>15,977,600</u>

**Sensitivity**

NPV of project	7,486,400
PV of costs (see above)	<u>÷15,977,600</u>
	<u>0.4685</u>
	<u>46.85%</u>

**Conclusion:**

The outcome of the order is most sensitive to material costs.

**5.5****JKL PHONE LIMITED**

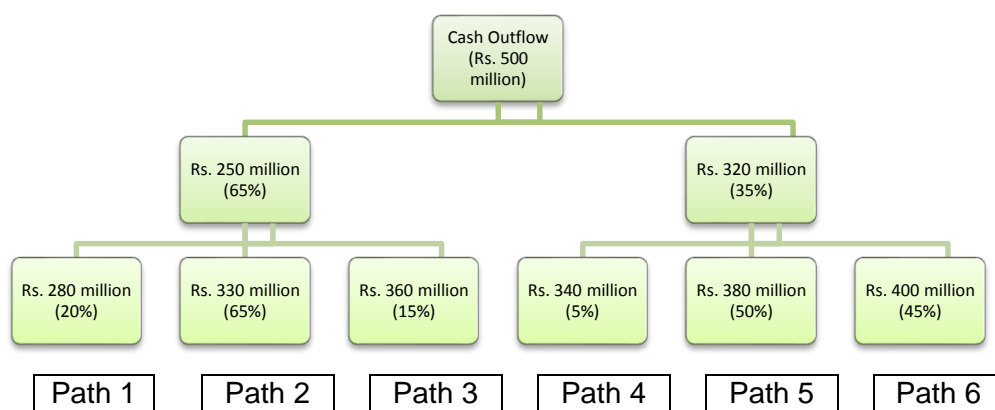
Selling Price	No. of subscribers in million	Probability	Airtime minutes	Probability	Expected incremental revenue	Cost of cell sites	Expected incremental Costs	Expected incremental earnings
Rupees in million								
A	B	C	D	E	AxBxCxDxE	H	HxCxE	ETR - ECOS
0.75	0.7	0.3	1,600	0.6	151	300	54	97
	0.7	0.3	1,800	0.4	113	300	36	77
	0.8	0.5	1,600	0.6	288	300	90	198
	0.8	0.5	1,800	0.4	216	300	60	156
	0.9	0.2	1,600	0.6	130	540	65	65
	0.9	0.2	1,800	0.4	97	540	43	54
					995		348	647
1.00	0.5	0.3	1,600	0.6	144	180	32	112
	0.5	0.3	1,800	0.4	108	180	22	86
	0.6	0.5	1,600	0.6	288	300	90	198
	0.6	0.5	1,800	0.4	216	300	60	156
	0.8	0.2	1,600	0.6	154	300	36	118
	0.8	0.2	1,800	0.4	115	300	24	91
					1,025		264	761
1.25	0.3	0.3	1,600	0.6	108	180	32	76
	0.3	0.3	1,800	0.4	81	180	22	59
	0.4	0.5	1,600	0.6	240	180	54	186
	0.4	0.5	1,800	0.4	180	180	36	144
	0.6	0.2	1,600	0.6	144	300	36	108
	0.6	0.2	1,800	0.4	108	300	24	84
					861		204	657

**Conclusion:**

Tariff of Re. 1 is most suitable because it gives the highest value of pay-off.

## 5.6 KHAYYAM LIMITED (KL)

(a)



(b)

*All amount are in million rupees*

Path	PV of NCIAT of Year 1			PV of NCIAT of Year 2			PV of total inflow	Cash outflow	NPV	Joint Probability	Expected NPV
	Amount	Discount factor	PV	Amount	Discount factor	PV					
1	250	0.8772	219.30	*330	0.7695	253.94	473.24	500	(26.76)	0.1300	(3.48)
2	250	0.8772	219.30	*380	0.7695	292.41	511.71	500	11.71	0.4225	4.95
3	250	0.8772	219.30	*410	0.7695	315.50	534.80	500	34.80	0.0975	3.39
4	320	0.8772	280.70	*390	0.7695	300.11	580.81	500	80.81	0.0175	1.41
5	320	0.8772	280.70	*430	0.7695	330.89	611.59	500	111.59	0.1750	19.53
6	320	0.8772	280.70	*450	0.7695	346.28	626.98	500	126.98	0.1575	20.00
											<b>45.80</b>

*\*including salvage value of Rs. 50 million*

**Comment:** Since the expected net present value of project is positive, it is suggested to accept investment proposal.

## CHAPTER 6 – DCF: SPECIFIC APPLICATIONS

### 6.1 LEASE OR BUY

(a) Evaluate the investment decision

Year of claim		Tax saving (30% of allowance)		Cash flow year
		Rs.	Rs.	
1	Cost	30,000		
	Allowance (25%)	(7,500)	2,250	2
2		22,500		
	Allowance (25%)	(5,625)	1,688	3
3		16,875		
	Allowance (25%)	(4,219)	1,266	4
4		12,656		
	Allowance (25%)	(3,164)	949	5
5		9,492		
	Disposal	6,000		
	Balance	(3,492)	1,048	6

Year	Cash flows						
	0	1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Equipment	(30,000)					6,000	
Tax relief			2,250	1,688	1,266	949	1,048
Project cash flows		10,000	10,000	10,000	10,000	10,000	
Tax on these at 30%			(3,000)	(3,000)	(3,000)	(3,000)	(3,000)
Net cash flow	(30,000)	10,000	9,250	8,688	8,266	13,949	(1,952)
DCF factor at 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Present value	(30,000)	9,090	7,641	6,525	5,646	8,662	(1,101)

**NPV** = + Rs. 6,463

The acquisition is worthwhile.

**(b) Evaluate the financing decision:**

Now consider how it should be financed. The project cash flows and tax on these are now irrelevant to this decision. Only the financing cash flows need to be considered.

The cost of financing is the after-tax cost of borrowing, which is 8%.

<b>Leasing</b>		<b>Cash flows</b>				
<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Lease payments	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)	
Tax relief		2,100	2,100	2,100	2,100	2,100
Net cash flow	(7,000)	(4,900)	(4,900)	(4,900)	(4,900)	2,100
DCF factor at 8%	0.926	0.857	0.794	0.735	0.681	0.630
Present value	(6,482)	(4,199)	(3,891)	(3,602)	(3,337)	1,323

**PV of the cost of leasing = Rs. 20,188**

<b>Purchase</b>		<b>Cash flows</b>					
<b>Year</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Equipment	(30,000)					6,000	
Tax relief			2,250	1,688	1,266	949	1,048
Net cash flow	(30,000)	0	2,250	1,688	1,266	6,949	1,048
DCF factor at 8%	1.000		0.857	0.794	0.735	0.681	0.630
Present value	(30,000)		1,928	1,340	931	4,732	660

**PV of the cost of purchasing = Rs. 20,409**

**Leasing** has the lower PV of costs (although only by about Rs. 200) and is slightly cheaper.

On this basis, the company might decide to lease the asset. However, the difference in cost is so small that other non-financial factors might influence the decision.



## 6.2 MOHANI LIMITED

I would recommend to the management of the company to consider option B as this option provides NPV of cash outflow of Rs. 1,988,750 to the company which is lower by Rs. 455,798 in comparison to option A. Detailed computation is as follows:

Year	Security deposits	Salvage value	Lease payment	Tax benefits 35%	Net cash outflow	PV Factor 14%	PV
	Rupees						Rs.
0	320,000		860,000	-	1,180,000	1.000	1,180,000
1			860,000	(301,000)	559,000	0.877	490,243
2			860,000	(301,000)	559,000	0.769	429,871
3			860,000	(301,000)	559,000	0.675	377,325
4			860,000	(301,000)	559,000	0.592	330,928
5		(400,000)	-	(301,000)	(701,000)	0.519	(363,819)
							<u>2,444,548</u>

### Alternative answer

Description	Rupees	PV factor	PV Rupees
Security deposit	320,000	1	320,000
Lease payments	860,000	3.913	3,365,180
Tax benefit @35%	301,000	3.432	(1,033,032)
Salvage value	400,000	0.519	(207,600)
			<u>2,444,548</u>

$$\text{Installment Amount} = \frac{\text{Rs. } 3,200,000}{R \frac{1 - (1+i)^{-n}}{i}} = 865,825$$

Year	Loan payment	Interest @ 11%	Principal Repayment	Balance	Insurance	Depreciation		Tax Shield @ 35%	Salvage value	Outflow	PV Factor @14%	PV (Rs.)
						Initial	Normal					
Rupees												
0	-	-	-	3,200,000	96,000	-	-	-	-	96,000	1.000	96,000
1	865,825	352,000	513,825	2,686,175	96,000	1,600,000	160,000	(772,800)	-	189,025	0.877	165,775
2	865,825	295,479	570,346	2,115,829	96,000	-	144,000	(187,418)	-	774,407	0.769	595,519
3	865,825	232,741	633,084	1,482,023	96,000	-	129,600	(160,419)	-	801,406	0.675	540,949
4	865,825	163,102	702,723	780,023	96,000	-	116,640	(131,510)	-	830,315	0.592	491,547
5	865,825	85,802	780,023	0	-	-	104,976	*(291,081)	400,000	190,674	0.519	98,960

**\*This includes tax benefit / loss on disposal amounted to Rs. 190,674.  
Computation of this tax benefit is as follows:**

	Rs.
Cost of machine	3,200,000
Less: Initial and normal depreciation	2,255,216
Tax WDV	944,784
Less: Sales value	400,000
Tax loss	544,784
	<u>544,784</u>
Tax benefits @35%	<u>190,674</u>

### 6.3 DS LEASING COMPANY LIMITED

(a)

	Years					
	0	1	2	3	4	5
	Rupees in million					
Principal repayment		5.00	5.00	5.00	5.00	-
Interest (Principal outstanding x 16%)		3.20	2.40	1.60	0.80	-
Tax savings (W1)		-	(3.40)	(1.31)	(0.99)	(3.41)
Recovery of residual value (Note)		-	-	-	(2.00)	-
Net cash outflow to DS		8.20	4.00	5.29	2.81	(3.41)
Discount @ 18%	1.00	0.85	0.72	0.61	0.52	0.44
PV of net cash outflow		6.97	2.88	3.23	1.46	(1.50)
Total PV of net cash outflow						<u>13.04</u>
NPV factor of tax rental income (W2)						<u>2.236</u>
Annual rental						<u>5.83</u>

#### W1: Tax savings

	Years					
	0	1	2	3	4	5
	Rupees in million					
WDV at start of year		20.00	13.50	12.15	10.93	
Initial depreciation (25%)		5.00	-	-	-	
Normal depreciation (10%)		1.50	1.35	1.22	1.09	
Loss on disposal (Note)		-	-	-	7.84	
Total tax allowance		6.50	1.35	1.22	8.93	
WDV at end of year		13.50	12.15	10.93	2.00	

**Note: Disposal value i.e. Rs. 2 million (10% of Rs. 20 million) - WDV at the end of year 4 i.e. 9.84 = Rs. 7.84 million (Loss on disposal)**

	Years					
	0	1	2	3	4	5
	Rupees in million					
Total tax allowance as computed above		6.50	1.35	1.22	8.93	
Interest payment computed above		3.20	2.40	1.60	0.80	
		9.70	3.75	2.82	9.73	
Tax savings @ 35% in next year			3.40	1.31	0.99	3.41

**W2 : NPV factor of after tax rental income**

	Years					
	0	1	2	3	4	5
	Rupees					
Income	1.00	1.00	1.00	1.00		
Tax savings		(0.35)	(0.35)	(0.35)	(0.35)	
	1.00	0.65	0.65	0.65	(0.35)	
Discount factor @ 18%	1.000	0.850	0.720	0.610	0.520	
PV factor of income	1.000	0.553	0.468	0.397	(0.182)	
Total PV of income	2.236					

**(b) Leasing**

	Years					
	0	1	2	3	4	5
	Rupees in million					
Annual rental	7.00	7.00	7.00	7.00		
Tax savings (rental x 35%)		(2.45)	(2.45)	(2.45)	(2.45)	
	7.00	4.55	4.55	4.55	(2.45)	
Discount at 20%	1	0.833	0.694	0.578	0.482	
PV of cash flow	7.00	3.79	3.16	2.63	(1.18)	15.4
NPV of leasing option	15.40					

Purchase Outright		Y e a r s					
		0	1	2	3	4	5
Principal outstanding (Opening - Loan payment + Interest)		Rupees in million					
		20.00	16.17	11.65	6.30	0.00	
Loan payment (W1)	A		7.43	7.43	7.43	7.43	
Interest (@18% of opening principal)			3.60	2.91	2.08	1.13	
Maintenance costs	B		0.60	0.60	0.60	0.60	
Tax allowance as computed above			6.50	1.35	1.22	8.93	-
			10.70	4.86	3.90	10.66	
Tax savings (in next year)	C		-	(3.75)	(1.70)	(1.37)	(3.73)
Recovery of residual value			-	-	-	(2.00)	-
Cash outflow to BP	A + B + C	-	8.03	4.29	6.33	4.67	(3.73)
Discount at 20%		-	0.833	0.694	0.578	0.482	0.402
PV of cash outflow		-	6.69	2.97	3.66	2.25	(1.50)
NPV of purchase option		14.07					

**W1:**

$$\text{Installment amount} = \frac{\text{Rs. 20 million}}{\frac{1 - (1 + 0.18)^{-4}}{0.18}} = 7.43$$

**Conclusion:**

The feasible option is the outright purchase.

**Note:** Insurance costs are ignored in our computation as these are the same in both options.

## 6.4 HIN TEXTILE MILLS LIMITED

### Proposal of BAL Leasing Company Limited

Cash flow	Amount (Rs. in million)	Frequency	Total no. of payments (Rs. in million)	Interest rate /period (W1)	Discount factor (annuity factor)	PV (Rs. in million)
Security deposit	10.00				1.000	10
Lease rentals	7.46	Quarterly	12	4.00%	*9.385	*70
Lubricants and filters	1.00	Quarterly	12	4.00%	*9.385	*9
Parts replacement	3.00	half yearly	6	8.00%	*4.623	*14
Staff cost	0.50	monthly	36	1.33%	*28.460	*14
Overhaul	15.00	End of 2 <sup>nd</sup> year			0.731	11
Residual value	(20.00)	End of 3 <sup>rd</sup> year			0.625	(13)
<b>Total present value</b>						<b>115</b>

### Proposal of PUS Rental Services

Quarter	1	2	3	4	5	6	7	8	9	10	11	12	Total
Quarterly rental (Rs. in m)	11. 0	11. 0	11. 0	11. 0	12. 1	12. 1	12. 1	12. 1	13. 31	13. 31	13. 31	13. 31	
Discount factor (W1) 4%	0.96 2	0.9 25	0.8 89	0.8 55	0.8 22	0.7 90	0.7 60	0.7 31	0.7 03	0.6 76	0.6 50	0.6 25	
Present value (Rs. in m)	10.5 8	10. 18	9.7 8	9.4 1	9.9 5	9.5 6	9.2 0	8.8 5	9.3 6	9.0 0	8.6 5	8.3 2	112.84

### Conclusion

PUS's option is better as it gives lower overall cost in present value terms

### W1 : Finding the rate offered by BAL

PV of inflow = Present value of outflows (annuity) =  $R \times \text{Annuity Factor (AF)}$

Hence,  $80 - 10 = 7.46 \times \text{AF}$

$\text{AF} = 70 \div 7.46 = 9.383$

IRR is 4% per quarter i.e. the figure corresponding to annuity factor of 9.383 and 12 periods, on the annuity table.

## 6.5 CRANK PLC.

Year	DF (10%)	1	2	3
		Rs.'000	Rs.'000	Rs.'000
0	1.0000	(1,500.00)	(1,500.00)	(1,500.00)
1	0.9091	(272.73)	(272.73)	(272.73)
2	0.8264		(495.84)	(495.84)
3	0.7513			(563.48)
		<u>(1,772.73)</u>	<u>(2,268.57)</u>	<u>(2,832.05)</u>
PV of scrap		954.56	619.80	450.78
NPV		(818.17)	(1,648.77)	(2,381.27)
Annuity factor		0.9091	1.7355	2.4868
Annual Equivalent Cost:		<u>(899.98)</u>	<u>(950.02)</u>	<u>(957.56)</u>

The optimal replacement cycle is one-year because it has the lowest cost.

### ALTERNATIVE SOLUTION

Decision: Replace every 1 year.

Year	Cash Flow	DF@ 10%	PV
	Rs.		Rs.
0	(1,500,000)	1.0000	(1,500,000)
1	(300,000)	0.9091	(272,730)
1	1,050,000	0.9091	954,555
			<u>(818,175)</u>

Replace every 2 years

Year	Cash Flow	DF@ 10%	PV
	Rs.		Rs.
0	(1,500,000)	1.0000	(1,500,000)
1	(300,000)	0.9091	(272,730)
2	(600,000)	0.8264	(495,840)
2	750,000	0.8264	619,800
			<u>(1,648,770)</u>

Replace every 3 years

Year	Cash Flow Rs.	DF@ 10%	PV Rs.
0	(1,500,000)	1.000	(1,500,000)
1	(300,000)	0.9091	(272,730)
2	600,000	0.8264	(495,840)
3	750,000	0.7513	(563,475)
3	600,000	0.7513	450,780
			<hr/> (2,381,265) <hr/>

Calculation of Annual Equivalent Value (AEV)

Every 1 year	(818,175)/0.9091	=	(899,984)
Every 2 years	(1,648,770)/1.7355	=	(950,026)
Every 3 years	(2,381,265)/2.4868	=	(957,562)

## 6.6 Asset replacement

(a) Replace every year

Year		Cash flow	Discount factor at 10%	PV
		Rs.		Rs.
0	Purchase cost	(40,000)	1.000	(40,000)
1	Running costs	(8,000)		
1	Disposal value	25,000		
1	Net cash flow, Year 1	17,000	0.909	15,453
				<hr/> (24,547) <hr/>
Annuity factor at 10%, Year 1				0.909
Equivalent annual cost				<hr/> Rs.(27,004) <hr/>

**(b) Replace every two years**

Year		Cash flow	Discount factor at 10%	PV
		Rs.		Rs.
0	Purchase cost	(40,000)	1.000	(40,000)
1	Running costs	(8,000)	0.909	(7,272)
2	Running costs	(12,000)		
2	Disposal value	20,000		
2	Net cash flow, Year 2	8,000	0.826	6,608
				<hr/>
				(40,664)
				<hr/>
Annuity factor at 10%, Years 1 – 2				1.736
Equivalent annual cost				Rs.(23,424)
				<hr/>

**(c) Replace every three years**

Year		Cash flow	Discount factor at 10%	PV
		Rs.		Rs.
0	Purchase cost	(40,000)	1.000	(40,000)
1	Running costs	(8,000)	0.909	(7,272)
2	Running costs	(12,000)	0.826	(9,912)
3	Running costs	(20,000)		
3	Disposal value	10,000		
3	Net cash flow, Year 3	(10,000)	0.751	(7,510)
				<hr/>
				(64,694)
				<hr/>
Annuity factor at 10%, Years 1 – 3				2.487
Equivalent annual cost				Rs.(26,013)
				<hr/>



**(d) Replace every four years**

Year		Cash flow	Discount factor at 10%	PV
		Rs.		Rs.
0	Purchase cost	(40,000)	1.000	(40,000)
1	Running costs	(8,000)	0.909	(7,272)
2	Running costs	(12,000)	0.826	(9,912)
3	Running costs	(20,000)	0.751	(15,020)
4	Running costs	(25,000)	0.683	(17,075)
				<u>(89,279)</u>
Annuity factor at 10%, Years 1 – 4				3.170
Equivalent annual cost				<u>Rs.(28,164)</u>

**Recommendation**

The machine should be replaced every two years, because this replacement policy gives the lowest equivalent annual cost.

**6.7 ROTOR PLC**

YEAR	DF (10%)	1	2	3	4
0	1.0000	(6,000,000)	(6,000,000)	(6,000,000)	(6,000,000)
1	0.9091	(409,095)	(409,095)	(409,095)	(409,095)
2	0.8264	—	(396,672)	(396,672)	(396,672)
3	0.7513	—	—	(428,241)	(428,241)
4	0.6830	—	—	—	(430,290)
PV of costs		(6,409,095)	(6,805,767)	(7,234,008)	(7,664,298)
PV of scrap value		4,090,950	3,222,960	2,253,900	1,434,300
NPV		(2,318,145)	(3,582,807)	(4,980,108)	(6,229,998)
Annuity factor (÷)		0.9091	1.7355	2.4868	3.1698
Annual equivalent cost		(2,549,934)	(2,064,424)	(2,002,617)	(1,965,423)

**Conclusion:** The machine should be replaced every four years.

## 6.8 UVW RENTAL SERVICES

### Option – 1: Overhaul and continue

(a)

Year	Cost of over hauling	Net Revenue	Residual value	Net cash flow	Discount rate @ 8.33% (W1)	Net present value
	Rupees					Rupees
0	(2,200,000)		-	(2,200,000)	1.0000	(2,200,000)
1	-	*13,600,000	-	3,600,000	0.9231	3,323,160
2	-	3,600,000	787,500	4,387,500	0.8521	3,738,589
						4,861,749

$$*1 (2,000 \times 0.94 - 440) \times 2,500$$

**Cum discount factor for two years (0.9231 + 0.8521)**

**1.7752**

**Annual equivalent Net Present Value**

**Rs.  
2,738,705**

### Option – 2: Replacement

Year	Capital Cost	Net Revenue	Residual value	Net cash flow	Discount rate @ 8.33% (W1)	Net present value
	Rupees					Rs.
0	*1(4,305,000)		-	(4,305,000)	1.0000	(4,305,000)
1	-	*23,700,000	-	3,700,000	0.9231	3,415,470
2	-	3,700,000	-	3,700,000	0.8521	3,152,770
3		3,700,000	1,312,500	5,012,500	0.7866	3,942,833
						6,206,073

$$*1 5,250,000 - 945,000 = 4,305,000$$

$$*2 (2,000 \times 0.94 - 400) \times 2,500 = 3,700,000$$

**Cum discount factor for three years (0.9231 + 0.8521 + 0.7866)**

**2.5618**

**Annual equivalent Net Present Value**

**Rs.  
2,422,544**

### W – 1: Calculation of Real Rate for discounting

$$\text{Real Discount Rate} = \left[ \frac{(1 + \text{Nominal Discount Rate})}{(1 + \text{Inflation Rate})} \right] - 1$$

$$= \left[ \frac{1 + 17\%}{1 + 8\%} \right] - 1 = 8.33\%$$

### Conclusion:

Since annual equivalent NPV of overhaul and continue option is higher, this equipment should be overhauled.

(b)	Rupees
Total required NPV of replacement option (Rs. 2,422,544 × 1.7752)	4,300,500
Less: NPV of overhauling and continue option	4,861,749
Difference	<u>(561,249)</u>
 % change in overhauling cost at which management would be indifferent (Rs. 561,249 ÷ Rs. 2,200,000)	 <u>25.51%</u>

## CHAPTER 7 – EVALUATING FINANCIAL PERFORMANCE

### 7.1 EQUITY RATIOS

Earnings per share (EPS)	Rs.
Profit before interest and tax	600,000
Interest (10% × Rs. 250,000)	<u>25,000</u>
Profit before tax	575,000
Tax (30%)	<u>172,500</u>
Profit available to equity (earnings)	402,500
Number of equity shares (÷)	<u>1,000,000</u>
EPS	<u>Rs.0.4025</u>

This is a measure of the profit per equity share.

$$\text{PE ratio} = \frac{\text{Rs. 3.2}}{\text{Rs. 0.4025}} = 7.95 \text{ times}$$

The above ratio shows that investors are ready to pay Rs. 7.95 for an earning of Rs. 1. The ratio indicates the confidence of investors in a company with a higher PE ratio implying higher confidence.

$$\text{Dividend yield} = \frac{\text{Rs. 0.2}}{\text{Rs. 3.20}} \times 100 = 6.25\%$$

This ratio shows how much a company is paying as a dividend for each Rs. 1 of its market value. The above example shows that the company pays Rs. 0.0625 out of every Rs. 1 of market value.

$$\text{Dividend cover} = \frac{\text{Rs. 0.4025}}{\text{Rs. 0.20}} = 2.01 \text{ times}$$

This shows that the profit available to the ordinary shareholders covers the dividend by a factor of 2. In other words, approximately 50% of the earnings for the year have been paid out as dividends and the remainder reinvested in the company.

$$\text{Interest yield on debentures} = \frac{\text{Rs. 10}}{\text{Rs. 90}} \times 100 = 11.1\%$$

This shows that the effective interest income on debenture is 11.1%. An investor earns Rs. 11.1 for each Rs. 100 invested in these debentures.

$$\text{Gearing based on market values} = \frac{\text{Rs. 250,000} \times \left(\frac{90}{100}\right)}{1,000,000 \times \text{Rs. 3.20}} \times 100 = 11.1\%$$

This shows the extent to which the company is financed by outsiders and how much by the owners. In the above scenario 11.1% of financing is by lenders and the remaining by equity holders implying that the company has low gearing.

$$\text{Gearing based on market values} = \frac{\text{Rs. 225,000}}{\text{Rs. 3,200,000}} \times 100 = 7.03\%$$

## 7.2 AYELAND AND ZEDLAND

### (a) Performance report for companies in Ayeland and Zedland

The performance of the companies may be measured against indicators from the relevant economies. A simple measure is to compare growth trends over the four year period.

Ayeland							
	Indexed trends				% growth		
	20X0	20X1	20X2	20X3	20X0-1	20X1-2	20X2-3
Revenue	100	131.2	160.4	187.5	31.2	22.2	16.9
Profit	100	138.2	185.5	229.1	38.2	34.2	23.5
RPI	100	135.5	171.7	205.2	35.5	26.7	19.5
Share price	100	125.7	153.1	189.1	25.7	21.8	23.5
Stock market	100	119.9	148.9	189.2	19.9	24.1	27.1
Zedland							
	Indexed trends				% growth		
	20X0	20X1	20X2	20X3	20X0-1	20X1-2	20X2-3
Revenue	100	103.6	109.2	121.4	3.6	5.4	11.2
Profit	100	108.9	126.1	138.0	8.9	15.8	9.5
RPI	100	104.3	107.1	110.8	4.3	2.7	3.5
Share price	100	81.4	86.4	97.0	(18.6)	6.2	12.3
Stock market	100	87.2	87.2	92.7	(12.8)	4.8	1.5

The average investment returns, measured by share price change, are:

- ☐ Ayeland 23.7%
- ☐ Ayelandian market 23.7%
- ☐ Zedland (1.0%)
- ☐ Zedland market (2.4%)

Indicators for the Ayeland company are mixed. Growth in turnover has lagged behind a broad measure of inflation, the retail price index, yet profit after tax has performed relatively well. Despite this profit performance the company's share price has only increased by a similar amount to the general stock market index.

The performance of the company in Zedland appears to be better, with turnover, profit and share price all growing faster than the relevant country indices.

However, comparisons such as this ignore the risk of the two companies. The company in Ayeland appears to be much more risky, as evidenced by its relatively high beta. Performance measures incorporating risk would be much more useful.

A possible performance measure is the historic alpha coefficient associated with the investment, the actual return less the required return for the risk of the investment.

Using CAPM, the required return for Ayeland was:

$$19\% + (23.7\% - 19\%) 1.55 = 26.3\%$$

The actual return was 23.7%. The investment has performed worse than would be expected over the period.

For Zedland the required return was:  $4\% + (-2.4\% - 4\%) 0.98 = (2.3\%)$

Actual return was (1.0%). Although the company's share price return was negative, it was still better than might have been expected given the general poor performance of the Zedland stock market. However, historic alphas are unlikely to persist in the future, and negative expected market returns over a long period make little economic sense.

Possible alternative performance measures include excess return to beta, which is useful for a well-diversified investor, and is measured by:

$$\frac{\text{investment return} - \text{risk free rate}}{\text{investment beta}}$$

For an investor who is not well diversified, a measure using total risk (the standard deviation of returns) is more appropriate.

$$\frac{\text{investment return} - \text{risk free rate}}{\text{standard deviation of returns}}$$

Based upon the available data, the company in Zedland appears to have been the more successful during the last four years.

(b) Other useful information might include:

- (i) A benchmark with which to draw comparisons, preferably data for companies in the same industries as the two companies in Ayeland and Zedland.
- (ii) The objectives and risk aversion of the client.
- (iii) Information about whether or not profits, RPI and other data are calculated in the same way in the two countries.
- (iv) Total returns from the relevant stock markets and for investors in the companies. The data provided only shows the return from share price movements, and excludes the dividend yield, which might be significant.
- (v) Exchange rate movements between the two countries and the UK. The client is likely to be interested in returns in sterling, not in foreign currencies.
- (vi) Any tax implications of investing in the two countries.
- (vii) Information about the future prospects of the companies. Historic returns do not provide an accurate guide to future performance. What are the future strategies of the two companies, what are their strengths and weaknesses, what is their competition?

- (viii) Macro economic information about the two countries and their prospects. Ayeland is a relatively high inflation country. Is the government likely to bring this under control? What are key economic indicators and trends?
- (ix) How stable are the governments in the two countries and would there be significant political risk with the investments?

### 7.3 KHAN INDUSTRIES PLC

The data provided does not provide the basis for a thorough analysis, but ratios and growth rates give an indication of the divisions' performance.

	Last year	Current year	Last year	Current year
Division	A	A	B	B
$\frac{\text{Operating profit}}{\text{Sales}}$	11.3%	12.2%	12.8%	14.5%
$\frac{\text{Operating profit}}{\text{Capital employed}}$	14.4%	15.8%	15.6%	18.4%
Current ratio	1.38	1.35	1.39	1.41
Gearing (medium and long-term debt/equity)	6%	22%	12%	12%

#### Growth rates:

	A	B
Revenue	19%	6.6%
Taxable profit	17%	23%
Non-current assets	17%	2%
Working capital	12.5%	–

Based upon the above financial ratios and growth rates the two divisions have both improved their performance during the last year. There is, however, no data allowing comparisons with similar operations to allow assessment of whether the improved performance is of the standard that might be expected in the industry(ies) concerned.

The only detrimental elements are the small reduction in the current ratio of division A, and the increase in gearing of division A to 22% probably in order to finance the purchase of fixed assets. It is unlikely that either of these factors would be of major concern.

These results have, however, been achieved in different ways. Division A seems to be taking a longer term perspective and has expanded its operations and invested heavily in new fixed assets. Division B's apparent good performance, for example in return on capital employed, has been achieved using existing assets. Division B is more likely to have ensured that the short-term results look good without considering the long-term implications of the lack of investment. It depends on companies objectives as to whether it would like to increase its short term profits or be inclined towards long term benefits.

The board of Khan Industries should be much more explicit in what is meant by 'an improvement in performance'. Controls should be introduced to ensure that the development of the divisions is in line with the long-term strategic plans of Khan Industries, including the nature of products in the divisions, and the markets to be served by the divisions.

The short termism approach of division B should be discouraged, and divisions should be encouraged to focus on the cash flows of their activities. Investments should be judged on their likely effect on cash flows and the value of the business (e.g. through the expected NPV of investments) rather than accounting ratios.



## CHAPTER 8 – CAPITAL RATIONING

### 8.1 CAPITAL RATIONING

- (a) Assume that all the investments are divisible

Total NPV is maximised by maximising the NPV per Rs. 1 invested.

Investment	Capital investment	NPV	NPV per Rs. 1 invested	Ranking
	Rs.	Rs.	Rs.	
A	60,000	12,000	0.20	3rd
B	80,000	21,600	0.27	1st
C	50,000	8,500	0.17	5th
D	45,000	10,800	0.24	2nd
E	55,000	9,900	0.18	4th

#### Investments to maximise NPV

Investment	Capital investment	NPV
	Rs.	Rs.
B	80,000	21,600
D	45,000	10,800
	<u>125,000</u>	
A (balance)	25,000	5,000
Total	<u>150,000</u>	<u>37,400</u>

- (b) Assume that all investments are indivisible

The combination to maximise total NPV is found by identifying possible combinations of investments within the Rs. 150,000 investment limit and calculating the total NPV from that combination.

Investments	Capital investment	Total NPV
	Rs.	Rs.
A + B (60,000 + 80,000)	140,000	33,600
B + D (80,000 + 45,000)	125,000	32,400
C + D + E (50,000 + 45,000 + 55,000)	150,000	29,200

#### Notes:

If A is undertaken there would only be enough cash left to undertake any one of the remaining investments. B has the highest NPV so other combinations involving A can be ignored.

Similarly, if B is undertaken there would only be enough cash left to undertake any one of the remaining investments. A + B has already been considered. Of the remainder, D has the highest NPV so other combinations involving B can be ignored.

Clearly, other combinations involving pairs of projects chosen from C, D and E could be considered but as all give positive NPVs it is obviously better to do all three rather than two put of the three projects.

### Conclusion

(A + B) is clearly better than (C + D + E) and (B + D).

If the projects are indivisible, the combination of investments to maximise total NPV is investment in A and B.

## 8.2 BASRIL COMPANY

### (a) (i) Analysis of projects assuming they are divisible

Year	DCF factor 12%	Project 1		Project 3	
		Cash flow	PV	Cash flow	PV
		Rs.	Rs.	Rs.	Rs.
0	1.000	(300,000)	(300,000)	(400,000)	(400,000)
1	0.893	85,000	75,905	124,320	111,018
2	0.797	90,000	71,730	128,795	102,650
3	0.712	95,000	67,640	133,432	95,004
4	0.636	100,000	63,600	138,236	87,918
5	0.567	95,000	53,865	143,212	81,201
NPV			32,740		77,791
Profitability index		32,740/300,000:	<b>0.109</b> <b>or</b> <b>10.9%</b>	77,791/400,000:	<b>0.194</b> <b>or</b> <b>19.4%</b>

Project 2 NPV at 12% = Rs.(140,800 × 3.605) – 450,000 = Rs. 57,584

Project 2 profitability index = 57,584/450,000 = 0.128 or 12.8%

The optimum investment schedule involves investment in projects 3 and 2:

Project	Profitability index	Ranking	Investment	NPV
			Rs.	Rs.
3	19.4%	1st	400,000	77,791
2	12.8%	2nd	400,000	51,186 ( 57,584 × 400/450)
			800,000	128,977

- (ii) If the projects are assumed to be indivisible, the total NPV of combinations of projects must be considered.

Projects	Investment	NPV	
	Rs.	Rs.	
1 and 2	750,000	90,324	(= 32,740 + 57,584)
1 and 3	700,000	110,531	(= 32,740 + 77,791)

The optimum combination is now projects 1 and 3.

- (b) The NPV decision rule requires that a company invest in all projects that have a positive net present value. This assumes that sufficient funds are available for all incremental projects, which is only true in a perfect capital market. When insufficient funds are available, that is when capital is rationed, projects cannot be selected by ranking them in order of their NPV. Choosing a project with a large NPV may mean not choosing smaller projects that, in combination, give a higher NPV. Instead, if projects are divisible, they can be ranked using the profitability index in order to make the optimum selection. If projects are not divisible, different combinations of available projects must be evaluated to select the combination with the highest NPV.
- (c) The NPV decision rule, to accept all projects with a positive net present value, requires the existence of a perfect capital market where access to funds for capital investment is not restricted. In practice, companies are likely to find that funds available for capital investment are restricted or rationed.

**Hard capital rationing** is the term applied when the restrictions on raising funds are due to causes external to the company. For example, potential providers of debt finance may refuse to provide further funding because they regard a company as too risky. This may be in terms of financial risk, for example if the company's gearing is too high or its interest cover is too low, or in terms of business risk if they see the company's business prospects as poor or its operating cash flows as too variable. In practice, large established companies seeking long-term finance for capital investment are usually able to find it, but small and medium-sized enterprises will find raising such funds more difficult.

**Soft capital rationing** refers to restrictions on the availability of funds that arise within a company and are imposed by managers. There are several reasons why managers might restrict available funds for capital investment. Managers may prefer slower organic growth to a sudden increase in size arising from accepting several large investment projects. This reason might apply in a family-owned business that wishes to avoid hiring new managers. Managers may wish to avoid raising further equity finance if this will dilute the control of existing shareholders. Managers may wish to avoid issuing new debt if their expectations of future economic conditions are such as to suggest that an increased commitment to fixed interest payments would be unwise.

One of the main reasons suggested for soft capital rationing is that managers wish to create an internal market for investment funds. It is suggested that requiring investment projects to compete for funds means that weaker or marginal projects, with only a small chance of success, are avoided. This allows a company to focus on more robust investment projects where the chance of success is higher<sup>1</sup>. This cause of soft capital rationing can be seen as a way of reducing the risk and uncertainty associated with investment projects, as it leads to accepting projects with greater margins of safety.

### 8.3 CB INVESTMENT LIMITED

	A	B	C	D	E	F
Project duration	4	5	3	6	3	2
Forecasted net cash inflows start from year	1	2	1	3	1	1
Discount rate	10%	11%	12%	11%	13%	14%
Annuity factor for total period	3.487	4.102	2.690	4.696	2.668	1.877
Less: Annuity factor for zero cash inflow period	-	(1.000)	-	(1.901)	-	-
Adjusted annuity factor	3.487	3.102	2.690	2.795	2.668	1.877
Forecasted annual net cash inflows	150.00	50.00	140.00	256.00	440.00	300.00
Present value of inflows	523.05	155.10	376.60	715.55	1,173.92	563.10
Adjustment for mutually compulsory projects	678.15		376.60	715.55	1,173.92	563.10
Less: Initial investment required today	(300.00)	(120.00)	(240.00)	(512.00)	(800.00)	(400.00)
Adjustment for mutually compulsory projects (a)	(420.00)		(240.00)	(512.00)	(800.00)	(400.00)
Net present value (b)	258.15		136.60	203.55	373.92	163.10
Profitability index (b ÷ a)	0.615		0.569	0.398	0.467	0.408
Ranking	1		2	5	3	4

#### Option 1 : Invest in the highest ranked projects

In this combination only up to Rs. 660 million is invested leaving Rs. 340 unused. This is not enough to undertake any other of the projects.

	Investment Rs. in million	NPV
Rank 1	420.00	258.15
Rank 2	240.00	136.60
	<u>660.00</u>	<u>394.75</u>

However, the company might be able to increase the available NPV by investing more of its available funds.

Hence other options should be considered. While selecting other options the basic presumption should be to select the last project (balancing amount) which can be scaled down i.e. Project C. Considering the above, there are four more options as shown below:

**Option 2: Invest in Rank 4 ahead of Rank 2 which can be scaled down**

If we consider the rank 4 project which requires lesser investment as compare to rank 5 project, we would be able to utilize about 75% of rank 2 project, as against option 3 in which Project C is only 28% utilized.

	Investment	NPV	
	Rs. in million		
Rank 1	420.00	258.15	
Rank 4	400.00	163.10	Because it cannot be scaled down.
Rank 2 (balance)	180.00	102.45	
	1,000.00	523.70	

**Option 3 : Invest in Rank 5 ahead of Rank 2 which can be scaled down**

	Investment	NPV	
	Rs. in million		
Rank 1	420.00	258.15	
Rank 5	512.00	203.55	Because it cannot be scaled down.
Rank 2 (balance)	68.00	38.70	
	1,000.00	500.40	

**Option 4: Invest in Rank 3 and Rank 2 which can be scaled down**

	Investment	NPV	
	Rs. in million		
Rank 3	800.00	373.92	Because it cannot be scaled down.
Rank 2(balance)	200.00	113.83	
	1,000.00	487.75	

**Option 5: Invest in Rank 4, Rank 5 and Rank 2 which can be scaled down**

	Investment	NPV	
	Rs. in million		
Rank 4	400.00	163.10	
Rank 5	512.00	203.55	Because it cannot be scaled down.
Rank 2(balance)	88.00	50.09	
	1,000.00	416.74	

**Conclusion:**

The most beneficial mix for the company is to invest in Projects A, B, F and C (balancing amount) which gives the highest NPV to the company.

## CHAPTER 9 – SOURCES OF FINANCE

### 9.1 RIGHTS

(a)

		Rs.
4 shares	have a current market value of ( $\times$ Rs. 5.50)	22.00
1 new share	- issue price	4.50
		<hr/>
5 shares	Have a theoretical value of	26.50
		<hr/>

Theoretical ex-rights price = Rs. 26.50/5 = Rs. 5.30 per share.

(b)

Value of rights	Rs.
Current market price	5.50
Theoretical ex-rights price	5.30
	<hr/>
Value of rights	0.20
	<hr/>

This is the theoretical value of the rights, for each existing share.

### 9.2 KAMALIA CARRIERS PLC

- (a) **Rights Issue** – This is an offer to the existing shareholders of securities listed in the primary market to subscribe for additional shares in the proportion of their existing shareholdings at a price generally lower than the current market price of the shares. It is the most common method of raising capital by private and public companies.
- (b) Differences between “rights issue” and “public issue”
- Rights issue is usually more successful than public issue because it is made to investors who are familiar with the operations of the company.
  - A rights issue involves selling of ordinary shares to the existing shareholders while a public issue involves raising of share capital directly from the public.
  - The flotation costs of a rights issue are significantly lower than those of a public issue because a rights issue is not underwritten.
  - A rights issue may be made by private companies as well as public companies whereas a public issue can only be made by public companies.
  - A rights issue does not lead to dilution of control except the rights are not fully taken up by the shareholders whereas a public issue can lead to dilution of control.

## (c) (i) Finance required:

The finance required to redeem the debenture and finance the new project is the addition of the current price of the debenture and the cost of the new project. This is obtained as follows:

**Calculation of the current value of the debenture**

15% Redeemable debenture = Rs. 6,000,000

Annual interest = Rs. 900,000

Year	Item	Cashflow Rs.	DCF @ 9%	PV (Rs.)
1 – 10	Interest	900,000	6.4177	5,775,930
10	Debt redeemed	6,000,000	0.4224	2,534,400
	Current value			8,310,330

Current value of the 15% redeemable debenture = Rs. 8,310,330

Cost of the proposed project (given) = Rs. 1,600,000

Therefore, the finance required is = Rs. 9,910,330

= Rs. 10,000,000  
approx.

(ii) **Calculation of issue price per share**

Finance required = Rs. 10,000,000 (c (i) above)

No of shares issued (6,000,000/3) = 2,000,000 shares

Issue price =  $\frac{\text{Rs. 10,000,000}}{2,000,000}$

= Rs. 5.00

(iii) **Calculation of theoretical ex-rights price**

	Rs.
3 shares at N6.20	18.60
1 share at N5.00	5.00
4 shares	<u>23.60</u>
Theoretical ex-rights price	= $\frac{\text{Rs. 23.60}}{4}$
	= Rs. 5.90

(iv) **Calculation of right per share**

Theoretical ex-rights price	=	Rs. 5.90
Less: Issue price		<u>5.00</u>
		0.90
Right per share	=	$\frac{0.90}{3}$
	=	Rs.0.30

### 9.3 RIGHTS ISSUE

#### (a) Calculations

(i) Number of shares in issue = total earnings/EPS

$$= \text{Rs. } 1,200,000 / \text{Rs. } 0.15 = 8,000,000$$

	Rs. m
Value of the existing shares = $8,000,000 \times \text{Rs. } 2.70$	21.6
Cash raised from new shares	3.8
Total	25.4

Number of shares issued =  $\text{Rs. } 3,800,000 / \text{Rs. } 1.90$  per share

$$= 2,000,000 \text{ shares}$$

The rights issue is therefore a 1 for 4 rights issue  
(2,000,000:8,000,000)

The number of shares after the issue = 10 million

	Rs.
Current value of 4 existing shares ( $\times \text{Rs. } 2.70$ )	10.80
Rights issue price of 1 share	1.90
Theoretical value of 5 shares	12.70
Theoretical ex-rights price ( $12.70/5$ )	Rs. 2.54

#### (ii)

	Rs.
Current market value of existing share	2.70
Theoretical ex-rights price	2.54
The value of a right	0.16

(iii) Existing P/E ratio =  $\text{Rs. } 2.70 / \text{Rs. } 0.15 = 18.0$

The revised profit after tax = Rs. 1.8 million

The revised total market value =  $18 \times \text{Rs. } 1.8 \text{ million} = \text{Rs. } 32.4 \text{ million}$

Therefore, the market value per share =

$$\frac{\text{Rs. } 32.4 \text{ million}}{10 \text{ million shares}} = \text{Rs. } 3.24$$

#### (b) The shareholder can do any of the following:

- ☐ Buy all the shares offered to him in the rights issue. This would maintain his percentage shareholding in the company.
- ☐ Sell the rights. Rights can be sold on the stock market. The theoretical market price is Rs.0.16 for the rights attached to one existing share.



- ❑ Buy some of the shares offered to him in the rights issue and sell some rights.
- ❑ Do nothing. This is a bad choice. Shareholders will see a fall in the value of their shares because the new shares will be issued at a discount to the current market price. The company may try to sell any rights that are not taken up on behalf of the shareholder, but the shareholder should not rely on getting any money from the company.

## 9.4 STOCK EXCHANGE LISTING

### Advantages

A stock market quotation might have the following advantages:

- (i) Access to outside finance. It provides the opportunity to raise equity finance from other than existing shareholders. It should also be easier to raise additional debt finance.
- (ii) Once well-established, a company via a better credit rating can obtain cheaper debt finance.
- (iii) Marketability of shares. Existing shareholders are given the opportunity to sell their shares more easily and at better prices.
- (iv) Incentive schemes including share ownership can be offered to management and employees.
- (v) Status of company. A publicly quoted company may achieve greater status than a similar unlisted company: this could improve staff morale and result in increased publicity and sales.
- (vi) Take-overs. Other businesses can be acquired by using shares as consideration rather than having to use cash.

### Disadvantages

A stock market quotation has the following disadvantages:

- (i) Costs. It is expensive e.g. in terms of advisers and advertising, to achieve a listing plus routine costs of conforming to requirements of the Stock Exchange.
- (ii) Accountability. It makes it necessary for the board to report to 'outside shareholders'; this would be particularly important, for example, in the case of a family-owned company where most shareholders are board members.
- (iii) Dilution of control of existing shareholders.
- (iv) Take-overs. With shares in the hands of the public, risk of take-over may be increased.

## 9.5 CONVERTIBLE BONDS

Earnings = profit after interest and tax.

	Rs.	Rs.
Current total annual earnings (2,000,000 × Rs.0.25)		500,000
On conversion:		
Reduction in interest cost (Rs. 1,000,000 × 4%)	40,000	
Minus increase in taxation (30%)	(12,000)	
Increase in annual earnings		28,000
Total annual earnings after conversion		528,000
		<b>Shares</b>
Shares currently in issue		2,000,000
New shares on conversion of the bonds (Rs. 1,000,000 × 40/Rs. 100)		400,000
		2,400,000

EPS after conversion = Rs. 528,000/2,400,000 shares = Rs.0.22 per share.

There will be dilution in EPS from Rs.0.25 to Rs.0.22 per share.

## 9.6 SHOAIB INVESTMENT COMPANY

(a) **Fresh equity required to be injected on June 30, 2016**

	Rupees in million	
Market value of equity on March 31, 2016	2,800	<b>Working 1</b>
Market value of equity as at June 30, 2016	700	<b>Working 2</b>
Fresh equity required	2,100	

Since the market value of debt on June 30, 2016 is the same as the market value of debt on March 31, 2016, the company has to maintain the same level of equity also.

**Working 1: Market value of net equity and debt as of March 31, 2016**

	Rupees in million
Net equity at book value	2,000
Market value of the company's shares (2,000 × 1.4)	2,800
Existing debt (2,800 × 70/30)	6,533

**Working 2: Market value of net equity as at June 30, 2016**

	Rupees in million	
Book value of net equity as of March 31, 2016	2,000	
Less: Loss on listed securities portfolio	1,222	<b>Working 3</b>
Net Equity as at June 30, 2016	778	
Market value of equity as at June 30, 2016 (Rs. 778 x 0.9)	700	

**Working 3: Loss on listed securities portfolio**

	Rupees in million	
Decline in Stock	20%	
Correlation	1.1	
Decline in company's portfolio value	22%	
Listed portfolio value as at March 31, 2016 (Rs. in million)	5,555	<b>Working 4</b>
Loss on portfolio (5,555 x 22%) (Rs. in million)	1,222	

**Working 4: Listed portfolio value as at March 31, 2016**

	Rupees in million	
Value of long term debt	6,533	<b>Working 1</b>
Value of other liabilities (6,533 ÷ 90 x 10)	726	
Value of equity	2,000	Given
	9,259	
Listed securities (60% of total assets)	5,555	

**(b) % holding of Mr. Alam**

Market value of required new equity (Rs. in million)	2,100
Current market price (700 ÷ 100) (Rs.)	7.00
Number of shares [2,100 ÷ (7 x 90%)] (shares in million)	333.33
Already issued shares (shares in million)	100.00
Total number of shares (shares in million)	433.33
Equity stake of new owner (333.33 ÷ 433.33)	76.92%

## 9.7 SAJAWAL SUGAR MILLS LIMITED

### (a) Right Ratio

	Rs.
Market value of the company after expansion (W1)	1,076.39
Current market price of SSML's Share (given)	<u>Rs. 20.00</u>

Number of shares to be issued to maintain Market Value Rs. 1,076.39 at Rs. 20 desired price:

	<b>Share in million</b>
Total number of shares after right issue (Market value / Price)	53.82
Less: Present number of shares	40.00
Number of right shares to be issued	<u>13.82</u>

**Right ratio - one right share will be issued for every 2.89** (40÷13.82) shares held.

### (b) Right offer price

To maintain Debt : Equity ratio, amount to be raised as equity (Rs. 300 million × (100% - 52%) [W7])

Rs. 144 Million

Offer price of right shares (Rs. 144 ÷ 13.82)

**Rs. 10.42** per share

### (c) Theoretical Ex-Rights price

	<b>Rs. in million</b>
The market value of 40 million shares (already issued to date)	800
Capital to be raised through right issue	144
	<u>944</u>

$$\text{Theoretical Ex - rights price} = \frac{944}{53.82} = 17.54$$

### (d) Value of Right

$$\text{Value of right} = \frac{\text{Ex - right price} - \text{issue price}}{\text{No. of rights required to buy one share}}$$

$$\begin{aligned} \text{Value of right (applicable to each existing share)} &= \frac{20 - 10.42}{2.89} \\ &= 3.31 \end{aligned}$$

**Workings****W1 : Market value after expansion**

$$MV = \frac{d_1}{r - g}$$

$$MV = \frac{\text{Rs. } 155 \text{ (W2)} \times 70\%}{16.9\% \text{ (W5)} - 6.82\% \text{ (W6)}} = 1,076.39$$

**W2: Expected profit**

$$\begin{aligned} \text{Expected Profit} &= \text{Total assets} \times \text{ROA} \\ &= 1,550 \text{ (W3)} \times 10\% \text{ (W4)} = 155 \end{aligned}$$

**W3: Total assets after capital increase****Rs. in million**

Existing assets	1,250
Total capital to be raised	300
Total assets after capital increase	<u>1,550</u>

**W4 : Existing return on assets**

$$\text{Existing ROA} = \frac{\text{Net profit}}{\text{Total Assets}} = \frac{125}{1,250} = 10.00\%$$

**W5: Required return (r)**

$$\begin{aligned} r &= R_f + (R_m - R_f) \times B \\ &= 12\% + (16\% - 12\%) \times 1.23 \\ &= 16.9\% \end{aligned}$$

**W6: Growth (g)**

$$\begin{aligned} g &= r \times b \\ &= \frac{\text{Net Profit}}{\text{Equity}} \times (1 - \text{payout}\%) \\ &= \frac{125}{550} \times (1 - 70\%) \\ &= 6.82\% \end{aligned}$$

**W7: Debt: Equity ratio**

$$\text{D/E ratio} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}} = \frac{600,000}{600,000 + 550,000} = 52\%$$

## 9.8 PSD ENGINEERING LIMITED

(a)	(i)	▪ <b>Theoretical ex-right price</b>	<b>Rupees</b>
		Value of 5 original shares @ Rs. 16	80.00
		Value of 2 right share @ Rs. 12.5)	25.00
			<hr/> 105.00
		Ex-right price (Rs. 105 ÷ 7)	<hr/> 15.00
		▪ <b>Value of the right</b>	
		Ex-right share price	15.00
		Cost of acquiring right share	12.50
			<hr/> 2.50
		Value of right per original share (Rs. 2.5 ÷ 5 share)	<hr/> 0.500
			<b>Rupees in million</b>
	(ii)	<b>Yield adjusted theoretical ex-right price</b>	
		Current shares market value (20 million share of Rs. 16 each)	320
		Value of right shares (8 million shares of Rs. 12.5 each)	100
		NPV	96
			<hr/> 516
		Yield adjusted theoretical ex-right price (Rs. 516 million ÷ 28 million shares)	<hr/> 18.43
	(iii)	<b>Current earnings per share</b>	
		Profit before interest and taxation	95.00
		Less: Interest on debentures (Rs. 350 million @ 10%)	(35.00)
		Profit before taxation	<hr/> 60.00
		Less: taxation @ 35%	(21.00)
			<hr/> 39.00
			Rs.
		Earnings per share (Rs. 39 million ÷ 20)	1.95
		Price earnings ratio (Rs. 16 ÷ Rs. 1.95)	8.21
		<b>New earnings per share and share price</b>	

	<b>Right issue</b>	<b>Debenture issue</b>
	<b>Rupees in million</b>	
Profit before interest and taxation (95.00 x 1.1)	104.50	104.50
Less: Debenture interest (10% x 350)	(35.00)	(35.00)
(9% x 100)	-	(9.00)
Profit before tax	69.50	60.50
Less: Taxation at 35%	24.33	21.18
	45.17	39.32
	<b>Rs.</b>	<b>Rs.</b>
EPS		
Rs. 45.17 million / 28 million shares	1.61	
Rs. 39.32 million / 20 million shares		1.97
New share price		
Rs. 1.61 x 8.21	13.22	
Rs. 1.97 x 8.21 x 70%		11.31

- (b) PSD already has a gearing level of 37% ( $350 \div 940$ ). If it is at or near its optimal level of gearing, shareholders may take negatively to the additional debt which would push the gearing level up to 43% ( $450 \div 1,040$ ). Accordingly the cost of equity would rise and the ordinary share price would fall.

## CHAPTER 10 – PORTFOLIO THEORY AND THE CAPITAL ASSET PRICING MODEL

### 10.1 TWO-ASSET PORTFOLIO

#### (a) Security X

EV of return ( $\bar{x}$ )

$$= (0.25 \times 15) + (0.60 \times 10) + (0.15 \times 2) = 10.05.$$

Probability	Return	$x - \bar{x}$	$p(x - \bar{x})^2$
p	x		
0.25	15	4.95	6.1256
0.60	10	(0.05)	0.0015
0.15	2	(8.05)	9.7204
Variance $\sigma^2$			15.8475

Standard deviation of return  $\sigma_x = \sqrt{15.8475} = 3.98$ .

#### (b) Security Y

EV of return ( $\bar{y}$ )

$$= (0.25 \times 20) + (0.60 \times 8) + (0.15 \times (6)) = 8.90$$

Probability	Return	$y - \bar{y}$	$p(y - \bar{y})^2$
p	y		
0.25	20	11.10	30.8025
0.60	8	(0.90)	0.4860
0.15	(6)	(14.90)	33.3015
Variance $\sigma^2$			64.5900

Standard deviation of return  $\sigma_y = \sqrt{64.59} = 8.04$ .

#### (c) Covariance

Probability (p)	$x - \bar{x}$	$y - \bar{y}$	$p(x - \bar{x})(y - \bar{y})$
0.25	4.95	11.10	13.7363
0.60	(0.05)	(0.90)	0.0270
0.15	(8.05)	(14.90)	17.9917
Cov <sub>x,y</sub>			31.7550

#### (d) Correlation coefficient

$$\rho_{x,y} = \frac{31.7550}{3.98 \times 8.04} = +0.992.$$

This shows a high level of positive correlation between the returns from Security X and the returns from Security Y.



- (e) The **EV of the return** from a portfolio consisting of 50% Security X and 50% Security Y

$$= (0.50 \times 10.05) + (0.50 \times 8.90) = 9.475\%.$$

The **variance** of the returns from this portfolio would be:

$$[(0.50)^2 \times 15.8475] + [(0.50)^2 \times 64.5900] + [2 \times 0.50 \times 0.50 \times 31.7550] \\ = 3.9619 + 16.1475 + 15.8775 = 35.9869.$$

The **standard deviation** of the portfolio returns =  $\sqrt{35.9869} = 6.0\%$ .

- (f) For a portfolio consisting of 80% Security X and 20% Security Y:

The **EV of the return**

$$= (0.80 \times 10.05) + (0.20 \times 8.90) = 9.82\%.$$

The **variance** of the returns from this portfolio would be:

$$[(0.80)^2 \times 15.8475] + [(0.20)^2 \times 64.5900] + [2 \times 0.80 \times 0.20 \times 31.7550] \\ = 10.1424 + 2.5836 + 10.1616 = 22.8876.$$

The **standard deviation** of the portfolio returns =  $\sqrt{22.8876} = 4.78\%$ .

Note: In this example, since Security Y has a lower expected return than Security X and a higher standard deviation, expected returns will be highest and risk lowest with a 'portfolio' consisting of Security X only, and none of Security Y.

## 10.2 COEFFICIENT OF VARIATION

Portfolio		Expected return
50% Country A, 50% Country B	$(0.5 \times 16) + (0.5 \times 22)$	19.0
50% Country A, 50% Country C	$(0.5 \times 16) + (0.5 \times 30)$	23.0
50% Country B, 50% Country C	$(0.5 \times 22) + (0.5 \times 30)$	26.0

The standard deviation of a portfolio is:

$$\sigma_p = \sqrt{\sigma_A^2 x^2 + \sigma_B^2 (1-x)^2 + 2x(1-x)\rho_{A,B}\sigma_A\sigma_B}$$

However, since the returns from each country are independent of each other, the covariance of returns ( $\rho_{A,B}$ ) is 0; therefore the second half of the formula can be ignored because its value is zero.

Portfolio		Standard deviation of returns
50% Country A, 50% Country B	$[(25^2 \times 0.5^2) + (36^2 \times 0.5^2)]^{1/2}$	21.9
50% Country A, 50% Country C	$[(25^2 \times 0.5^2) + (45^2 \times 0.5^2)]^{1/2}$	25.7
50% Country B, 50% Country C	$[(36^2 \times 0.5^2) + (45^2 \times 0.5^2)]^{1/2}$	28.8

(Tutorial note: 'To the power of  $\frac{1}{2}$ ' is the same as 'the square root'.)

### Coefficient of variation

The coefficient of variation is the ratio of the risk (standard deviation of returns) to the expected return.

Portfolio		Coefficient of variation
50% Country A, 50% Country B	21.9/19.0 =	1.15
50% Country A, 50% Country C	25.7/23.0 =	1.12
50% Country B, 50% Country C	28.8/26.0 =	1.11

The ratio of risk to expected returns is roughly the same for all three portfolios.

## 10.3 PORTFOLIO RETURN

(i) Calculation of beta factors for each of the security:

$$\frac{\sigma_x \times \text{Cox}}{\sigma_m} = \frac{\text{Standard deviation} \times \text{Correlation coefficient}}{\text{Market standard deviation}}$$

Security:

$$X = \frac{0.05 \times 0.8}{0.08} = 0.5$$

$$Y = \frac{0.15 \times 0.4}{0.08} = 0.75$$

$$Z = \frac{0.14 \times 0.6}{0.08} = 1.05$$

Expected Return for each security

$$= E(R_i) = R_f + \beta (R_m - R_f)$$

where:  $E(R_i)$  is expected return on the security

$R_f$  is the risk-free return

$R_m$  is the expected market return

$\beta$  is the beta (risk) of the security

$$X = 15\% + 0.5 (20-15)\% = 17.5\%$$

$$Y = 15\% + 0.75 (20-15)\% = 18.75\%$$

$$Z = 15\% + 1.05 (20-15)\% = 20.25\%$$

Expected return on the portfolio is derived from the following formula.

$$E(R_p) = W_x E(R_x) + W_y E(R_y) + W_z E(R_z)$$

where: X, Y, and Z are the securities

$E(R_p)$  is the expected return on portfolio

$E(R_x)$  is the expected return of security X and

$W_x$  is the proportion of the available investment funds invested in security X.

Therefore the expected return on the portfolio using the above formula is:

$$\begin{aligned} & (0.3 \times 17.50)\% + (0.3 \times 18.75)\% + (0.4 \times 20.25)\% \\ &= 5.250\% + 5.625\% + 8.100\% \\ &= 18.975\% = 19\% \end{aligned}$$

- (ii) The risk of the portfolio is the addition of the Beta factor for each security X proportion of the available investment funds invested in each security.

$$\text{i.e. } \beta_p = \beta_x \times W_x + \beta_y \times W_y + \beta_z \times W_z$$

which is:

$$\begin{aligned} & (0.5 \times 0.3) + (0.75 \times 0.3) + (1.05 \times 0.4) \\ &= 0.150 + 0.225 + 0.420 \\ &= 0.795 \\ &= 79.5\% = 80\%. \end{aligned}$$

Determination of  $R_f$

$$\begin{aligned} R_m - R_f &= \text{Premium} \\ \text{i.e. } 0.20 - R_f &= 0.05 \\ -R_f &= 0.05 - 0.20 \\ R_f &= 0.15 \\ &= 15\% \end{aligned}$$

## 10.4 DOLPHIN PLC.

- (a) Calculation of cost of equity capital using:

### CAPM

$$\begin{aligned} K_e &= R_f + \beta(R_m - R_f) \\ K_e &= 9\% + 0.7(17\% - 9\%) \\ &= 9\% + 5.6\% = 14.6\% \approx 15\% \end{aligned}$$

### Dividend Growth Model

$$\begin{aligned} K_e &= \frac{D_0 + (1 + g)}{M_v} \\ &= \frac{15(1.10)}{150} + 0.10 \\ &= 0.11 + 0.10 = 0.21 \text{ i.e. } 21\% \end{aligned}$$

Evaluation of the projects i.e. computation of NPV

## (i) Using CAPM

Year	Details	Project A			Project B	
		Cash flows	PV	DF (15%)	Cash flow	PV
		Rs.	Rs.	Rs.	Rs.	Rs.
0	Initial Outlay	(10,000,000)	(10,000,000)	1.0000	(24,000,000)	(24,000,000)
1 – 3	Inflow	4,800,000	10,959,360	2.2832	7,800,000	17,008,960
4 & 5	Inflow	5,600,000	5,986,400	1.069	8,900,000	7,514,100
5	Inflow	1,000,000	<u>497,200</u>	0.4972	1,000,000	<u>497,200</u>
	NPV		<u>7,442,960</u>			<u>3,820,260</u>

## (ii) Using Dividend Growth Model

Year	Details	Project A			Project B	
		Cash flows	PV	DF (21%)	Cash flow	PV
		Rs.	Rs.	Rs.	Rs.	Rs.
0	Initial Outlay	(10,000,000)	(10,000,000)	1.0000	(24,000,000)	(24,000,000)
1 – 3	Inflow	4,800,000	9,954,720	2.0739	7,800,000	16,176,420
4 & 5	Inflow	5,600,000	4,771,760	0.8521	8,900,000	7,583,690
5	Inflow	1,000,000	<u>385,600</u>	0.3856	1,000,000	<u>385,600</u>
	NPV		<u>5,112,080</u>			<u>145,710</u>

(b) Under the two methods, i.e. the CAPM and the DGM, Project A has a higher Net Present Value and should therefore be selected. Assuming the two projects are not mutually exclusive, both would have been accepted on the basis of positive Net Present Values.

(c) The three factors are explained as follows:

- (i) Life of the Asset: The life of assets can differ. For instance, bonds have a fixed maturity life, while equity has no fixed maturity life.
- (ii) The expected stream of cash flows/returns: for bond, the stream of return can easily be determined because it is fixed, whereas those of equity are difficult to estimate because of the discretionary nature of the dividends.
- (iii) Appropriate discount rate: This will reflect the risk attached to the asset. The higher the risk, the higher the discount rate. The rate of equity is subjective, but that of bond is typically determined.

## 10.5 RISK AND RETURN

(a)

	Project 3			Project 4		
Expected return	$(0.6 \times 6) + (0.4 \times 1) = +4.0$			$(0.5 \times 8) + (0.5 \times -1) = +3.5$		
	Return $r$	Probability $p$	$p(r-\bar{r})^2$	Return $r$	Probability $p$	$p(r-\bar{r})^2$
	6.0	0.6	2.40	8.0	0.5	10.125
	1.0	0.4	3.60	-1.0	0.5	10.125
Variance $(\sigma)^2$			6.00			20.250
$\sigma$			2.45			4.5

- (b) The divisional manager will invest in projects that are more risky provided that they offer a higher return.

The manager will not invest in Project 4 because it offers a lower expected return than Project 3 but higher risk.

The expected return from Project 1 is  $(0.8 \times 4) + (0.2 \times 2) = +3.6$ .

The expected return from Project 2 is  $(0.7 \times 5) + (0.3 \times 1.5) = +3.95$ .

The highest expected return is offered by Project 3, which has a higher risk than Project 1 and Project 2. It would seem that the divisional manager will invest in Project 3 because he is prepared to take the higher risk for a higher expected return. However, Project 2 might seem more attractive: its expected return is almost as high as for Project 3 and the risk is much less.

## 10.6 OBTAINING A BETA FACTOR

(a) Standard deviations

Month	Market portfolio		Security Y	
	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	+1.5	2.25	+2	4
2	(1.5)	2.25	(3)	9
3	(2.5)	6.25	(3)	9
4	+2.5	6.25	+4	16
		17.00		38

Standard deviation of market returns =  $\sqrt{17.00} = 4.123\%$ .

Standard deviation of Security Y returns =  $\sqrt{38} = 6.164\%$ .

**(b) Correlation coefficient**

Month	$x - \bar{x}$	$y - \bar{y}$	$(x - \bar{x})(y - \bar{y})$
1	+ 1.5	+ 2	+ 3.0
2	(1.5)	(3)	+ 4.5
3	(2.5)	(3)	+ 7.5
4	+ 2.5	+ 4	+ 10.0
			<u>+ 25.0</u>

Covariance of returns = 25.0

**Correlation coefficient**  $\rho_{m,y}$

$$\rho_{x,y} = \frac{25.0}{4.123 \times 6.164} = + 0.984.$$

**(c) Beta factor for Security Y**

$$\beta = \frac{\text{Cov}_{m,y}}{\text{Var}_m} = \frac{25}{17} = 1.47$$

Alternatively

$$\beta = \frac{\rho_{m,y} \times \sigma_y}{\sigma_m} = \frac{0.984 \times 6.164}{4.123} = 1.47$$

**10.7 SODIUM PLC****(a) (i) Computation of NPV using WACC****Hotel & Tourism (H & T)**

Year	Cash Flow Rs.'m	Discount Factor @17%	PV Rs.'m
0	(300)	1	(300.00)
1	85	0.8547	72.65
2	170	0.7305	124.19
3	150	0.6244	93.66
		NPV	<u>(9.50)</u>

**Food & Beverages (F & B)**

Year	Cash Flow Rs.'m	Discount Factor @17%	PV Rs.'m
0	(400)	1	400.00
1	190	0.8547	162.39
2	180	0.7305	131.49
3	200	0.6244	124.88
		NPV	<u>(18.76)</u>

(ii) **Projects' NPVs using CAPM****Hotel & Tourism (H & T)**

Year	Cash Flow	Discount Factor	PV
	Rs.'m	@15%	Rs.'m
0	(300)	1	(300.00)
1	85	0.8696	73.92
2	170	0.7561	128.54
3	150	0.6575	98.63
		NPV	(1.09)

**Food & Beverages (F & B)**

Year	Cash Flow	Discount Factor	PV
	Rs.'m	@20%	Rs.'m
0	400	1	400.00
1	190	0.8333	158.33
2	180	0.6944	124.99
3	200	0.5787	115.74
		NPV	(0.94)

- (iii) In view of the high risk inherent in the Food and Beverages project, the Hotel and Tourism project should be selected. The positive NPV before the incorporation of the risk factor on the F&B project should not be taken for viability as the NPV became negative after adjusting for risk.

(b) **Uses of CAPM**

- (i) To evaluate projects taking risk into account.
- (ii) To determine an optimal capital structure.
- (iii) It is a device for understanding the risk-return relationship.

**Limitations of CAPM**

- (i) It is based on unrealistic assumptions.
- (ii) It is difficult to test its validity.
- (iii) It only considers systematic risk which does not remain stable over time.
- (iv) Many times, the risk of an asset is not captured by beta alone.
- (v) It only examines investments from the shareholders point of view.
- (vi) It is a theoretically one-period model and should therefore be used with caution in the appraisal of multi-period projects.

**Workings****Cost of capital using CAPM:**

Hotel &amp; Tourism (HT)

$$\begin{aligned}
 \text{Rs.} &= R_f + B(R_m - R_f) \\
 &= 9\% + 1.2 (14\% - 9\%) \\
 &= 9\% + 6\% \\
 &= 15\%
 \end{aligned}$$

Food and Beverages (F&amp;B)

$$\begin{aligned}
 \text{Rs.} &= R_f + B(R_m - R_f) \\
 &= 9\% + 2.2 (14\% - 9\%) \\
 &= 9\% + 11\% = 20\%
 \end{aligned}$$

**Cost of capital using WACC:**

$$\begin{aligned}
 K_e &= \sqrt{\frac{d(l+g)}{MV}} + g \\
 g &= n-1 \sqrt[n]{\frac{Ld}{Ed}} - 1 \\
 &= 5-1 \sqrt[4]{\frac{0.25}{0.18}} - 1 \\
 &= \left(\frac{0.25}{0.18}\right)^{1/4} - 1 \\
 &= 0.085 \text{ or } 8.5\% \\
 K_e &= \frac{0.25(1.085)}{3.20} + 0.085 \\
 &= 0.169 = 16.9\%
 \end{aligned}$$

**10.8 DR JAMAL**

- (a) (i) The Beta Factor for the portfolio can be calculated by means of a weighted average of the Beta values of the individual shares. Market values should be used in the weightings.

	Number of Shares	Market Price  Rs.	Market Value (MV)  Rs.	Beta Factor (B)	MV <sub>x</sub>  Rs.
Black Plc.	15,000	2.50	37,500	1.32	49,500
Blue Plc.	18,000	2.20	39,600	1.20	47,520
Yellow Plc.	10,000	1.90	19,000	0.80	15,200
Purple Plc.	12,000	1.50	18,000	1.05	18,900
White Plc.	20,000	0.60	12,000	0.80	9,600
Total			<u>126,100</u>		<u>140,720</u>



$$\begin{aligned}
 \therefore \text{The portfolio Beta} &= (MV \times \beta) / MV \\
 &= 140,720 / 126,100 \\
 \beta &= 1.11594
 \end{aligned}$$

- (ii) The required return on the portfolio can be calculated by establishing the required rate of return for each share, and then applying this to the market value of the holding.

The formula used is:  $R = R_f + \beta (R_m - R_f)$

where  $R$  = Return on the individual share

$\beta$  = Beta factor

$R_m$  = Market rate of return

$R_f$  = Risk free rate of return

A quicker way to calculate this is to calculate 'Rs.' for the portfolio as a whole using the Beta factor previously derived, and then to apply this rate of return to the market value of the portfolio:

$$\begin{aligned}
 R &= R_f + \beta (R_m - R_f) \\
 R &= 8\% + 1.11594 (14\% - 8\%) \\
 R &= 14.6956\% \\
 \therefore \text{Selected return} &= \text{Rs. } 126,100 \times 14.6956\% \\
 &= \text{Rs. } 18,531
 \end{aligned}$$

Alternatively, we can calculate the 'R' for each security and have an aggregate value for the portfolio as demonstrated below:

	Beta factor	R (%)	Market Value (MV) Rs.	R x MV
Black Plc.	1.32	15.92	37,500	5,970
Blue Plc.	1.20	15.20	39,600	6,019
Yellow Plc.	0.80	12.80	19,000	2,432
Purple Plc.	1.05	14.30	18,000	2,574
White Plc.	0.80	12.80	12,000	1,536
Total				<u>18,531</u>

- (b) Portfolio theory will assist Dr Jamal with a formal means of evaluating the systematic risk profile of his portfolio. He can decide the level of risk that he is happy to accept and express this in terms of a target beta factor for his portfolio as a whole. He can then select securities which will provide him with this risk/return profile. As has been demonstrated above, he can also use the theory to indicate whether an individual security is correctly priced in the market, as this will influence his buying and selling decisions.

At the same time, however, the portfolio manager must be aware of the theoretical shortcomings of this form of analysis as stated below:

- (i) The theory assumes that transactions costs can be ignored. In practice, the costs of buying and selling shares, particularly in relatively small quantities may become significant.
- (ii) It further assumes that investors hold a well diversified portfolio and they are, therefore, protected against unsystematic risk and need only be concerned with systematic risk.
- (iii) The theory is based upon a single period time horizon. This is unrealistic in terms of the way business decisions within firms are made.

In practice, the portfolio manager must also take other factors as well as the risk/return profile into account. The factors include the following:

❑ Liquidity

The manager must ensure that liquid funds are available to meet current commitments. This may mean that the portfolio at any one time contains a higher than predicted element of risk-free securities which are being held in anticipation of a known payment.

❑ Purpose

The purpose for which the portfolio is being held will influence its make-up. For instance, if the overall fund is small and transaction costs are significant, and the fund is being invested with the intention of providing a regular income, then the manager will select high income securities in preference to growth stocks. This may mean that the optimum portfolio from the point of view of the theory may not be the one which should be selected in practice.

❑ Investment Criteria

The owners of the fund may lay down investment criteria such as the ethical status of the companies in which to invest. This may restrict the choice available to the portfolio manager. Again, this may mean that the “optimum portfolio” is not chosen.

Thus, it can be seen that the theory does have relevance to a portfolio manager in his selection of securities, but it does not provide the complete answer to the structuring of a portfolio.

## 10.9 MR. FARAZ

### (a) COST OF EQUITY OF MR. FARAZ (UNDER CAPM MODEL)

$$\text{CAPM} = \text{RF} + (\text{RM} - \text{RF}) \times \text{Beta}$$

$$\text{Beta} = \frac{\text{Co - variance with Market}}{\text{Market Variance}}$$

Company Name	Market Standard Deviation	Market Variance	Co-variance with market	Beta	RF	RM-RF	Required Return %
	A	B=A <sup>2</sup>	C	C/B		20%-8%	
A	15%	0.0225	2.10%	0.93	8%	12%	19.16%
B	15%	0.0225	3.00%	1.33	8%	12%	23.96%
C	15%	0.0225	2.60%	1.16	8%	12%	21.92%
D	15%	0.0225	1.90%	0.84	8%	12%	18.08%
E	15%	0.0225	2.80%	1.25	8%	12%	22.88%

### (b) (i) Estimated Value of portfolio as at December 31, 2016

Co. Name	Price on Jan. 1, 2016 (Rs.)	Dividend yield	Required Return	*Price at Dec 31 (Rs.) P[1 + (x - y)]	No. of Shares	Portfolio Value on Dec 31 (Rs.)
	(P)	(y)	(x)	(A)	(B)	A X B
A	60	3.50%	19.16%	69.40	15m/60 = 250,000	17,350,000
B	245	3.00%	23.96%	296.35	18m/245 = 73,469	21,772,538
C	225	2.50%	21.92%	268.70	22m/225 = 97,778	26,272,949
D	130	8.00%	18.08%	143.10	25m/130 = 192,308	27,519,275
E	210	5.00%	22.88%	247.55	20m/210 = 95,238	23,576,167
						116,490,929

(ii) **Portfolio beta as at December 31, 2016**

Company Name	Portfolio Value on Dec 31	New Investment Weightage	Beta	Weighted Beta
	Rs.	A	B	A X B
A	17,350,000	14.89%	0.93	0.14
B	21,772,538	18.65%	1.33	0.25
C	26,272,949	22.55%	1.16	0.26
D	27,519,275	23.62%	0.84	0.20
E	23,576,167	20.24%	1.25	0.25
	116,490,929			1.10

(iii) **Estimated Total return on portfolio**

Co. Name	Beg. Price	End Price	Capital Gain	Dividend	Total Return
	(A)	(B)	B-A	A x Div. yield	
	Rs.	Rs.	Rs.	Rs.	Rs.
A	15,000,000	17,350,000	2,350,000	525,000	2,875,000
B	18,000,000	21,772,538	3,792,538	540,000	4,312,538
C	22,000,000	26,272,949	4,272,949	550,000	4,822,949
D	25,000,000	27,519,275	2,519,275	2,000,000	4,519,275
E	20,000,000	23,576,167	3,576,167	1,000,000	4,576,167
			16,490,929	4,615,000	21,105,929

**OR**

Company Name	Portfolio Value on January 1	Required return	Total Return
	Rs.		Rs.
A	15,000,000	19.16%	2,875,000
B	18,000,000	23.96%	4,312,538
C	22,000,000	21.92%	4,822,949
D	25,000,000	18.08%	4,519,275
E	20,000,000	22.88%	4,576,167
	100,000,000		21,105,929

## 10.10 MUSHTAQ LIMITED

### Computation of market variance

Probability	Market Return	Probable Market Return	Deviation from Mean	Market Variance
1	2	3 = 1 x 2	4	5 = 1 x (4) <sup>2</sup>
p <sub>1</sub>	R <sub>m</sub>	pR <sub>m</sub>	R <sub>m</sub> - $\bar{R}_m$	p(R <sub>m</sub> - $\bar{R}_m$ ) <sup>2</sup>
0.25	30	7.5	0	0
0.5	25	12.5	-5	12.5
0.25	40	10	10	25
		30		37.5

### Return and cost of project 1

Probability	Project Return	Probable Project Return	Deviation from Mean	Market Variance	Covariance
1	2	3 = 1 x 2	4	5 (above)	1 x 4 x 5
p <sub>1</sub>	R <sub>p1</sub>	pR <sub>p1</sub>	R <sub>p1</sub> - $\bar{R}_{p1}$	p(R <sub>m</sub> - $\bar{R}_m$ ) <sup>2</sup>	*
0.25	20	5	-10	0	0
0.5	30	15	0	12.5	0
0.25	40	10	10	25	25
		30		37.5	25

$$* p(R_m - \bar{R}_m)(R_{p1} - \bar{R}_{p1})$$

$$\beta(\text{project1}) = \frac{\text{Covariance between project and market}}{\text{Variance market}}$$

$$\beta(\text{project1}) = 25 / 37.5 = 0.67$$

Required Return from new project =

Risk free rate +  $\beta$  (Market rate – Risk free rate)

$$= 10\% + 0.67 (30\% - 10\%)$$

$$= 23.4$$

### Return and cost of project 2

Probability	Project Return	Probable Project Return	Deviation from Mean	Market Variance	Covariance
1	2	3 = 1 x 2	4	5 (above)	1 x 4 x 5
p <sub>2</sub>	R <sub>p2</sub>	pR <sub>p2</sub>	R <sub>p2</sub> - $\bar{R}_{p2}$	p(R <sub>m</sub> - $\bar{R}_m$ ) <sup>2</sup>	*
0.25	22	5.50	-7.5	0	0
0.50	28	14.00	-1.5	12.5	3.75
0.25	40	10.0	10.5	25	26.25
		29.50		37.5	30.00

$$* p(R_m - \bar{R}_m)(R_{p2} - \bar{R}_{p2})$$

$$\beta (\text{project2}) = \frac{\text{Covariance between project and market}}{\text{Variance market}}$$

$$\beta (\text{project2}) = 30 / 37.5 = 0.8$$

Required Return from new project =

Risk free rate +  $\beta$  (Market rate – Risk free rate)

$$= 10\% + 0.8 (29.5\% - 10\%)$$

$$= 25.6\%$$

### **Conclusion:**

Since the project 1 has higher return over its cost of capital worked out under CAPM, the company should undertake this project.

## **10.11 ATTOCK INDEX TRACKER FUND**

- (a) Systematic risk is measured by Beta.

Beta = Co-relation of returns  $\times \sigma$  of the fund  $\div \sigma$  of the market

$$= 0.737 \times 0.22 \div 0.18 = 0.9$$

### **Assessment of AITF Performance**

Beta of 0.9 shows that AITF substantially (90%) matches the performance of KSE 100 Index.

- (b) AITF's actual return is 11% which is less than the return which AITF should achieve according to its risk profile i.e. 11.6% (W1) as per its current systematic risk.

### **W1: Required return of the fund**

The required return of AITF in terms of CAPM would be

$$R = R_f + (R_m - R_f) \times \beta$$

$$= 8\% + (12\% - 8\%) \times 0.901$$

$$= 11.60\%$$

(c)

Name of company	Current price per share	Forecasted price after one year (Rs.)	Dividend per share next year (Rs.)	Total return	Market Variance	Co-variance	Beta	Required return (W1)	Remarks
	a	b	c	$d = (b + c - a) \div a$	$(\sigma)^2$	(f)	$g = f \div e$	$= R_f + \beta (R_m - R_f)$	
A	25	27	2.0	16.0%	0.0324	0.024	0.741	11.0%	-
B	15	17	1.0	20.0%	0.0324	0.039	1.204	12.8%	-
C	46	52	2.5	18.5%	0.0324	0.044	1.357	13.4%	-
D	106	111	4.0	8.5%	0.0324	0.033	1.019	12.1%	under performing
E	75	85	2.0	16.0%	0.0324	0.018	0.556	10.2%	-
F	114	125	3.0	12.3%	0.0324	0.041	1.265	13.1%	under performing
G	239	220	5.5	-5.6%	0.0324	0.032	0.988	12.0%	under performing
H	156	168	3.0	9.6%	0.0324	0.040	1.235	12.9%	under performing
I	145	170	2.5	19.0%	0.0324	0.034	1.049	12.2%	-
J	67	75	1.0	13.4%	0.0324	0.033	1.019	12.1%	-

1

Name of company	Current price	No. of shares '000'	Value Rs. in '000'	Beta	Weighted beta
	A	b	$c = a \times b$	d	$(c) \times d / \sum(c)$
A	25	150	3,750	0.741	0.088
B	15	230	3,450	1.204	0.132
C	46	190	8,740	1.357	0.376
E	75	100	7,500	0.556	0.132
I	145	35	5,075	1.049	0.169
J	67	45	3,015	1.019	0.097
			<b>31,530</b>		<b>0.994</b>

## 10.12 IRON LIMITED

(a)

	Projects			
	A	B	C	D
Required rate of return (W1)	14.12%	13.84%	16.16%	15.84%
Expected return	16%	14%	17%	15%
Decision	Invest	Invest	Invest	Not to invest
Excess return index (Expected /Required return)	1.13	1.01	1.05	
Preference	1	3	2	

### W1: Required rate of return

Risk free rate of return ( $R_f$ )	10%	10%	10%	10%
Market return ( $R_m$ )	14%	14%	14%	14%
$\beta$ (W2)	1.03	0.96	1.54	1.46
Required rate of return $R_f + (R_m - R_f)\beta$	14.12%	13.84%	16.16%	15.84%

### W2: Computation of $\beta$

Estimated correlation of returns with market return	a	0.82	0.85	0.91	0.78
Project standard deviation of returns	b	20%	18%	27%	30%
Market Standard Deviation	c	16%	16%	16%	16%
$\beta$ ( $a \times b \div c$ )		<b>1.03</b>	<b>0.96</b>	<b>1.54</b>	<b>1.46</b>

(b) Combined portfolio beta

Project	PV	$\beta$	Weighted $\beta$	
A	197.20	1.03	0.34	
B	202.71	0.96	0.32	
C	201.60	1.54	0.52	
	<u>601.51</u>		<u>1.18</u>	
Net annual cash flows (Rs. in millions)		85.00	87.00	90.00
*Cumulative discount factor at required rate of return		2.32	2.33	2.24
<b>Present value of cash flows (Rs. in millions)</b>		<b>197.20</b>	<b>202.71</b>	<b>201.60</b>

$$* \frac{1 - (1 + i)^{-n}}{i}$$



### 10.13 FR CO-OPERATIVE HOUSING SOCIETY

#### (a) Computing the effective annual yield

		A	B	C
Investment	a	500,000	1,000,000	500,000
Public Offer Price per unit (NAV at acquisition × (1 + Buy Load))	b	10.82	10.20	9.85
No of units acquired	c = a ÷ b	46,210.72	98,039.22	50,761.42
Bonus units received (10%, 5%, 5%)	d	4,621.07	4,901.76	2,538.07
Total units at year end	e = c + d	50,831.79	102,940.98	53,299.49
Redemption value per unit (NAV at 31-Mar-2016 ÷ (1 + Sales Load))	f	10.30	10.00	9.71
Value of investment at year end	g = e × f	523,567	1,029,410	517,538
Increase in NAV	h = g - a	23,567	29,410	17,538
Cash dividend received	i	9,500	15,000	-
Total return	j = h + i	33,067	44,410	17,538
No. of days	k	183	152	121
Effective annual yield	(j ÷ a) × 365 ÷ k	13.19%	10.66%	10.58%

#### (b) Evaluation of each investment

	A	B	C
Required rate of return (W1)	12.15%	11.08%	10.92%
Effective annual yield (Computed in (a) above)	13.19%	10.66%	10.58%
Decision	Over performed	Under performed	Under performed

#### Calculation of required rate of return

	A	B	C
<i>R<sub>m</sub></i>	16%	17%	12%
Sharpe Ratio	0.71	0.31	0.16
<i>R<sub>p</sub></i> (effective annual yield, computed above)	13.19%	10.66%	10.58%
<i>R<sub>f</sub></i>	9%	9%	9%
Investment SD = [( <i>R<sub>p</sub></i> - <i>R<sub>f</sub></i> ) ÷ Sharpe Ratio]	0.06	0.05	0.10
Correlation with Index	0.75	0.92	0.83
Market SD	0.10	0.18	0.13
$\beta = \text{Inv. SD} \times \text{Corr. with index} \div \text{Market SD}$	0.45	0.26	0.64
<b>Required Return = <i>R<sub>f</sub></i> + <math>\beta</math> (<i>R<sub>m</sub></i> - <i>R<sub>f</sub></i>)</b>	<b>12.15%</b>	<b>11.08%</b>	<b>10.92%</b>

## CHAPTER 11 – DIVIDEND POLICY

### 11.1 DIVIDENDS AND RETENTIONS

The dividend growth model will be used to estimate what share price might be expected.

It is assumed that the growth rate in earnings and dividends will be  $br$ , where  $b$  is the proportion of earnings that is retained and  $r$  is the return on new investment.

- (a) Dividends are 25% of earnings and 75% of earnings are retained:

$$\text{Growth rate} = 0.75\% \times 0.09 = 0.0675.$$

$$\text{Expected share price} = \frac{0.50 (1.0675)}{(0.09 - 0.0675)} = \text{Rs. 23.72}$$

- (b) Dividends are 50% of earnings and 50% of earnings are retained:

$$\text{Growth rate} = 0.50\% \times 0.09 = 0.045.$$

$$\text{Expected share price} = \frac{1.00 (1.045)}{(0.09 - 0.045)} = \text{Rs. 23.22}$$

- (c) Dividends are 70% of earnings and 30% of earnings are retained:

$$\text{Growth rate} = 0.30\% \times 0.09 = 0.027.$$

$$\text{Expected share price} = \frac{1.40 (1.027)}{(0.09 - 0.027)} = \text{Rs. 22.82}$$

### 11.2 ACKERS PLC

(a)	Year	Net Earnings per share (Rs.)	Net dividend per share (Rs.)	Dividend as % of Earnings %
	2012	1.40	0.84	60
	2013	1.35	0.88	65
	2014	1.36	0.90	67
	2015	1.30	0.95	73
	2016	1.25	1.00	80

$$\text{Change in EPS} = \frac{0.15}{1.40} \times 100 = 10.7\% \quad \text{DPS} \frac{0.16}{0.84} \times 100 = 19\%$$

During this period, earnings per share have declined by 10.7%, while at the same time, dividend per share has increased by 19.0%

The payment ratio has increased from 60% in 2009 to 80% in 2013, and thus the proportion of earnings retained has fallen to 20%. If it is assumed that the capital structure has not changed over the period, then it can be seen that both actual earnings and return on capital employed have declined over the period.

One possible implication of this policy is that insufficient earnings have been retained to finance the investment required to at least, maintain the rate of return on capital employed. It then means that the Company is falling behind its competitors, which could have a serious impact on the long-term profitability of the business. However, Rs. 1.00 dividend per share in the current year will result in a fall in the share price.

(b) Rate of return

For the purposes of calculation, it is assumed that any new investment will earn a rate of return equivalent to that required by the shareholders (i.e. 15%), and that this will also be the level of return that is earned on existing investments for the foreseeable future. It is further assumed that investors are indifferent as to whether they receive their returns in the form of dividend or as capital appreciation.

**Option 1**

The amount of dividend per share is Rs. 1.00 with no growth forecast. The rate of return required by shareholders is 15%. The theoretical share price can be estimated using the dividend valuation model.

$$k_3 = \frac{d_1}{P_0}$$

where  $k_e$  = Cost of equity

$d_1$  = Dividend per share

$P_0$  = Market price per share

$$0.15P_0 = \text{Rs. 1.00}$$

$$\therefore P_0 = \frac{\text{Rs. 1.00}}{0.15} = \text{Rs. 6.67 ex-div or Rs. 7.67 cum-div}$$

100% of the total return will be paid as dividend.

**Option 2**

In this case, 50% of the expected return is in the form of dividend and 50% as capital appreciation.

A numerical example will clarify the position.

The rate of growth of dividend  $g$  may be expressed as:

$$g = rb$$

where  $r$  = required rate of return

$b$  = proportion of profits retained

Therefore, with dividend at 0.50 rupee per share;

$$g = 0.15 \times 0.5 = 0.075$$

$$\text{NOTE } P_0 = \frac{d_1}{r - g}$$

$$\text{where } d_1 = d_0(1+g)$$

$$P_0 = \frac{0.5 \times 1.075}{0.15 - 0.075} = \text{Rs. } 7.17$$

or Rs. 7.17 plus 0.50 rupee = Rs. 7.67 cum-div

### Option 3

In this case, 25% of the expected return is paid in form of dividend while 75% is retained.

Therefore,

$$g = 0.15 \times 0.75 = 0.1125$$

$$P_0 = \frac{0.25 \times 1.1125}{0.15 - 0.1125} = \text{Rs. } 7.416$$

$$= \text{Rs. } 7.42 \text{ ex-div.}$$

or

Rs. 7.42 plus 0.25 rupee dividend

$$= \text{Rs. } 7.67 \text{ cum-div.}$$

### Option 4

In this case, for a share price of Rs. 6.67, investors would need to believe that retained profits will be invested in projects yielding annual growth of 15% and that the share price will be at this rate. 100% of the expected return is provided in the form of capital appreciation under this option.

## 11.3 Dividend policy

- (a) The factors that determine the dividend policy of a large public company whose shares are quoted on the stock exchange include:
  - (i) **Legal Constraints:** The management of a company must recognise the existence of laws guiding payment of dividends. For example, the Companies Ordinance 1984 rules that dividends:
    - ☐ may only be paid out of profits but not those from the sale of capital assets (unless that is the business of the company); and
    - ☐ may not exceed the amount recommended by directors.
  - (ii) **Future Financial Requirement:** Once the legal constraints have been cleared, management should focus on its future financial needs including future investment opportunities. This should be done via budgeted sources and application of funds statements, budgeted cash flow statements and cash budget.
  - (iii) **Liquidity:** Dividends are usually paid out of cash. Therefore, the amount of dividend paid by the company is largely influenced by the available cash resources. Cash has alternative uses within the firm; management may, therefore, want to recognise these important alternatives (and also be protected against the future) and may, therefore, decide not to have a high target dividend-payment.

- (iv) **Capacity for borrowing:** A firm may not be liquid, but may be in a strong position to borrow at short notice. This ability can be by arranging a line of credit. The ability of a firm to borrow often largely influences its ability to meet its short-term obligations as and when due, including payment of cash dividends.
- (v) **Access to the capital market:** If the company is large enough and has good access to the corporate bond market, it needs not bother much about its liquidity situation for the purpose of paying cash dividends.
- (vi) **Existence of Restrictive Covenants:** Restrictions on payment of cash dividends may be entrenched in a loan agreement.
- (vii) **Dilution of Control:** Payment of cash dividends, supported by subsequent rising of external finance may dilute the controlling interest of the existing shareholders, if they do not partake in the provision of such finance.
- (viii) Dividend policy decisions of other similar firms
- (ix) Stock market reaction
- (x) Taxation
- (xi) Attitude of company's board of directors
- (xii) Repayment of debt
- (xiii) Liquidity preference of the dominant shareholder
- (b) A stable dividend policy is expected to lead to a higher market valuation of a company's share because this policy usually attracts a premium due to preference for current regular income by certain investors. It gives rise to positive signalling effects and also facilitates conformity with directives issued by regulatory authorities to certain institutions like the Pension Fund Administrators.
- (c) (i) Determination of market value of the firm based on retention of 20% of earnings.

$$\begin{aligned}
 \text{Dividend payable} &= 80\% \text{ of Rs. 2,250,000} \\
 &= \underline{\text{Rs. 1,800,000}} \\
 \therefore \text{MV} &= \frac{D_0 (1+g)}{K_e - g} \\
 \text{MV} &= \frac{\text{Rs. 1,800,000 (1.05)}}{0.14-0.05} \\
 &= \underline{\text{Rs. 21,000,000}}
 \end{aligned}$$

Where MV is Market Value,  $D_0$  is Initial Dividend,  $g$  is dividend growth rate,  $K_e$  is cost of capital

(ii) Retain 10%	
Dividend payable	= 90% of Rs. 2,250,000
	= <u>Rs. 2,025,000</u>
∴MV	= $\frac{\text{Rs. 2,025,000 (1.02)}}{0.14-0.02}$
	= <u>Rs. 17,212,500</u>

**Advice:**

The retention policy that favours the company is that of the retention of 20% as it will make the market value of the company higher than when 10% is retained.

**11.4 YB PAKISTAN LIMITED**

(a)	YEARS				
	1	2	3	4	5
	Rupees in million				
Existing operating profit from current projects [67.79(W1)x1.12]	75.92	85.03	95.23	106.66	119.46
Operating profit from new investment plan (W2)	-	5.85	13.05	22.95	32.85
Less: Depreciation for the year (W3)	(15.12)	(18.70)	(23.10)	(29.53)	(35.00)
Less: Interest on debt (W5)	(12.58)	(13.05)	(14.10)	(15.73)	(16.92)
Net profit before tax	48.22	59.13	71.08	84.35	100.39
Tax (38%, 36%, 34%, 34%, 34%)	(18.32)	(21.29)	(24.16)	(28.68)	(34.13)
Net profit after tax	29.90	37.84	46.91	55.67	66.26
Less: Retained for CAPEX (A x 60%)	(23.40)	(28.80)	(39.60)	(39.60)	*(48.60)
<b>Residual income for dividend distribution</b>	<b>6.50</b>	<b>9.04</b>	<b>7.31</b>	<b>16.07</b>	<b>17.66</b>

\*(Rs. 300 m x 27% x 60%)

- (b) The company would have surplus cash of Rs. 79.55 million (W5) which is less than Rs. 90 million. However, the company may pay the amount by obtaining the balance amount from its short term running finance facility.

### WORKINGS

	Rs. in millions
<b>W1: Existing operating profit</b>	
Net profit before tax and interest (190 - 110 - 30)	50.00
Add: Depreciation for current year (100.8 × 15 ÷ 85)	17.79
Operating profit	<u>67.79</u>

### W2: Operating profit from new projects

		YEARS				
		1	2	3	4	5
Year wise outlay for CAPEX in percentage terms		0%	13%	16%	22%	22%
		Rs. in million				
Year wise planned CAPEX (Rs. 300m × CAPEX %)	<b>A</b>	-	39.00	48.00	66.00	66.00
Cumulative new CAPEX	<b>B</b>	-	39.00	87.00	153.00	219.00
Yield from new projects : (B) × 15% pre-tax cash flow		-	<b>5.85</b>	<b>13.05</b>	<b>22.95</b>	<b>32.85</b>

### W3: Depreciation for the year

WDV at the beginning of year	100.80	85.68	105.98	130.88	167.35
Addition during the year (A)	-	39.00	48.00	66.00	66.00
Depreciable value	100.80	124.68	153.98	196.88	233.35
<b>Depreciation for the year</b>	<b>15.12</b>	<b>18.70</b>	<b>23.10</b>	<b>29.53</b>	<b>35.00</b>
WDV at the end of year	85.68	105.98	130.88	167.35	198.35

### W4: Interest on debts

Long term debt at the beginning of year (Rs. 135m ÷ 60 × 40)	90.00	90.00	105.60	124.80	151.20
New debt during the year (A × 40%)	-	15.60	19.20	26.40	26.40
Long Term debt at the end of year	90.00	105.60	124.80	151.20	177.6
Interest on long term debt (15 - (20 × 0.16)) ÷ 90 = 13.11%	11.80	13.84	16.36	19.82	23.28
Interest on short term debt (W5)	0.78	-	-	-	-
Interest income (W5)	-	(0.79)	(2.26)	(4.09)	(6.36)
	12.58	13.05	14.10	15.73	16.92

	YEARS				
	1	2	3	4	5
<b>(W5) Interest on short term running finance</b>					
Opening outstanding balance / (Cash)	20.00	4.88	(9.92)	(28.22)	(51.15)
Additional working capital (10% of additional CAPEX)	-	3.90	4.80	6.60	6.60
Less: Additional cash flow generated (Depreciation)	(15.12)	(18.70)	(23.10)	(29.53)	(35.00)
Debt / (balance) at the end of year	4.88	(9.92)	(28.22)	(51.15)	(79.55)
Interest on short term running finance	0.78	-	-	-	-
Interest income	-	(0.79)	(2.26)	(4.09)	(6.36)

### 11.5 AL-GHAZALI PAKISTAN LIMITED (AGPL)

- (a) Under dividend irrelevance theory, Modigliani and Miller argued that the value of the firm depends only on the income produced by its assets, not on how this income is split between dividends and retained earnings.

#### Arguments against the theory

- (i) Differing rates of taxation on dividends and capital gains can create a preference for a high dividend or one for high earnings retention.
- (ii) Dividend retention should be preferred by companies in a period of capital rationing.
- (iii) Due to imperfect markets and the possible difficulties of selling shares easily at a fair price, shareholders might need high dividends in order to have funds to invest in opportunities outside the company.
- (iv) Markets are not perfect. Because of transaction costs on the sale of shares, investors who want some cash from their investments will prefer to receive dividends rather than to sell some of their shares to get the cash they want.
- (v) Information available to shareholders is imperfect and they are not aware of the future investment plans and expected profits of their company. Even if management were to provide them with profit forecasts, these forecasts would not necessarily be accurate or believable.



- (vi) Perhaps the strongest argument against the MM view is that shareholders will tend to prefer a current dividend to future capital gains (or deferred dividends) because the future is more uncertain.

(b) **Market price per share**

Calculation of market price per share under MM dividend irrelevance theory

$$P_0 = \frac{P_1 + D_1}{1 + K_e} \quad \text{OR} \quad P_1 = P_0 \times (1 + K_e) - D_1$$

	<b>Market price if dividend</b>	
	<b>Declared</b>	<b>Not declared</b>
$P_0$	Rs. 80.00	Rs. 80.00
$D_1$	Rs. 2.00	-
$K_e$ (W1)	14.4%	14.4%
$P_1 \{80 \times (1 + 0.144) - 2\} \{80 \times (1 + 0.144) - 0\}$	Rs. 89.52	Rs. 91.52

**W1: Cost of equity under CAPM**

$$\begin{aligned} K_e &= R_f + (R_m - R_f) \beta \\ &= 0.075 + (0.129 - 0.075) 1.28 \text{ (W2)} \\ &= 14.4\% \end{aligned}$$

**W2:  $\beta$  Computation**

$$\begin{aligned} \beta &= \frac{\text{AGPL's Standard Deviation with Market Return}}{\text{Market Standard Deviation}} \times \text{Correlation of Return with Market Returns} \\ &= \frac{8\%}{5\%} \times 0.8 = 1.28 \end{aligned}$$

(c) **Justification of MM Dividend Irrelevance Theory**

		<b>No of shares to be issued</b>	
		<b>Declared</b>	<b>Not declared</b>
		<b>Rs. in million</b>	
Net income		250.00	250.00
Less: Dividend paid		40.00	-
Retained earnings		210.00	250.00
Less: New investments		(600.00)	(600.00)
Amount to be raised through right issue	A	390.00	350.00
Market price per share (as computed in (b) above)	B	89.52	91.52
Number of new shares to be issued (in million)	$C = A \div B$	4.36	3.82
Already issued share capital	D	20.00	20.00
Total number of shares to be outstanding	$E = C + D$	24.36	23.82
Market capitalization	$B \times E$	2,180	2,180

## CHAPTER 12 – FINANCING OF PROJECTS

### 12.1 GEARING

#### (a) Increase in earnings from increase in sales

	Company A		Company B	
	Rs.	% increase	Rs.	% increase
Sales	100,000	25%	100,000	25%
Variable costs	12,500		75,000	
Contribution	87,500		25,000	
Fixed operating costs	60,000		10,000	
Earnings before interest and tax	27,500	175%	15,000	50%
Interest costs	7,000		0	
Profit before tax	20,500		15,000	
Tax at 20%	4,100		3,000	
Earnings after interest and tax	16,400	583.3%	12,000	50%

#### (b) Further calculations

	Company A		Company B	
<b>Operational gearing</b>				
= Increase in earnings before interest and tax/increase in sales	(175/25)	7.0	(50/25)	2.0
<b>Financial gearing</b>				
= Increase in earnings after interest and tax/ increase in earnings before interest and tax	(583.3/175)	3.3	(50/50)	1.0
<b>Combined gearing effect</b>				
= Increase in earnings after interest and tax/ increase in sales	(583.3/25)	23.3	(50/25)	2.0

The combined gearing effect is the operational gearing effect multiplied by the financial gearing effect.

For company A, a combination of high operational gearing and high financial gearing will result in a 583% increase in earnings for shareholders, as a consequence of a 25% increase in sales.

For company B, a combination of operational gearing and financial gearing will result in a 50% increase in earnings for shareholders, as a consequence of a 25% increase in sales.

## 12.2 FINANCING SCHEMES

(a) Projected statements of profit or loss for the year ended 30<sup>th</sup> November

	Financing method		
	i	ii	iii
	Rs. m	Rs. m	Rs. m
Profit before interest and tax: (17.9 + 5.0)	22.9	22.9	22.9
Interest payable	1.5	2.1	2.1
Profit before tax	21.4	20.8	20.8
Taxation (25%)	5.4	5.2	5.2
Profit after tax	16.0	15.6	15.6
Preference dividend	0.0	1.4	0.0
Profit available to ordinary shareholders	16.0	14.2	15.6
Number of shares			
20.0 + 9.0	29.0m		
		20.0m	
20.0 + 6.0			26.0m
Earnings per share =	Rs.0.552	Rs.0.71	Rs.0.60
	Rs. m	Rs. m	Rs. m
Accumulated profit at start of the year	17.8	17.8	17.8
Profit available to equity for the year	16.0	14.2	15.6
Dividend payments (Rs.0.30 per share)	(8.7)	(6.0)	(7.8)
Accumulated profit at end of the year	25.1	26.0	25.6
Equity shares	14.5	10.0	13.0
Share premium	13.5	0.0	9.0
General reserve	4.6	4.6	4.6
Total share capital and reserves	57.7	40.6	52.2
Fixed rate long-term capital:			
10% debentures	15.0	21.0	21.0
Preference shares	0.0	12.0	0.0
Total long-term capital	72.7	73.6	73.2
Gearing	15.0/72.7	33.0/73.6	21.0/73.2
	20.6%	44.8%	28.7%

Other methods of calculating the gearing ratio would be acceptable.

- (b) Financing scheme (i) produces the lowest EPS of the three options. This EPS is also lower than the current EPS of Rs.0.615.

Financing scheme (ii) produces the highest EPS. It is also the only option that produces a higher EPS than the current EPS. However the gearing ratio is substantially higher than the current gearing ratio or the gearing ratios of the other options. The projected statements of profit or loss show a high level of coverage for interest payments under this option and therefore the relatively high level of gearing is unlikely to be a problem.

Financing option (iii) produces an EPS that is lower than the current EPS and lower than the EPS of option (ii). However the gearing ratio is fairly low, indicating a relatively low level of financial risk.

### 12.3 MM, GEARING AND COMPANY VALUATION

Value of geared company = Value of company ungeared + (Value of debt × Tax rate)

$$V_g = V_u + Dt$$

$$V_g = (4,000,000 \times \text{Rs. } 10) + (\text{Rs. } 15,000,000 \times 30\%) = \text{Rs. } 44,500,000$$

	<b>Rs. million</b>
Total value of geared company (equity + debt)	44.5
Value of debt	(15.0)
Therefore value of equity in geared company	29.5

The total value of the equity in the geared company is lower than when the company was ungeared, but there are fewer shares left in issue and the value per share will be higher.

### 12.4 DIVERSIFY

(a)

The first step is to use the equity betas of the three chemical manufacturing companies (proxy companies) to estimate an asset beta for the business risk in chemicals manufacturing.

Company	Estimated asset beta
A	$2.66 \times [40/40 + 60(1 - 0.25\%)] = 2.66 \times 0.4706 = 1.25$
B	$1.56 \times [75/75 + 25(1 - 0.25\%)] = 1.56 \times 0.80 = 1.25$
C	$1.45 \times [80/80 + 20(1 - 0.25\%)] = 1.45 \times 0.8421 = 1.22$

It is assumed that the asset beta is a simple average of these three values:

$$(1.25 + 1.25 + 1.22)/3 = 1.24.$$

This asset beta can be used to calculate an equity beta for Bustru, for the investment in chemicals manufacturing:

$$1.24 = \beta_E \times \left[ \frac{60}{60 + 40(1 - 0.25)} \right]$$

$$0.667 \beta_E = 1.24$$

$$\beta_E = 1.86$$

If an appropriate equity beta for Bustru in chemicals manufacturing is 1.86, the **cost of equity** (using the CAPM) is:

$$5\% + 1.86(9 - 5)\% = 12.44\%$$

(b)

If the cost of equity is 12.44%, the pre-tax cost of debt is 5% (= risk-free rate) and tax is 25%, a suitable discount rate (WACC) for evaluating the proposed investment would be:

$$(60\% \times 12.44\%) + [40\% \times 5(1 - 0.25)\%] = 8.964\%, \text{ say } 9\%.$$

## 12.5 FINANCIAL AND OPERATING GEARING

(a) Existing earnings per share =

$$\frac{\text{Net profit after tax}}{\text{Number of equity shares}} = \frac{\$344,000/800,000}{\$0.43}$$

Earnings per share with new production process:

	Rs.000	Rs.000
Sales		1,800
Minus:		
Variable costs: (60,000 × Rs. 5)	300	
Fixed costs: (360 + 120)	480	
		<u>780</u>
Net profit before interest and taxation		1,020
Interest payable [190 + (12.5% × Rs. 2 million)]		<u>440</u>
Net profit before taxation		580
Tax at 35%		<u>203</u>
Net profit after taxation		<u>377</u>
EPS = $\frac{\$377,000}{800,000}$	\$0.4713	

There is an increase in EPS of Rs.0.0413

- (b) (i) The degree of operating gearing

$$= \frac{\text{Contribution}}{\text{Profit before interest and tax}}$$

$$= \frac{1800 - 300}{1020}$$

$$= 1.47 \text{ times}$$

- (ii) The degree of financial gearing

$$= \frac{\text{Profit before interest and tax}}{\text{Profit after interest but before tax}}$$

$$= \frac{1020}{1020 - 440}$$

$$= 1.76 \text{ times}$$

- (iii) The combined gearing effect =
- $1.47 \times 1.76 = 2.59$

## 12.6 OPTIMAL WACC

The optimal WACC is the lowest WACC, because this will maximise the value of the company and the wealth of shareholders.

### Step 1

Calculate the geared beta for equity at each level of gearing.

Gearing	Geared beta		
20%	$0.90 \times \frac{80 + 20(1 - 0.30)}{80}$	=	1.0575
30%	$0.90 \times \frac{70 + 30(1 - 0.30)}{70}$	=	1.170
40%	$0.90 \times \frac{60 + 40(1 - 0.30)}{60}$	=	1.320
50%	$0.90 \times \frac{50 + 50(1 - 0.30)}{50}$	=	1.530
60%	$0.90 \times \frac{40 + 60(1 - 0.30)}{40}$	=	1.845

### Step 2

Use the geared beta value and the CAPM to calculate a cost of equity at each gearing level.

Gearing	Cost of equity ( $4\% + \beta(9 - 4)\%$ )	
20%	$4 + 1.0575 \times 5$	= 7.17%
30%	$4 + 1.170 \times 5$	= 7.51%
40%	$4 + 1.320 \times 5$	= 7.96%
50%	$4 + 1.530 \times 5$	= 8.59%
60%	$4 + 1.845 \times 5$	= 9.54%

### Step 3

Calculate the WACC at each level of gearing, and identify the gearing level with the lowest WACC.

Gearing	WACC		
20%	$[20\% \times 5.0 (1 - 0.30)]$	$+ [80\% \times 7.17]$	$= 6.44\%$
30%	$[30\% \times 5.4 (1 - 0.30)]$	$+ [70\% \times 7.51]$	$= 6.39\%$
40%	$[40\% \times 5.8 (1 - 0.30)]$	$+ [60\% \times 7.96]$	$= 6.40\%$
50%	$[50\% \times 6.5 (1 - 0.30)]$	$+ [50\% \times 8.59]$	$= 6.58\%$
60%	$[60\% \times 7.2 (1 - 0.30)]$	$+ [40\% \times 9.54]$	$= 6.84\%$

### Conclusion

The optimal gearing level is 30%, because the WACC is lowest at this gearing level. However, the WACC is almost as low at a gearing level of 40%.

## 12.7

### GEARED BETA

- (a) The current proportion of equity in the capital structure is  $1,500/(1,500 + 500) = 0.75$  or 75%.

The current proportion of debt in the capital structure is  $500/(1,500 + 500) = 0.25$  or 25%.

Cost of equity =  $5\% + 1.126 (11 - 5)\% = 11.756\%$ .

Since the beta factor of debt is 0, the debt must be risk-free, with a pre-tax cost of 5%.

WACC =  $[0.25 \times 5.0 (1 - 0.30)] + [0.75 \times 11.756] = 9.692\%$ , say 9.7%

- (b) The asset beta of a company is a measure of the systematic business risk in the company's business operations. This is a measure of systematic risk assuming that the company is all-equity financed.

To convert the current geared beta into an asset beta given that debt capital is risk-free:

$$\beta_A = \beta_E \times \left[ \frac{E}{E + D (1 - T)} \right]$$

$$\beta_A = 1.126 \times \left[ \frac{75}{75 + 25 (1 - 0.30)} \right]$$

$$\beta_A = 0.913$$

- (c) If the company is geared differently, its equity beta will not be 1.126 because its financial risk will be different. A **geared beta** can be calculated for the new gearing level.

$$0.913 = B_{\text{geared}} \times \frac{60}{60 + 40 (1 - 0.30)}$$

$$B_{\text{geared}} = \frac{0.913}{0.6818} = 1.339$$

This geared beta factor can now be used to calculate the **cost of equity** at this gearing level.

$$\text{Cost of equity} = 5\% + 1.339 (11 - 5)\% = 13.03\%.$$

**WACC at this gearing level.** It is assumed that the cost of debt remains risk-free.

$$\text{WACC} = (60\% \times 13.03\%) + [40\% \times 5\%(1 - 0.30)] = 9.218\%, \text{ say } 9.2\%$$

## 12.8 ADJUSTED PRESENT VALUE

### Capital allowances: Workings

Year of claim	Rs.	Tax saving at 35%	Year of cash flow
	Rs.	Rs.	
	450,000		
0	(315,000)	110,250	1
	135,000		
1	(45,000)	15,750	2
	90,000		
2	(45,000)	15,750	3
	45,000		
3	(45,000)	15,750	4
	0		

#### (a) Current WACC

$$\text{Cost of equity} = 10\% + 1.8(15 - 10)\% = 19\%.$$

$$\text{WACC} = (0.80 \times 19\%) + [0.20 \times 10\%(1 - 0.65)] = 16.5\%$$

Year	0	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Machine	(450)				
Tax saved, tax allowances		110.25	15.75	15.75	15.75
Cash profits		220.00	220.00	220.00	
Tax on cash profits (35%)			(77.0)	(77.0)	(77.00)
Net cash flow	(450)	330.25	158.75	158.75	(61.25)
Discount factor at 16.5%	1.000	0.858	0.737	0.632	0.543
Present value	(450)	283.35	117.00	100.33	(33.26)
<b>NPV = + Rs. 17,420</b>					



**(b) WACC adjusted for business risk and financial risk****Step 1**

Calculate an ungeared beta for the plastics industry.

$$= 1.356 \times \frac{5}{5 + 1(1 - 0.35)} = 1.20$$

The company's gearing is 60% equity and 40% debt; therefore we need to re-gear the equity beta for the company.

$$1.20 = \text{Beta}_{\text{geared}} \times \frac{60}{60 + 40(1 - 0.35)}$$

$$\text{Beta}_{\text{geared}} = 1.72$$

The cost of equity for the project is therefore  $10\% + 1.72 (15\% - 10\%) = 18.6\%$ .

$$\text{WACC} = (0.60 \times 18.6\%) + (0.40 \times 10\% (1 - 0.35)) = 13.76\%, \text{ say } 14\%.$$

Year	0	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Net cash flows (as in (a))	(450.00)	330.25	158.75	158.75	(61.25)
DCF factor at 14%	1.000	0.877	0.769	0.675	0.592
Present value	(450.00)	289.63	122.08	107.16	(36.26)
<b>NPV = Rs. 32,610</b>					

**(c) APV method****Step 1**

The ungeared beta for the plastics industry is 1.20 (see above)

The cost of ungeared equity in the industry is  $10\% + 1.20 (15\% - 10\%) = 16\%$ .

The cash flows of the project are discounted at this cost of capital, to obtain the base case NPV.

Year	0	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Net cash flow	(450.00)	330.25	158.75	158.75	(61.25)
DCF factor at 16%	1.000	0.862	0.743	0.641	0.552
Present value	(450.00)	284.68	117.95	101.76	(33.81)
Base case NPV = Rs. 20,580					

## Step 2: PV of issue costs

Issue costs before tax	Net finance obtained		Issue costs
	Rs.		Rs.
Debt: (40% × 450,000)	180,000	2%	3,600
Equity: (60% × 450,000)	270,000	5%	13,500
Total issue costs			17,100

The PV of issue costs is calculated using the risk-free rate of 10% as the discount rate.

Year	Item	Cash flow	Discount factor at 10%	PV
		Rs.		Rs.
0	Issue costs	(17,100)	1.000	(17,100)
1	Tax saved at 35%	5,985	0.909	5,440
<b>PV of issue costs</b>				<b>(11,660)</b>

## Step 3: PV of tax shield

The amount borrowed will be Rs. 180,000 + Rs. 3,600 = Rs. 183,600.

The interest rate will be 10%.

If the loan is repaid in three 1equal annual instalments, the annual repayments will be:

$$\frac{\text{Loan}}{\text{PV factor, years 1–3 at 10\%}} = \frac{\$183,600}{2,487} = \$73,824$$

Year	Balance at beginning of year	Loan payment	Interest at 10%	Loan repayment
	Rs.	Rs.	Rs.	Rs.
1	(183,600)	73,824	18,360	55,464
	(55,464)			
2	128,136	73,824	12,814	61,010
	(61,010)			
3	67,126	73,824	6,713	67,111
	(67,111)			
Balance	15	(rounding error)		

Year of interest cost	Interest	Year of tax saving	Tax saving at 35%	DCF factor at 10%	PV of tax saving
	Rs.		Rs.		Rs.
1	18,360	2	6,426	0.826	5,308
2	12,814	3	4,485	0.751	3,368
3	6,713	4	2,350	0.683	1,605
PV of tax shield					10,281

Adjusted present value

	Rs.
Base case NPV	20,580
PV of issue costs	(11,660)
PV of tax shield	10,281
APV	+ 19,201

## 12.9 APV METHOD

### (a) Modigliani-Miller formula approach

Ungeared beta for the telecommunications industry:

$$= 1.30625 \times \frac{80}{80 + 20(1 - 0.25)}$$

$$= 1.10$$

The company's gearing is 70% equity and 30% debt; therefore we need to re-gear the equity beta for the company.

$$1.10 = \text{Beta}_{\text{geared}} \times \frac{70}{70 + 30(1 - 0.25)}$$

$$\text{Beta}_{\text{geared}} = 1.45$$

The cost of equity for the project is therefore  $4\% + 1.45(9\% - 4\%) = 11.25\%$ .

$$\text{WACC} = (0.70 \times 11.25\%) + (0.3 \times 4\%(1 - 0.25))$$

$$= 7.875\% + 0.9\%$$

$$= 8.775\%, \text{ say } 8.8\%$$

Year	0	1	2	3	4
	Rs.	Rs.	Rs.	Rs.	Rs.
Capital expenditure	(200,000)				
Cash profits		100,000	165,000	120,000	
Tax at 25%			(25,000)	(41,250)	(30,000)
Net cash flow	(200,000)	100,000	140,000	78,750	(30,000)
DCF factor at 8.8%	1.000	1/(1.088)	1/(1.088) <sup>2</sup>	1/(1.088) <sup>3</sup>	1/(1.088) <sup>4</sup>
Present value	(200,000)	91,912	118,269	61,145	(21,409)
<b>NPV = Rs. 49,917</b>					

**(b) APV method**

The ungeared beta for the telecommunications industry is 1.10 (see above)

The cost of ungeared equity in the industry is  $4\% + 1.10 (9\% - 4\%) = 9.5\%$ .

The cash flows of the project are discounted at this cost of capital, to obtain the base case NPV.

Year	0	1	2	3	4
	Rs.	Rs.	Rs.	Rs.	Rs.
Capital expenditure	(200,000)				
Cash profits		100,000	165,000	120,000	
Tax at 25%			(25,000)	(41,250)	(30,000)
Net cash flow	(200,000)	100,000	140,000	78,750	(30,000)
DCF factor at 8.8%	1.000	$1/(1.095)$	$1/(1.095)^2$	$1/(1.095)^3$	$1/(1.095)^4$
Present value	(200,000)	91,324	116,762	59,980	(20,867)

**Base case NPV = Rs. 47,199**

PV of issue costs

Issue costs before tax:	Rs.
Equity	Rs. 1,000,000 × 4/96
Debt	Rs. 1,000,000 × 3/97
Total issue costs	72,595

The PV of issue costs is calculated using the risk-free rate of 4% as the discount rate.

Year	Item	Cash flow	Discount factor at 4%	PV
		Rs.		Rs.
0	Issue costs	(72,595)	1.000	(72,595)
1	Tax saved at 25%	18,149	0.962	17,459
	PV of issue costs			(55,136)

PV of tax shield

The amount borrowed will be Rs. 1,000,000 + Rs. 30,928 = Rs. 1,030,928.

The interest rate will be 4%.

The annual interest cost will be Rs. 1,030,928 × 4% = Rs. 41,237 each year, years 1 – 3.

The reduction in tax due to the interest payments = Rs. 10,309 (= 25% × Rs. 41,237) each year, years 2 – 4.

Discount factor at 4%, years 1 – 4	3.630
Discount factor at 4%, year 1	0.962
Discount factor at 4%, years 2 – 4	2.668

**PV of tax shield** = Rs. 10,309 × 2.668 = Rs. 27,504.

Adjusted present value

	Rs.
Base case NPV	47,199
PV of issue costs	(55,136)
PV of tax shield	27,504
APV	+ 19,567

## 12.10 MORE APV

It is assumed that the company's debt capital will be risk-free.

The asset beta for the industry is  $1.39 \times 80/[80 + 20(1 - 0.25)] = 1.17$

The cost of ungeared equity in the industry is  $6\% + 1.17(10 - 6)\% = 10.68\%$ .

This will be rounded up to 11%.

Only relevant cash flows should be included in the DCF analysis. Non-relevant costs are the market research cost (already incurred, so a sunk cost) and head office allocated charges (a non-cash cost).

Note: an increase in head office spending as a result of undertaking a project would be a relevant cost.

Year	0	1	2	3	4	5	6
	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000	Rs.000
Revenue		6,800	7,800	8,800	9,200	9,476	9,760
Operating costs		5,500	6,600	7,100	7,500	7,725	7,957
Head office		50	50	50	60	60	60
Royalty payments	600	500	400	300	200	200	200
Lost contribution		100	100				
Tax-allowable dep'n		600	480	480	480	480	480
	600	6,750	7,630	7,930	8,240	8,465	8,697
Taxable profit	(600)	50	270	870	960	1,011	1,063
Tax at 25%	150	(13)	(68)	(218)	(240)	(253)	(266)
	(450)	37	202	652	720	758	797
Add back dep'n	-	600	480	480	480	480	480
Equipment	(3,000)						
Working capital	(400)						400
Net cash flow	(3,850)	637	682	1,132	1,200	1,238	1,277
DCF factor 11%	1.000	0.901	0.812	0.731	0.659	0.593	0.535
Present value	(3,850)	574	554	827	791	734	897

The base case NPV, discounting the cash flows at the ungeared cost of equity, is (in Rs.000) + 527.

**Issue costs**

Issue costs will be 2%. The net borrowing after issue costs needs to be Rs. 3,400,000; therefore the gross amount borrowed will need to be Rs. 3 million/0.98 = Rs. 3,469,400. Issue costs will be (2%) Rs. 69,000. It is assumed that this is a Year 0 cost.

There is no tax relief on issue costs

**Tax shield**

The annual interest cost will be Rs. 3,469,400 × 6% = Rs. 208,164.

Tax relief each year will be (25%) Rs. 52,041

Annuity factor at 6% (the risk-free cost of capital), Years 1 – 6 = 4.917.

Present value of tax shield = Rs. 255,886, say Rs. 256,000.

	Rs.000
Base case NPV	527
PV of issue costs	(69)
PV of tax shield	256
<b>Adjusted present value</b>	<b>+ 714</b>

**12.11 JALIB LIMITED**

(a)	Rs. in million
Existing value of equity	672
Existing value of debt	599
Total MV of the company before investments	1,271
<b>Increase in MV if the new project to be undertaken</b>	
NPV of new project, if funded from all equity	60
Investment required	399
Total Market Value of the company after investment (ungeared)	1,730
Benefit of tax shield on debt funding (D × t) (Assume the value of debt = X)	35% of X
Total market value of the company after investments (geared)	Rs. 1,730 + 35% of X
Maximum debt will be half of the above i.e.	Rs. 865 + 17.5% of X
Existing debt	599
Hence, new debt should be	Rs. 266 + 17.5% of X
New debt will be (Rs. 266 / 82.5%)	322
Less: Total investments required	399
Minimum increase in equity required	77

(b)	(i)	Rs. in million
	Existing equity	672
	New equity	77
	NPV of the new project (ungeared)	60
	Benefit of tax shield on debt funding (Rs. 322 x 35%)	113
	<b>Value of equity after investment is taken up</b>	<b>922</b>
	Price to remain the same	Rs. 16.8
	Hence, number of new total shares	54,880,952
	Existing shares (given)	40,000,000
	New shares to be issued	14,880,952
	<b>Right shares ratio (14,880,952 / 40,000,000)</b>	<b>3.72:10</b>
		Rs.
	Amount to be raised through equity	77,000,000
	Right share price (Rs. 77,000,000 / 14,880,952)	Rs. 5.17
		Rs.
(ii)	Value of equity after investment is taken up	922,000,000
	No. of shares already issued	40,000,000
	New issue of ordinary shares (Rs. 77,000,000 / Rs. 14)	5,500,000
		45,500,000
	Market value of shares after new share issue	Rs. 20.26

## 12.12 JAVED LIMITED

### Weighted average cost of capital

	Value rupees	Cost %	Cost rupees
Equity	(W3)120,000,000	(W1)24.09	28,905,120
Debt	(W5)152,538,000	15.00	22,880,700
	272,538,000		51,785,820

$$\begin{aligned} \text{WACC} &= \frac{51,785,820}{272,538,000} \\ &= 19\% \end{aligned}$$

**W1: Cost of equity**

$$K_e(g) = K_e(u) + [(K_e(u) - K_d) \times D/E]$$

$$K_e(g) = 19\% + [(19\% - 15\%) \times 1.27115] \text{ (W2)}$$

$$K_e(g) = 24.09\%$$

**W2: Debt Equity Ratio**

$$= \frac{152,538,000 \text{ (W5)}}{120,000,000 \text{ (W3)}}$$

$$= 1.27115$$

**W3: Market value of equity**

$$\text{Market value of equity} = \text{Profit} \times \text{P/E ratio}$$

$$= 15,000,000 \times 8 = 120,000,000$$

**W4: Market value of TFC's**

Cost of debt (6 months KIBOR + 1%) i.e. (14% + 1%)	15.00%
Actual markup (6 months KIBOR + 2%) i.e. (14% + 2%)	16.00%

**W5 Present value of outflows against TFCs**

Date	Description	Markup at 16%	Discount factor 15.00%	PV
31-Dec-08	Markup payment	12,000,000	0.930	11,160,000
30-Jun-09	Markup payment	12,000,000	0.865	10,380,000
31-Dec-09	Markup payment	12,000,000	0.805	9,660,000
30-Jun-10	Markup payment	12,000,000	0.749	8,988,000
30-Jun-10	Redemption	150,000,000	0.749	112,235,000
				152,538,000

**12.13 GHI LIMITED****Advise:**

Debt ratio of 40% is the optimal debt structure as at this level the WACC is at the lowest.

**Weighted Average Cost of Capital (WACC)**

	Debt ratios			
	0%	10%	40%	50%
Wd	0.00%	10.00%	40.00%	50.00%
Kd	0.00%	8.00%	10.00%	12.00%
We	100.00%	90.00%	60.00%	50.00%
Ke (Working 1)	10.80%	11.20%	12.00%	12.80%
Tax	35.00%	35.00%	35.00%	35.00%
WACC = WdKd (1-t) + WeKe	10.80%	10.60%	<b>9.80%</b>	10.30%



**Working 1: Cost of equity**

	Debt ratios			
	0%	10%	40%	50%
Beta	1.20	1.30	1.50	1.70
R <sub>f</sub>	6.00%	6.00%	6.00%	6.00%
R <sub>m</sub>	10.00%	10.00%	10.00%	10.00%
<b>Re = R<sub>f</sub> + β(R<sub>m</sub> - R<sub>f</sub>)</b>	<b>10.80%</b>	<b>11.20%</b>	<b>12.00%</b>	<b>12.80%</b>

**12.14 NS TECHNOLOGIES LIMITED**

- (a) APV separates project value into one component associated with the unlevered operating cash flows and another associated with financing the project. Each component is evaluated separately.

The disaggregation of cash flows is undertaken so that different discount rates may be used. As operating cash flows are more risky, they are discounted at higher rate.

**Comparative advantages of APV over WACC**

- Unbundles major components of value – drivers of value are much more apparent under APV than WACC.
- Miscalculation in WACC, sometimes, produces large errors in the estimates of value. APV is less prone to such miscalculations.
- Show better result when there are significant changes in capital structure.

- (b) **Adjusted present value**

**Rs in million**

**Net present value on the basis of revised K<sub>e</sub>**

	Years	Cash flows (Rs. in million)	Discount @ 18.72% (W1)	Present value (Rs. in million)
Investments	0	(600.00)	1.00	(600)
After tax cash flows <b>(180 x 0.65)</b>	1-8	117.00	*13.99	467
Residual value	8	90.00	0.30	27

**Net present value on the basis of revised K<sub>e</sub>** **(106)**

Tax shield [(600 x 55% x 9% x 35% x \*26.21] 65

Issue

costs                      -      Right shares (3% x 600 x 45% x (1 - 0.35)) (5)

                                    -      Loan (1% x 600 x 55% x (1 - 0.35)) (2)

(48)

$$*1 \frac{1 - (1 + 0.1872)^{-8}}{0.1872(W - 1)}$$

$$*2 \frac{1 - (1 + 0.06)^{-8}}{0.06}$$

## Conclusion

The project is not feasible for the company as the APV of the project is negative.

### W1: Cost of equity

$$K_e = R_f + (R_m - R_f) \times \beta_e$$

$$K_e = 6\% + (14\% - 6\%) \times 1.59 \text{ (W2)}$$

$$= 18.72\%$$

### W2: Calculating Equity Beta for Telecommunication Industry

$$\beta_a = \beta_e \frac{E}{E + D(1 - t)} + \beta_d \frac{D(1 - t)}{E + D(1 - t)}$$

$$1.5 = \beta_e \frac{60}{60 + 40(1 - 0.35)} + 1.3 \frac{40(1 - 0.35)}{60 + 40(1 - 0.35)}$$

$$\beta_e = 1.59$$

## 12.15 COPPER INDUSTRIES LIMITED

### (a) (i) Weighted average cost of capital

*Existing WACC =*

- (Equity % (W1) x  $K_e$  (W2)) + (Debt % (W1) x  $K_d$  (1-t))

$$= (60\% \times 17\% \text{ (W2)}) + (40\% \times 9\% \times 65\%) = 12.54\%$$

- 70% equity 30% debt

$$\text{WACC} = (70\% \times 15.9\% \text{ (W2)}) + (30\% \times 8\% \text{ (W3)} \times 65\%) = 12.70\%$$

- 50% equity 50% debt

$$\text{WACC} = (50\% \times 18.5\% \text{ (W2)}) + (50\% \times 11\% \text{ (W3)} \times 65\%) = 12.83\%$$

### (ii) Value of the company

- Current value of the company (825+550) = Rs. 1.375 million

- Value of the company at 70% equity 30% debt

$$\text{WACC (Computed above)} = 12.70\%$$

$$\text{Valuation} = \frac{112.55 \times 1.0403}{0.1270 - 0.0403(W - 5)} = 1350 \text{ million}$$

- Value of the company at 50% equity 50% debt

$$\text{WACC (Computed above)} = 12.83\%$$

$$\text{Valuation} = \frac{112.55 \times 1.0403}{0.1283 - 0.0403(W - 5)} = 1330 \text{ million}$$

### W1: Existing debt equity ratio

$$\text{Equity} = \frac{825}{1375} = 60\%$$

$$\text{Debt} = \frac{550}{1375} = 40\%$$

### W2: Cost of equity

- Existing

$$K_e = r_f + (r_m - r_f)\beta$$

$$K_e = 7\% + (15\% - 7\%) \times 1.25 = 17\%$$

- At 70% equity 30% debt

$$K_e = 7\% + (15\% - 7\%) \times 1.115 = 15.9\%$$

$$\beta_e = \beta_a \frac{E + D(1-t)}{E} = * 0.872 \frac{70\% + 30\% \times 65\%}{70\%} = 1.115$$

- At 50% equity 50% debt

$$K_e = 7\% + (15\% - 7\%) \times 1.439 = 18.5\%$$

$$\beta_e = \beta_a \frac{E + D(1-t)}{E} = * 0.872 \frac{50\% + 50\% \times 65\%}{50\%} = 1.439$$

$$\begin{aligned} * \quad \beta_a &= \beta_e \frac{E}{E + D(1-t)} + \beta_d \frac{D(1-t)}{E + D(1-t)} \\ &= 1.25 \frac{825}{825 + 550 \times 65\%} + 0 = 0.872 \end{aligned}$$

### W3 : Cost of debt

- At 70% equity 30% debt

Since interest cover has an inverse relationship, we assume decline in debt moves the CIL to lower category of interest rate:

30% debt in existing market value of the company (30% x 1375) = 412.5

Cost of debt = (8% x 412.5) = 33

Interest cover = (327\* ÷ 33) = 9.91

∴  $K_d = 8\%$

\* Profit before interest and tax

▪ *At 50% equity 50% debt*

Since interest cover has an inverse relationship, we assume increase in debt moves the CIL to upper category of interest rate:

50% debt in existing market value of the company (50% x 1375) = 687.5

Cost of debt is = (11% x 687.5) = 75.63

Interest cover = (327 ÷ 75.63) = 4.32

$K_d = 11\%$

**W4: Current Free cash flow (FCF<sub>0</sub>)**

**Rs. in million**

Profit before tax	272.00
Add: Interest	55.00
Profit before tax and interest	327.00
Less: Income tax @ 35%	114.45
Profit after tax	212.55
Add: Depreciation	50.00
Less	
: Capital expenditures	(150.00)
Free cash flow	112.55

**W5 Computation of growth factor**

$$\text{Current valuation} = 1375 = \frac{FCF_1}{(k - g)}$$

$$1375 = \frac{FCF_1}{(k - g)} \Rightarrow 1375 = \frac{112.55(1 + g)}{0.1254 - g}$$

$$1375(0.1254 - g) = 112.55(1 + g) \Rightarrow 59.88 = 148.8g \Rightarrow g = 4.03\%$$

**(b) Evaluation of the above options**

(i) The existing debt equity structure gives the lowest WACC i.e. 12.54%.

If debt equity ratio is decreased, some of the benefits of tax shield on debt are lost.

If debt equity ratio is increased, the financial risks cause an increase in the cost of debt.

Since the existing debt equity ratio gives the lowest WACC and resultantly the highest valuation to the company, the capital structure of the company should not be changed.

## 12.16 MAC FERTILIZER LIMITED

### DIRECTOR A's RECOMMENDATION : Evaluation on the basis of Existing WACC

$$WACC = K_e \times \frac{V_e}{V_e + V_d} + k_d \times \frac{V_d}{V_e + V_d}$$

$$V_e = 700 \times 80.00 = \text{Rs. } 56,000 \text{ million}$$

$$V_d = 280 \times 102.50 = \text{Rs. } 28,700 \text{ million}$$

$$\underline{\underline{84,700}}$$

$$WACC = 14.5\% (\mathbf{W1}) \times \frac{56,000}{84,700} + 7.5\% (\mathbf{W2}) \times \frac{28,700}{84,700} = 12.1\%$$

#### W1: Cost of equity

$$\begin{aligned} k_e &= R_f + (R_m - R_f) \times \beta \\ &= 8\% + (13\% - 8\%)1.3 = 14.5\% \end{aligned}$$

#### W2: Cost of debt

Year	Description	Cash flows (Rs.)	Discount factor (6%)	PV (Rs.)	Discount factor (9%)	PV (Rs.)
0	Price of TFC	(102.50)	1.000	(102.50)	1.000	(102.50)
	Interest (Rs. 100 × 11.5% × (1-30%))	8.05	4.212	33.91	3.890	31.31
5	Repayment	100	0.747	74.70	0.650	65.00
				<u>6.11</u>		<u>(6.19)</u>

Calculating the cost of debt using IRR

$$k_d = 6\% + \frac{6.11}{(6.11 + 6.19)} \times 3\% = 7.49\%$$

### DIRECTOR B's RECOMMENDATION: Evaluation on the basis of Project Specific Cost of Capital

$$WACC = K_e \times \frac{V_e}{V_e + V_d} + k_d \times (1 - t) \frac{V_d}{V_e + V_d}$$

$$WACC = 19.82\% (\mathbf{W - 3}) \times \frac{1,620}{3,600} + 8.4\% (\mathbf{W - 4}) \times \frac{1,980}{3,600} = 13.54\%$$

**W3: Cost of equity**

$$k_e = 8\% + (5\%) \times 2.364 (W - 5) = 19.82\%$$

**W4: Cost of debt**

$$k_d = 12.0\% \times (1 - 30\%) = 8.4\%$$

**W5: Computation of project specific beta**

Un-gearred Steel Company Beta

$$B_u = B_g \times \frac{V_e}{V_e + V_d(1 - t)} + B_d \times \frac{V_d(1 - t)}{V_e + V_d(1 - t)}$$

where,

$$V_e = 900 \times 35 = 31,500,$$

$$V_d(1 - t) = 8,000 \times 70\% = 5,600$$

$$B_g = 1.5$$

$$B_u = 1.5 \times \frac{31,500}{(31,500 + 5,600)} + 0 = 1.274$$

Get the project beta on the basis of steel company un-gearred beta

$$B_g = B_u + (B_u - B_d) \times \frac{V_d(1 - t)}{V_e}$$

$$B_g = 1.274 + 1.274 \times \frac{1,980 \times 70\%}{1,620} = 2.364$$

**Appropriateness of discount rate**

The view expressed by the Director A is not worthwhile because:

- ☐ existing WACC only reflects the current business and financial risk. It does not incorporate the additional risk of the new sector as well as additional return required by the company's shareholders.
- ☐ the proportion of debt in the investment i.e. 55% is quite high as compare to existing debt proportion i.e. 34%. The financial risk has therefore increased and it could therefore be argued that current WACC is not an acceptable discount rate.
- ☐ rate used for evaluation of the project i.e. 17% is too high as it is based only on the relatively high cost of equity and ignores the amount of debt that will be used to finance the project.

The suggestion given by the Director B is worthwhile as the project specific cost of capital (based on steel industry's risk) incorporates the business and financial risk of the new sector, in which MFL intends to invest and also incorporates the higher return expectation of the shareholder because of increase in financial risk.

## CHAPTER 13 – BUSINESS VALUATION

### 13.1 VALUATION MODEL

- (a) Expected share price = Rs. 24/0.08 = Rs. 300
- (b) Expected share price = Rs. 24(1.03)/(0.08 – 0.03) = Rs. 494
- (c) Expected growth rate in dividends = 60% × 9% = 5.4%.

$$\text{Expected share price} = \frac{\text{Rs. } 24(1.054)}{(0.08 - 0.054)} = \text{Rs. } 973$$

### 13.2 VALUATION

The dividend growth model:

$$800 = \frac{38(1+g)}{(0.10-g)}$$

$$800(0.10 - g) = 38(1 + g)$$

$$80 - 800g = 38 + 38g$$

$$838g = 42$$

$$g = 0.05 \text{ or } 5\%.$$

An expected dividend growth rate of 5% per year is required to achieve a share price of 800.

### 13.3 VALUATION OF BONDS

#### (a) 7.5% irredeemable bonds

$(7.5/9.0) \times 100 = 83.33$ . (Rs. 83.33 market value for each Rs. 100 nominal value of bonds.)

#### (b) 6% redeemable bond

Year	Item	Cash flow	Discount factor at 9%	PV
1 – 3	Interest	6	2.531	15.19
4	Interest plus capital	106	0.708	75.05
				<u>90.24</u>

The market value of the bonds should be 90.24 for each Rs. 100 nominal value of bonds.

#### (c) 10% redeemable bond

Period	Item	Cash flow	Discount factor at 4.4%	PV
1 – 7	Interest	5	5.914	29.57
8	Interest plus capital	105	1/(1.044) <sup>8</sup>	74.40
				<u>103.97</u>

The market value of the bonds should be 103.97 for each Rs. 100 nominal value of bonds.

**(d) Convertible bond**

Year	Item	Cash flow	Discount factor at 9%	PV
1 – 3	Interest	5	2.531	12.66
3	Value of shares acquired (20 shares × Rs. 7)	140	0.772	108.08
				<u>120.74</u>

The market value of the bonds should be 120.74 for each Rs. 100 nominal value of bonds.

## 13.4 ANNUITIES AND BOND PRICES

### Tutorial note

You might be required in the examination to remember and use the formula for the present value of an annuity. This is:

$$\text{PV of annuity} = \text{Annuity} \times \frac{1}{r} \left[ 1 - \frac{1}{(1+r)^n} \right]$$

(a) (i)  $\text{Value of zero coupon bond} = 100 \times \frac{1}{(1.05)^{10}}$

$$= 100 \times 0.6139$$

$$= 61.39.$$

- (ii) PV of interest payments to maturity of the bond: interest = 4 every 6 months for 10 years.

$$\text{PV of annuity} = 4 \times \frac{1}{0.025} \left[ 1 - \frac{1}{(1.025)^{20}} \right]$$

$$= 160 \times [0.3897]$$

$$= 62.35$$

Period		Cash flow	Discount factor (2.5%)	PV
1 – 20	Interest	4	See above	62.35
20	Redemption	100	$1/(1.025)^{20}$	61.03
	Value of bond			<u>123.38</u>

- (b) When interest yields rise, bond prices fall. Edit: the below boxes needs the 'x' replaced

(i)  $\text{Value of zero coupon bond} = 100 \times \frac{1}{(1.06)^{10}}$

$$= 100 \times 0.5584$$

$$= 55.84.$$



$$(ii) \quad PV \text{ of annuity} = 4 \times \frac{1}{0.03} \left[ 1 - \frac{1}{(1.03)^{20}} \right]$$

$$= 133.33 \times [0.4463]$$

$$= 59.51$$

Period	Cash flow	Discount factor at 3%	PV
1 – 20 Interest	4	See above	59.51
20 Redemption	100	$1/(1.03)^{20}$	55.37
Value of bond			114.88

### 13.5 WARRANTS AND CONVERTIBLES

#### (a) Convertibles

Share price	Value of equity if converted per Rs. 100 of bonds (20 shares)	Value as debt if not converted	Value of convertibles	Convert?
Rs. 4.40	Rs. 88	Rs. 105	Rs. 105	No
Rs. 5.20	Rs. 104	Rs. 105	Rs. 105	No
Rs. 6.00	Rs. 120	Rs. 105	Rs. 120	Yes
Rs. 6.80	Rs. 136	Rs. 105	Rs. 136	Yes

#### Warrants

Share price	Exercise price	Value of warrant	Exercise?
Rs. 4.40	Rs. 5	Rs.0	No
Rs. 5.20	Rs. 5	Rs.0.20	Yes
Rs. 6.00	Rs. 5	Rs. 1.00	Yes
Rs. 6.80	Rs. 5	Rs. 1.80	Yes

#### (b) Convertibles

	Before conversion	After conversion
	Rs.000	Rs.000
Profit before interest	1,200	1,200
Interest (Rs. 2.5 million × 12%)	300	-
	900	1,200
Tax at 50%	450	600
Earnings (profit after tax)	450	600
Number of shares	2,000,000	2,500,000
Earnings per share	Rs.0.225	Rs.0.24

**Warrants**

	<b>Before exercise</b>	<b>After exercise</b>
	<b>Rs.000</b>	<b>Rs.000</b>
Profit before interest	1,200	1,200
Plus return on additional funds raised: 10% x Rs. 2,500,000	-	250
	<u>1,200</u>	<u>1,450</u>
Tax at 50%	600	725
	<u>600</u>	<u>725</u>
Number of shares	2,000,000	2,500,000
Earnings per share	<u>Rs.0.30</u>	<u>Rs.0.29</u>

**13.6 KENCAST LIMITED**

(a) Computation of the value of Kenecast Limited's share capital as at 30/12/2017

(i) **Price/Earnings' Basis:**

$$\begin{aligned}
 \text{Value of Business} &= \text{P/E ratio} \times \text{Earnings} \\
 &= 6 \times \text{Rs. } 4,050,000 \\
 &= \text{Rs. } 24,300,000
 \end{aligned}$$

**Computation of earnings:**

	<b>2015</b>	<b>2016</b>	<b>2017</b>
	Rs.'000	Rs.'000	Rs.'000
Profit	3,250	3,600	4,175
Overvaluation of opening inventory	600	-	-
Overcharge of directors remuneration	625	1 025	1 125
Undercharged depreciation (3000 – 2250)	(750)	(750)	(750)
Adjusted Profit	<u>3,725</u>	<u>3,875</u>	<u>4550</u>

$$\begin{aligned}
 \text{Earnings (Average)} &= \frac{\text{Rs. } 3,725 + \text{Rs. } 3,875 + \text{Rs. } 4,550}{3} \\
 &= \text{Rs. } 4,050,000
 \end{aligned}$$

**Computation of P/E ratio:**

Company 1	5.4
Company 2	6.6
Total	<u>12.0</u>
Average $12/2 =$	<u><u>6.0</u></u>

(Note: It would have been better to calculate a PE ratio as the weighted average of the ratios of the two companies based on their market values. However, the information necessary to do this was not available in the question)

(ii) **Liquidation/break-up basis as at 31/12/2017**

Non-Current Assets:	Rs.'000	
Freehold Properties	15,000	
Equipment	5,400	
Current Assets:		
Inventories	8,000	
Account Receivables	4,825	
Cash Equivalent/Bank	650	
	<u>33,875</u>	
Less: Liabilities	4,150	
	<u>29,725</u>	i.e. Rs. 29,725,000

(iii) **Dividend Yield Basis:**

**Computation of dividend yield**

Company 1	9%
Company 2	11%
Total	<u>20%</u>
Average $^{12}/_2 =$	<u>10%</u>
Value of business:	$\frac{\text{Total Dividend}}{\text{Dividend Yield}} = \frac{\text{Rs. 2,250,000}}{*10\%} = \text{Rs. 22,500,000}$

(b) (i) **Limitations of P/E ratio method**

- ☐ It assumes that current earnings will continue. The value computed will be overstated if there is reduction in earnings.
- ☐ It used the P/E ratio of a similar company. This may not correctly reflect the true position of Kencast Ltd.
- ☐ It makes use of accounting profit whereas cash profit is more useful.
- ☐ It ignores the time value of money.

(ii) **Limitations of Liquidation basis**

- ☐ It ignores the future potential earnings of an entity.
- ☐ It is only used when a company's going concern is threatened. It cannot be used for a continuing business.
- ☐ The break up values may not be readily available.
- ☐ Liquidation costs that need to be deducted may be omitted.

(iii) **Limitations of Dividend Yield basis**

- ❑ Value may be understated if earnings are substantially higher than dividend.
- ❑ It used the dividend yield of a similar entity which may not reflect the true position of Kencast Ltd.
- ❑ It is only useful for the valuation of non-controlling interest or small holding
- ❑ It will not be usable if a company pays no dividend
- ❑ There may be difficulty of finding a comparable firm.

**13.7 A PLC'S AND B PLC**

Calculation of offer price by A Plc to shareholders of B Plc based on:

(a) **Net asset basis**

$$\begin{aligned} \text{Net Asset Value (NAV)} &= \frac{\text{Value attributable to equity}}{\text{No of ordinary shares}} \\ \text{NAV for Company A} &= \frac{\text{Rs. 1,380,000,000}}{1,000,000,000} \\ &= \underline{\text{Rs. 1.38}} \\ \text{NAV for Company B} &= \frac{\text{Rs. 560,000}}{500,000,000} \\ &= \underline{\underline{\text{Rs. 1.12}}} \end{aligned}$$

**Comment**

A Plc is expected to issue 112 of its own shares in exchange for every 138 of those in B Plc, which it acquires

To acquire the whole of the issued share capital of B Plc, A Plc should issue.

$$\frac{500,000,000}{138} \times 112 = 405,797,101 \text{ new Rs. 1 shares}$$

(b) **Earnings Basis**

$$\begin{aligned} \text{Earnings per share (EPS)} &= \frac{\text{Total earnings attributable to equity}}{\text{No. of shares}} \\ \text{EPS for A Plc} &= \frac{\text{Rs. 240,000,000}}{1,000,000,000} \\ &= \frac{1,000,000,000}{1,000,000,000} \\ &= \underline{\text{Rs.0.24}} \\ \text{EPS for B Plc} &= \frac{\text{Rs. 150,000,000}}{500,000,000} \\ &= \underline{\underline{\text{Rs. 0.30}}} \end{aligned}$$

**Comment**

A Plc is expected to issue 30 new shares in exchange for 24 existing shares in B Plc. This leads to a total issue of

$$\frac{500,000,000}{24} \times 30 = 625,000,000 \text{ new Rs. 1 shares}$$

**(c) Market value Basis**

The current market price of A Plc share is Rs. 2.40 and that of B Plc's share is Rs. 2.70. To maintain the market value of the holdings, A Plc should issue 9 new shares for each 8 of Bayela's shares (i.e. 270 for 240). Therefore, the total number of shares to be issued is

$$\frac{\text{Rs. } 500,000,000}{8} \times 9 = 562,500,000 \text{ new Rs. } 1 \text{ shares}$$

**(d) Financial Analysis**

A Plc current cost of equity (assuming no expected growth) is:

$$\begin{aligned} & \frac{\text{Maintainable annual profit}}{\text{Market value of equity}} \times \frac{100\%}{1} \\ &= \frac{\text{Rs. } 240,000,000}{\text{Rs. } 2,400,000,000} \times \frac{100\%}{1} \\ &= \underline{10\% \text{ per annum}} \end{aligned}$$

$$\begin{aligned} \text{A Plc cost of debt is:} & \quad \text{Coupon rate} \times \frac{\text{Nominal value}}{\text{Market value}} \\ &= 10\% \times \frac{100}{125} \\ &= \underline{8\%} \end{aligned}$$

The after tax cost of debt is therefore 8 (1-tax rate)

$$\begin{aligned} &= 8 (0.7) \\ &= \underline{5.6\% \text{ per annum}} \end{aligned}$$

A Plc WACC is:

$$\begin{aligned} & \frac{(10 \times \text{Rs. } 2,400,000,000) + [5.6 \times (\text{Rs. } 150,000,000 \times 1.25)]}{\text{Rs. } 2,587,500,000} \\ &= \underline{9.68\% \text{ per annum}} \end{aligned}$$

The maximum price that A Plc would be prepared to pay to B Plc for this to be an acceptable "project" under conventional capital project appraisal methods is:

$$\begin{aligned} & \frac{\text{Earning of B Plc}}{\text{Cost of capital of A Plc}} \\ &= \frac{\text{Rs. } 150,000,000}{0.0968} \\ &= \underline{\text{Rs. } 1,549,586,777} \end{aligned}$$

This implies issuing

$$\begin{aligned} & \frac{\text{Rs. } 1,549,586,777}{\text{Rs. } 2.40} \\ &= 645,661,157 \text{ new shares in A Plc} \\ & \quad \text{for the equity in B Plc} \end{aligned}$$

This is an offer of about 129 new shares in A Plc for 100 shares in B Plc as follows:

$$\frac{645,661,157}{500,000,000} = 1.29 : 1 \text{ or } 129 : 100$$

### 13.8 MNO CHEMICALS LIMITED

	Merger with PQ	Merger with RS
	Rupees in million	
<b>Investment required to be made (W – 1)</b>	<b>848.00</b>	<b>1,888.75</b>
Net profit after tax	124.80	169.00
Synergy impact (W5)	37.05	47.39
	161.85	216.39
<b>Return on investment</b>	<b>19.09%</b>	<b>11.46%</b>

#### Conclusion:

By acquiring PQ (Pvt.) Ltd., the shareholders of MNO Chemicals will earn a higher return on investment as compared to the acquisition of RS. Hence, acquisition of PQ is financially feasible for the shareholders of MNO Chemicals.

#### W1: Value of equity i.e. investment required to be made by MNO

	PQ	RS
	Rupees in million	
Total value of the company (W – 2)	1,248.00	2,388.75
Less: Value of TFCs	(400.00)	(500.00)
Value of equity i.e. investment to be made by MNO	848.00	1,888.75

#### W2: Total value of company

$$\frac{Y_o \times (1 + g)}{Re - g}$$

$$\text{Total Value of PQ (Pvt.) Ltd.} = \frac{156(W - 3) \times (1 + 4\%)}{17\%(W - 4) - 4\%} = 1,248$$

$$\text{Total Value of RS Ltd.} = \frac{204.75(W - 3) \times (1 + 5\%)}{14\%(W - 4) - 5\%} = 2,388.75$$

#### W3: Maintainable earnings (Y<sub>o</sub>)

	PQ	RS
	Rupees in million	
Net profit after tax	124.80	169.00
Add Interest (PQ : 48 × 0.65) (RS : 55 × 0.65)	31.20	35.75
Maintainable earnings	156.00	204.75

**W4: Cost of equity (Re)**

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

$$\text{Cost of equity of RS} = 8\% + (13\% - 8\%) \times 1.2 = \underline{14\%}$$

Cost of equity of PQ (Pvt.) Ltd.

=  $K_e$  of RS Ltd. + Illiquidity premium

$$= 14\% + 3\% = \underline{17\%}$$

**W5 Synergy Impact**

**PQ                      RS**

**Rupees in million**

Net profit after tax of MNO	585.00	585.00
Maintainable earnings of PQ (W3)	156.00	
Maintainable earnings of RS (W3)		204.75
Combined profit of merged entities	741.00	789.75
Synergies impact on profitability	5%	6%
<b>Synergy impact</b>	<b>37.05</b>	<b>47.39</b>

**13.9      FREE CASH FLOW**

	Rs.
Profit before interest and tax	3,000,000
Interest	(440,000)
Taxation	(600,000)
Depreciation charges	550,000
Increase in working capital	(150,000)
Essential capital expenditure	(1,000,000)
Free cash flow	<u>1,360,000</u>

**13.10      FINANCIAL PLAN**

- (a) **Tutorial note.** Many of the figures for the financial plan can be calculated by increasing the amount by 8% each year, in line with sales growth. The bank overdraft interest each year is calculated by taking the bank overdraft at the end of the previous year. The bank overdraft is a balancing figure in the statement of financial position, that makes the equity and liabilities add up to the total assets.

Statements of profit or loss		Year 5	Year 6	Year 7	Year 8
		Rs. m	Rs. m	Rs. m	Rs. m
EBITDA	(+ 8% per year)	583	630	680	735
Depreciation	(+ 8% per year)	(173)	(187)	(202)	(218)
Earnings before interest		410	443	478	517
Interest	(see workings)	(86)	(95)	(106)	(118)
Profit before tax		324	348	372	399
Tax (30%)		(97)	(104)	(112)	(120)
Profit after tax		227	244	260	279
Dividends	(64%)	(145)	(159)	(166)	(179)
Retained earnings		82	85	94	100
Plant and equipment	(+ 8% per year)	2,182	2,356	2,545	2,748
Inventory + receivables – trade payables	(+ 8% per year)	767	828	894	966
Cash	(+ 8% per year)	32	35	38	41
		2,981	3,219	3,477	3,755
Share capital		450	450	450	450
Reserves	(add retained profit)	1,283	1,368	1,462	1,562
		1,733	1,818	1,912	2,012
Long-term loan		800	800	800	800
		2,533	2,618	2,712	2,812
Bank overdraft	(balancing figure)	448	601	765	943
		2,981	3,219	3,477	3,755

### Workings

(1) At the end of year 4, inventory + receivables – trade payables = 710 (in Rs. million). This amount will increase by 8% each year.

### (2) Interest charges

Long-term loan	(8% × 800)	64	64	64	64
Bank overdraft	(7% × previous year)	22	31	42	54
		86	95	106	118



- (b) There are several definitions of free cash flow. Other definitions are acceptable for your answer.

	Year 5	Year 6	Year 7	Year 8
	Rs. m	Rs. m	Rs. m	Rs. m
EBIT (1 – t)      Earnings before interest less tax at 30%	287	310	335	362
Depreciation	173	187	202	218
Increase in plant and equipment	(162)	(174)	(189)	(203)
Increase in inventory + receivables - payables	(57)	(61)	(66)	(72)
Free cash flow	241	262	282	305

- (c) A feature of the financial plan that might need review is the cash position of the company. The bank overdraft is forecast to increase from Rs. 310,000 to Rs. 943,000, although the company expects to make a profit each year. The free cash flow each year, as measured, is not much more than the interest payments and dividend payments.

This suggests that the company might need to reconsider its dividend policy, and pay lower dividends. In addition, the company might possible consider alternative sources of finance, so that it does not have to rely so much on an overdraft facility. More long-term debt might be appropriate, if this can be obtained at a suitable interest rate.

- (d) A possible value of the company's shares at the end of the financial planning period can be estimated using the dividend growth model, assuming that dividends will grow by about 8% per year (in line with sales growth) and the cost of equity will remain at 12%.

$$\begin{array}{r} \text{Expected equity value in Rs. millions} \\ \hline 179 (1.08) \\ (0.12 - 0.08) \end{array}$$

= Rs. 4,833 million.

There are 9,000,000 shares of Rs.0.05 each . This gives a valuation of Rs. 537 per share.

### 13.11 TAKEOVER

- (a) Cost of equity in Flat Company, using the CAPM =  $5\% + 1.20 (11 - 5)\% = 12.2\%$

WACC in Flat Company =  $(12.2 \times 75\%) + (7 (1 - 0.30) \times 25\%) = 10.375\%$ , say 10.4%

Cost of equity in Slope Company, using the CAPM =  $5\% + 1.35 (11 - 5)\% = 13.1\%$

WACC in Slope Company =  $(13.1 \times 60\%) + (8 (1 - 0.30) \times 40\%) = 10.1\%$ .

Free cash flow is defined here as EBIT less tax, plus tax-allowable depreciation minus replacement capital expenditure.

### Free cash flows and valuation of Flat Company based on free cash flows

Year	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000
Earnings before interest and tax	1,918	2,014	2,115	2,221
Tax at 30%	(575)	(604)	(635)	(666)
	1,343	1,410	1,480	1,555
Add back tax-allowable depreciation	872	915	961	1,009
Less: Replacement capital spending	(966)	(1,014)	(1,065)	(1,118)
Free cash flow	1,249	1,311	1,376	1,446
Discount factor at 10.4%	0.906	0.820	0.743	0.673
Present value	1,132	1,075	1,022	973
End-of-year 4 value of free cash flows from Year 5 onwards				$= \frac{1,446 (1.03)}{(0.104 - 0.03)}$

= (in Rs.000) 20,322

Present value of Year 5 onward cash flows (Year 0 value) =  $20,322 \times 0.673$   
= 13,677.

Total valuation of Flat Company equity, using the free cash flow method, is  
(1,132 + 1,075 + 1,022 + 973 + 13,677) = Rs. 17,879,000.

### Free cash flows and valuation of Slope Company based on free cash flows

Year	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000
Earnings before interest and tax	1,893	1,969	2,047	2,129
Tax at 30%	(568)	(591)	(614)	(639)
	1,325	1,378	1,433	1,490
Add back tax-allowable depreciation	728	757	787	819
Less: Replacement capital spending	(822)	(854)	(889)	(924)
Free cash flow	1,231	1,281	1,331	1,385
Discount factor at 10.1%	0.908	0.825	0.749	0.681
Present value	1,118	1,057	997	943
End-of-year 4 value of free cash flows from Year 5 onwards				$= \frac{1,385 (1.02)}{(0.101 - 0.02)}$

= (in Rs.000) 17,441

Present value of Year 5 onward cash flows (Year 0 value) =  $17,441 \times 0.681 = 11,877$ .

Total valuation of Slope Company equity, using the free cash flow method, is  $(1,118 + 1,057 + 997 + 943 + 11,877) = \text{Rs. } 15,992,000$ .

### Combined group WACC

		Market value	Cost of capital	MV × Cost
		Rs. m		
Flat equity	$(6\text{m} \times 3.20)$	19.20	0.104	1.9968
Flat debt	$(19.2\text{m}/0.75) \times 25\%$	6.40	0.049	0.3136
Slope equity	$(9\text{m} \times 1.54)$	13.86	0.101	1.3999
Slope debt	$(13.86\text{m}/0.60) \times 40\%$	9.24	0.056	0.5174
		48.70		4.2277

WACC =  $4.2277/48.70 = 0.068$  or 8.68%, say 8.7%.

### Free cash flows and valuation of combined company based on free cash flows

Tax-allowable depreciation in the year just ended (combined) was 1,530 and replacement capital expenditure combined was 1,710.

Year	1	2	3	4
	Rs.000	Rs.000	Rs.000	Rs.000
Earnings before interest and tax	4,100	4,305	4,520	4,746
Tax at 30%	(1,230)	(1,292)	(1,356)	(1,424)
	2,870	3,013	3,164	3,322
Add back tax-allowable depreciation	1,607	1,687	1,771	1,860
Less: Replacement capital spending	(1,860)	(1,885)	(1,980)	(2,079)
Free cash flow	2,617	2,815	2,955	3,103
Discount factor at 8.7%	0.920	0.846	0.779	0.716
Present value	2,408	2,381	2,302	2,222

End-of-year 4 value of free cash flows from Year 5 onwards =  $\frac{3,103 (1.04)}{(0.087 - 0.04)}$   
 = (in Rs.000) 68,662

Present value of Year 5 onward cash flows (Year 0 value) =  $68,662 \times 0.716$   
 = 49,162.

Total valuation of equity in the combined company, using the free cash flow method, is  $(2,408 + 2,381 + 2,302 + 2,222 + 49,162)$  = Rs. 58.475 million

<b>Summary of free cash flow valuations</b>	<b>Rs. m</b>
Value of Flat Company equity	17.879
Value of Slope Company equity	15.992
	<hr/>
	33.871
Value of equity in combined company	58.475
	<hr/>
Increase in equity value	24.604
	<hr/>

On the basis of these estimates, the value of equity (as valued on a free cash flow basis) will increase by about 72.6% as a result of the takeover.

- (b) The estimates of equity value might not be reliable, for several reasons.
- (1) The WACC used for the combined company, based on current market values, is lower than the WACC used for each separate company valuation. This lower WACC is questionable, and if a WACC of over 10% were used, the valuation of the company after the takeover would be much lower.
  - (2) The estimates for the increase in the combined Year 1 EBIT might be unrealistic, and the estimates of higher growth in sales and earnings should also be questioned.
  - (3) Valuations based on a dividend growth model, rather than a free cash flow model, would produce a lower valuation.
- (c) Shareholders in Slope are being offered 2 shares in Flat (current value Rs. 6.40) for every three shares they hold (current value Rs. 4.62). On the basis of current market values, they are being offered a price that is 38.5% above the current share price. This is a very high premium in a takeover bid, and is likely to be very attractive to them.

For the same reason, shareholders in Flat might oppose the takeover bid, because 'value' is being given to the shareholders of Slope and a very high premium is being offered for the shares. The shareholders in Flat will only support the bid if they believe that it will 'unlock value' in the shares or result in substantial synergy gains through higher sales, cost savings or faster business growth.

### 13.12 MK LIMITED

#### (a) VALUE OF MK LIMITED

		Years	
		1	2
		Rupees in million	
Sales	4%	12,480	12,979
Operating costs including depreciation	75%	(9,360)	(9,734)
Profit before interest and tax		3,120	3,245
Taxation	35%	(1,092)	(1,136)
Add back depreciation	4%	1,357	1,411
Annual capital expenditure	4%	(728)	(757)
<b>Free cash flow</b>		<b>2,657</b>	<b>2,763</b>
Discount factor (W1)	9.8%	0.911	0.830
Present value		2,421	2,292

Present value 1 - 2 years 4,713

Free cash flow after year 2 =  $\frac{2,763(1.09)^2}{0.098 - 0.05} \times 0.83 = \text{Rs. } 50,166 \text{ million}$

Total free cash flows = (4,713 + 50,166) Rs. 54,879 million

#### W1: Weighted Average Cost of Capital

	D/E Ratio	Rate	WACC
$k_e (8\% + (13\% - 8\%) \times 1.1)$	60%	13.50%	8.1%
$k_d (6.5\% \times 0.65)$	40%	4.23%	1.7%
WACC			9.8%

#### VALUE OF ZA LIMITED

		Years	
		1	2
		Rupees in million	
Sales	5.5%	8,925	9,416
Operating costs including depreciation	5.5%	(6,219)	(6,561)
Profit before interest and tax		2,706	2,855
Taxation	35%	(947)	(999)
Add back depreciation	5.5%	1,044	1,101
Annual capital expenditure	5.5%	(686)	(724)
<b>Free cash flow</b>		<b>2,117</b>	<b>2,233</b>

**VALUE OF ZA LIMITED**

		Years	
		1	2
		Rupees in million	
Discount factor ( <b>W2</b> )	9.2%	0.916	0.839
Present value		1,939	1,873
Present value 1 - 2 years		3,812	

$$\text{Free cash flow after year 2} = \frac{2,233(1.05)}{0.092 - 0.05} \times 0.839 = \text{Rs. 46,837 million}$$

$$\text{Total free cash flows} = (3,812 + 46,837) \quad \underline{\underline{\text{Rs. 50,649 million}}}$$

**W2: Weighted Average Cost of Capital**

	Rate	D/E %	WACC
$k_e - (8\% + (13\% - 8\%) \times 1.3)$	14.5%	45%	6.5%
$k_d - (7.5\% \times 65\%)$	4.9%	55%	2.7%
WACC			9.2%

**VALUE OF PROPOSED MERGED COMPANY**

		Years	
		1	2
		Rupees in million	
Combined Sales	5%	21,483	22,557
Operating costs including depreciation	70%	(15,038)	(15,790)
Profit before interest and tax		6,445	6,767
Taxation	35%	(2,256)	(2,368)
Add back depreciation	5%	2,410	2,531
Annual capital expenditure	5%	(1,418)	(1,489)
<b>Free cash flow</b>		<b>5,181</b>	<b>5,441</b>
Discount factor ( <b>W3</b> )	9.8%	0.911	0.830
Present value		4,720	4,516

$$\text{Present value 1 - 2 years} \quad \underline{\underline{9,234}}$$

$$\text{Free cash flow after year 2} = \frac{5,441(1.05)}{0.098 - 0.055} \times 0.83 = \text{Rs. 110,800 million}$$

$$\text{Total free cash flows} = (9,234 + 110,800) \quad \underline{\underline{\text{Rs. 120,036 million}}}$$

**W3: Weighted Average Cost of Capital**

Equity - MK (100 x 20)	2,000	13.50%	270.00
Equity - ZA (90 x 7/9 x 20)	1,400	14.5%	203.00
Debt - MK (2,000 x 40% / 60%)	1,333	4.23%	56.00
Debt - ZA (90 x 12 x 55% / 45%)	1,320	4.98%	65.00
Total equity + debt of merged company	6,053		594

WACC =  $594 \div 6,053$ 9.8%**(b) Synergy effect of acquisition****Rupees in million**

Total free cash flow of Merged Co. 120,036

Total free cash flow of MK Limited 54,879

Total free cash flow of ZA Limited 50,649

105,528**Synergy effect of acquisition 14,508****13.13 PLATINUM LIMITED****(a) Synergistic effects can arise from five sources:**

- (i) Operating economies, which result from economies of scale in management, marketing, production, or distribution.
- (ii) Financial economies, including lower interest costs etc.
- (iii) Tax effects, where the combined enterprise pays less in taxes than the separate firms would pay.
- (iv) Differential efficiency, which implies that management of one firm is more efficient and that the weaker firm's assets will be more productive after the merger.
- (v) Increased market power, due to reduced competition.

**(b) (i) The number of shares in Platinum Limited offered to shareholders of Diamond Limited are:**No. of shares to be issued to DL ( $7/6 \times 19.2$ ) = 22.4 million shares

Existing earnings per share of PL (Rs. 231m / 90m) = Rs. 2.57

Value of shares in PL (Rs. 2.57 x 15) = Rs. 38.55

Total value of bid  
(22.4 million shares x Rs. 38.55) = Rs. 863.52 million

(ii) EPS of PL following a successful acquisition:	<b>Rs. in million</b>
Earnings of PL before acquisition	231.00
Earnings of DL before acquisition	58.00
Post takeover synergy	24.00
	<u>313.00</u>
Shares in issue following acquisition (90+22.4) (in million)	<u>112.40</u>
EPS after acquisition (Rs. 313m / 112.4m) =	<u>Rs. 2.78</u>
Share price after acquisition (Rs. 2.78 x 18)	<u>50.04</u>
(iii) <b>Cost of each debenture</b>	

	<b>Rupees</b>
EPS of DL before acquisition (Rs. 58 ÷ 19.2)	3.02
Value of a share in DL (Rs. 3.02 x 19)	57.38
Value of 2 shares of DL (2 X 57.38)	114.76
Present Value of 3 redeemable debentures of Rs. 100 each ( <b>W1</b> )	130.17

Since the present value of debentures is greater than the current market price of DL shares, the offer is expected to be worth considering by shareholders of DL. In case these debentures are marketable, there will be high chance that it will satisfy those shareholders too who are interested in equity instrument. Such shareholders will be able to swap debentures with PL's shares in market.

**W1**

	Redeemable value (Rs.)	8 year DF @ 11%	PV
PV of 3 debentures of Rs. 100 each	300	0.4339	130.17

**13.14 EMH**

- (a) Capital markets are said to be efficient when prices of securities in such markets fully reflect all information about the company, the industry to which it belongs and the economy as a whole. This means that any new information about a company coming into the market is immediately reflected in the price of the share of the company such that no investor can make above average return on an investment.

In a supposedly efficient market, the price of a security is expected to fluctuate randomly around its true or intrinsic value. Efficient simply means security is price efficient. The price is right and represents the best estimate of the security's true value based on the available information.



**Forms of efficiency:**

**The Weak Form:** This form of efficiency implies that information about past share price movement is already reflected in the current market price. Therefore, the ability to forecast future prices cannot be enhanced based on the use of past information alone.

**The Semi-Strong Form:** This form states that the current market price of a security, fully and immediately reflects all publicly available information including information from financial statements, Chairman's report and news items. Here, insider information is excluded.

**The Strong Form:** This form of efficiency implies that all pieces of information both public and private (including insider information) are fully and immediately reflected in the current market price of the security. Insider information is said to be information that is known to management but unknown to the public.

(b)

(i) Weak form efficiency

The share price will not react to the announcement by the directors. Share prices in a market with weak-form efficiency react to historical data, not future expectations.

(ii) Semi-strong form efficiency

If investors believe the estimate of an NPV of + Rs. 4,000,000, the value of the company's shares will increase by this amount (Rs.0.08 per share) and rise to Rs. 4.08 on 12<sup>th</sup> May – the date that the announcement is made to the market.

(iii) Strong form efficiency

If investors believe the estimate of an NPV of + Rs. 4,000,000, the value of the company's shares will increase by this amount (Rs.0.08 per share) and rise to Rs. 4.08 on 1<sup>st</sup> May – the date that the investment decision is taken and before it is formally announced to the market.

### 13.15 X PLC AND Y PLC

(a) (i) **Semi-Strong form efficient – Cash Offer**

In semi-strong form efficient, shareholders know all the relevant historical data and publicly available current information.

#### DAY 2

Value of X Plc. shares = (Rs. 3 x 30,000,000) i.e. Rs. 90,000,000

Value of Y Plc. shares (Rs. 6 x 80,000,000) = Rs. 480,000,000

The decision of the private meeting does not reach the market, hence share-prices will remain unchanged.

**DAY 5**

The takeover bid was announced, but no information is available yet about the operating savings, hence, value of X Plc. shares will be (Rs.  $5 \times 30,000,000$ ) = Rs. 150,000,000

<b>Value of Y Plc.</b>	<b>Rs.</b>
Previous value (Rs. $6 \times 80,000,000$ )	480,000,000
Value of X Plc acquired (Rs. $3 \times 30,000,000$ )	90,000,000
	<hr/> 570,000,000
Less purchase consideration for X Plc	150,000,000
	<hr/> 420,000,000
Number of shares ( $\div$ )	80,000,000
Price per share	<hr/> <hr/> Rs. 5.25

The number of shares in Y Plc. after acquisition remains unchanged since cash is paid.

**DAY 10**

The market learns of the potential savings of Rs. 80,000,000. Value of X Plc. remains unchanged at Rs. 5 per share but the value of Y Plc. will be as follows:

<b>Value of Y Plc.</b>	<b>Rs.</b>
Previous value (R	420,000,000
Potential savings	80,000,000
	<hr/> 500,000,000
Number of shares ( $\div$ )	80,000,000
Price per share	<hr/> <hr/> Rs. 6.25

**(ii) Semi-Strong form Efficient-Share Exchange Offer****Day 5**

<b>Value of Y Plc.</b>	<b>Rs.</b>
Previous value (Rs. $6 \times 80,000,000$ )	480,000,000
Value of X Plc. acquired (Rs. $3 \times 30,000,000$ )	90,000,000
	<hr/> 570,000,000
Less purchase consideration for X Plc	150,000,000
	<hr/> 420,000,000
Number of shares in Y Plc	
$80,000,000 + (5/6 \times 30,000,000)$	105,000,000
Price per share	<hr/> <hr/> Rs. 5.43

Price per share of X Plc. will be  $\frac{5}{6} \times 5.43 = \text{Rs. } 4.53$

### DAY 10

	Rs.
Value of Y Plc	500,000,000
Value of X Plc. acquired (Rs. 3 x 30,000,000)	150,000,000
	<hr/> 650,000,000
Number of shares in Y Plc	
80,000,000 + $(\frac{5}{6} \times 30,000,000)$	105,000,000
Price per share	<hr/> Rs. 6.29

Price per share of X Plc. will be  $\frac{5}{6} \times 6.19 = \text{Rs. } 5.16$

(b) (i) **Strong Form Efficient – Cash Offer**

In strong form efficient, the market would become aware of all the relevant information when the private meeting takes place. The value per share would change as early as day 2 to

X Plc. = Rs. 5.00

Y Plc. = Rs. 6.25

The share prices would then remain unchanged until day 20.

(ii) **Strong Form Efficient-Share Exchange Offer**

Also, for the same reason, the price per share would change on day 2 to

X Plc. = Rs. 5.16, Y Plc. = 6.19 and these prices would remain unchanged till day 20.

## CHAPTER 14 – MERGERS AND ACQUISITIONS

### 14.1 ACQUISITION

- (a) The earnings of Little next year are expected to be Rs. 86,000. A forward P/E multiple of 8.0 could be applied to this estimate, and the valuation of the equity shares in Little would be:

$$\text{Rs. } 86,000 \times 8.0 = \text{Rs. } 688,000.$$

- (b) The cost of equity of Big is expected to be:

$$6\% + 1.60 (11 - 6)\% = 14\%.$$

The WACC of Big is expected to be:

$$[35\% \times 7.4 (1 - 0.30)] + (65\% \times 14)$$

$$= 10.913\%.$$

- (c) Since Little is in the same industry as Big, it is probably appropriate to use the WACC of Big to obtain a DCF-based valuation of Little. The WACC of 10.913% will be rounded to 11%.

The cash flows from the acquisition of Little must be calculated.

	Year 1	Year 2	Year 3
	Rs.	Rs.	Rs.
Sales	200,000	280,000	320,000
Cash costs	(120,000)	(160,000)	(180,000)
	80,000	120,000	140,000
Capital allowances	(20,000)	(30,000)	(40,000)
Interest	(10,000)	(10,000)	(10,000)
Taxable profit	50,000	80,000	90,000
Tax at 30%	(15,000)	(24,000)	(27,000)
Profit after tax	35,000	56,000	63,000
Profit after tax	35,000	56,000	63,000
Add back capital allowances	20,000	30,000	40,000
	55,000	86,000	103,000
Asset replacement	(25,000)	(30,000)	(35,000)
Cash flow	30,000	56,000	68,000

Cash flows will increase by 4% each year from Year 4 onwards.

The dividend growth valuation model can be used to calculate the Year 3 value of these cash flows, using a growth rate of 4% and a cost of capital of 11%:

$$\text{Year 3 value of cash flows from Year 4} = \frac{\$68,000(1.04)}{(0.11 - 0.04)} = \text{Rs. } 1,010,286$$

The expected cash flows can now be converted in to a present value:

Year	Cash flow	Discount factor at 11%	PV
	Rs.		Rs.
1	30,000	0.901	27,030
2	56,000	0.812	45,472
3	68,000	0.731	49,708
4 onwards	1,010,286	0.731	738,519
Total value			860,729

## 14.2 ADAM PLC

### (a) (i) Market Value of Adam Plc

Using the Gordon's growth model:  $g = rb$

where  $r$  = return on investment

$b$  = retention ratio

$g = rb$ ,  $r = 0.16$ ,  $b = 0.25$

$g = 0.16 \times 0.25 = 4\%$

Future dividend in one year

$$= \text{Rs. } 300\text{m} \times 1.04 = \text{Rs. } 312 \text{ million}$$

$$\text{Market Value} = \frac{d}{r - g} = \frac{\text{Rs. } 312,000,000}{0.12 - 0.04}$$

$$= \text{Rs. } 3.9 \text{ billion}$$

### Market value of Eve Plc

$$r = 0.21, b = \frac{2}{3}$$

$$g = 0.21 \times \frac{2}{3} = 14\%$$

Future dividend in one year =  $50\text{m} \times 1.4 = \text{Rs. } 57 \text{ million}$

$$\text{MV} = \frac{\text{Rs. } 57,000,000}{0.18 - 0.14}$$

$$= \text{Rs. } 1.425 \text{ billion}$$

(ii) Adam Plc earning in 1 year Rs.'m

$$\text{Rs. } 400\text{m} \times 1.04 \quad 416$$

Eve Plc earning in 1 year

$$\text{Rs. } 150 \text{ m} \times 1.14 \quad \underline{171}$$

$$\underline{587}$$

$$\text{Dividend in 1 year} = \text{Rs. } 587\text{m} \times 0.4$$

$$= \text{Rs. } 234,800,000$$

If  $r = 0.2$  and  $b = 0.6$

$$g = 0.2 \times 0.6 = 0.12$$

$$\text{Market Value} = \frac{\text{Rs. } 234,800,000}{0.16 - 0.12} = \text{Rs. } 5,870,000,000$$

$$\text{Maximum Price} = \text{Rs. } 5,870,000,000 - \text{Rs. } 3,900,000,000$$

$$\text{Payable for Eve Plc} = \text{Rs. } 1,970,000,000 \text{ or}$$

$$= \text{Rs. } 1.97 \text{ billion}$$

(b) (i) **White Knight**

A situation in which the target company looks for a friendly company whose offer is more appealing for the takeover bid.

(ii) **Shark Repellant**

This involves amending the company's memorandum and articles of association in such a way that makes the takeover difficult for the acquiring company.

An example is increasing the margin of majority votes required at an Annual General Meeting called to approve such a take-over.

(iii) **Pac-man Defence**

An anti-takeover strategy in which the target company tries to buy up the shares of the acquiring company.

(iv) **Poison-Pill**

A strategy sometimes employed by target companies in a take-over bid to reduce the attractiveness of their securities to the prospective acquiring companies. This is often done by enlarging the outstanding shares of a target company through a new issue of shares to its shareholders at a discount to the market price, thus making the take-over quite expensive to the prospective acquiring company.

(v) **Golden Parachutes**

This refers to provisions in the executives' employment contract that call for payment of severance pay or other compensation should they lose their jobs as a result of a successful takeover.

## 14.3 D LIMITED

(a) The following are the various options available to D Limited:

- (i) **Merger:** The term merger is normally used to describe a situation where two businesses come together by agreement to form a single entity. Here, the two companies go into liquidation and an entirely new one is formed to acquire their shares. Alternatively, the life of one company is, in law, terminated (still in physical existence as a division or branch) and the other one remains.

- (ii) **Take over:** This describes a situation where one business acquires control of another business. This usually occurs when one company buys shares in another company substantial enough to acquire a controlling interest in the other company. The former is called the bidding company while the latter is called the target company.
- (iii) **Consolidation:** This is a combination of two or more companies into a new company.

(b)

- ❑ Exchange ratio =  $40/80 = 1:2$  (one share of D Limited exchanges for every two shares of F Limited.)
- ❑ Number of shares to be issued to shareholders of F Limited =  $3,000,000/2 = 1,500,000$
- ❑ Combined post merger number of shares = 5,500,000 (i.e. 4,000,000 + 1,500,000)
- ❑ Combined post acquisition earnings = Rs. 29,000,000 (i.e. Rs. 20,000,000 + Rs. 9,000,000)
- ❑ Post merger earnings per share of enlarged company – D Limited = Rs.  $29,000,000/5,500,000 = \underline{\text{Rs. 5.27}}$

**Comment:**

The merger improves the Earnings Per Share (EPS) of D Limited from Rs. 5.00 to Rs. 5.27. However, the shareholders of F Limited suffer a drop in their EPS from Rs. 3.00 to Rs. 2.64 (i.e. Rs.  $5.27/2$ )

## 14.4 CLOONEY PLC AND PITT PLC

(a) Price Earnings, P/E ratio computation before merger:

	Clooney Plc	Pitt Plc
	Rs.'m	Rs.'m
EPS	$= \left( \frac{\text{PAT}}{\text{No of shares}} \right) = \frac{150}{600} = 0.25$	$\frac{30}{150} = 0.2$
P/E ratio	$= \frac{\text{Share price}}{\text{EPS}} = \frac{\text{Rs. 5}}{\text{Rs.0.25}} = 20 \text{ times}$	$\frac{\text{Rs. 2}}{\text{Rs.0.20}} = 10 \text{ times}$

(b) P/E ratio computation for the group after merger

$$\text{P/E ratio} = \frac{\text{Share price}}{\text{Earning Per Share}} \bigg/ \frac{\text{Total market value}}{\text{Total Earnings}}$$

$$\text{EPS} = \frac{\text{Total Earnings}}{\text{No of shares}}$$

$$\text{No of shares} = (600 + 75)\text{m} = 675 \text{ million shares.}$$

## Total earnings

	Rs.'m
Clooney Plc	150.0
Pitt Plc	30.0
Increased cash flow	4.5
	<u>184.5</u>

$$\text{Therefore EPS} = \frac{184,500,000}{675,000,000} = \text{Rs.0.27}$$

$$\text{If EPS} = \text{Rs.0.27 and}$$

$$\text{Share price} = \text{Rs. 5.50 (given)}$$

Then, the Price Earning (P/E) Ratio of the group would be:

$$\frac{\text{Rs. 5.50}}{\text{Rs.0.27}} = 20.37 \text{ times}$$

(c) **Calculation of market capitalisation of Clooney Plc (after merger)**

	Rs. million
Capitalisation of Clooney Plc (pre-merger)	
= 600m x Rs. 5.0	= 3,000
Capitalisation of Pitt Plc (pre-merger)	
= 150m x Rs. 2.0	= 300
Value of merger benefit (given)	= 45
Therefore, capitalisation of group after merger	= <u>3,345</u>

- (d) Calculation of dividend income of the holder of 1 share in Pitt Plc before and after merger assuming Clooney Plc maintains the same dividend per share as before the merger.

Dividend per share (DPS) of holder of 1 share in Pitt Plc:

**Before merger:**

$$\begin{aligned} \text{DPS} &= \frac{\text{Rs. 21,000,000}}{150,000,000} \\ &= \text{Rs.0.14} \end{aligned}$$

**After merger:** assuming Clooney Plc maintains the same dividend per share as before the merger:

$$\begin{aligned} \text{DPS} &= \frac{60,000,000}{600,000,000} \\ &= \text{Rs.0.10} \end{aligned}$$

Therefore, a holder of 1 share in Pitt Plc will now get  $\text{Rs.0.1} \div 2 = \text{Rs.0.05}$  since the ratio of offer is 2:1.

**Comment:**

The shareholders of Pitt Plc would be losing Rs.0.09, that is,  $(0.14 - 0.05)$  on each of their shareholding since they were earning Rs.0.14 on each holding, before the merger.



## 14.5 NELSON PLC

- (a) Calculation of market values of the two companies using Gordon's growth model (rb)

(i) **Nelson Plc:**

Using rb model where:

$r =$  return on investment

$b =$  proportion of earnings retained

$r =$  21% or 0.21

$b = \frac{2}{3}$

growth =  $rb = 21\% \times \frac{2}{3} = 14\%$

Future dividend in one future year

$=$  Rs. 75,000  $\times$  1.14

$=$  Rs. 85,500

$$\begin{aligned} \text{Market Value (MV)} &= \frac{\text{Rs. 85,500}}{18\% - 14\%} \\ &= \frac{\text{Rs. 85,500}}{4\%} \\ &= \frac{\text{Rs. 85,500}}{0.04} \\ &= \text{Rs. 2,137,500} \end{aligned}$$

(ii) **Drake Plc**

$g = rb$  where:  $r = 16\%$

$b = \frac{1}{4}$  (or 0.25)

$\therefore g = 0.16 \times 0.25 = 0.04$

$= 4\%$

Dividend in the next one year  $=$  Rs. 450,000  $\times$  1.04  
 $=$  Rs. 468,000

$$\begin{aligned} \text{Market Value} &= \frac{\text{Rs. 468,000}}{12\% - 8\%} \\ &= \frac{\text{Rs. 468,000}}{0.04} \\ &= \underline{\underline{\text{Rs. 11,700,000}}} \end{aligned}$$

- (b) Maximum Price Nelson Plc should pay for Drake Plc:

Earnings in the next one year:

	Rs.
Nelson Plc Rs. 225,000 $\times$ 1.14	$=$ 256,500
Drake Plc Rs. 600,000 $\times$ 1.04	$=$ 624,000
	<u>880,500</u>

$$\begin{aligned}
 \text{Dividend in the next one year (100\% - 60\%)} &= 40\% \\
 &= \text{Rs. } 880,500 \times 0.4 = \underline{\text{Rs. } 352,200} \\
 r &= 20\%; b = 60\% \\
 \therefore g = rb &= 20\% \times 60\% = 12\%
 \end{aligned}$$

Market Value after Merger

$$\begin{aligned}
 M/V &= \frac{\text{Rs. } 352,200}{0.16 - 0.12} \\
 &= \frac{\text{Rs. } 352,200}{0.04} \\
 &= \underline{\text{Rs. } 8,805,000}
 \end{aligned}$$

$$\begin{aligned}
 \text{Maximum Price} &= \text{Market Value after merger} - \text{Market value before merger} \\
 &= \text{Rs. } 8,805,000 - \text{Rs. } 2,137,000 \\
 &= \underline{\text{Rs. } 6,667,500}
 \end{aligned}$$

## 14.6 HALI LTD

(a) To: Board of Directors  
 From: XYZ  
 Date: June 4, 2016  
 Sub: Report on Demerger Scheme

Dear Sirs,

My comments on demerger scheme are as follows:

a) If the company opts for demerger scheme, the ordinary shareholder will get a surplus of Rs. 28.64 million details of which are as follows:

	Rupees in million	
Value of OCX	276.59	Annexure 'A'
Value of OCY	281.05	Annexure 'B'
<b>Total value of both the companies</b>	<b>557.64</b>	
Current market value of HL		
Equity (5 million shares of Rs. 90)	450.00	
Debt (40+30*130/100)	79.00	
<b>Surplus</b>	<b>529.00</b>	
	<b>28.64</b>	

As the demerger of two separate divisions has increased the value of two companies by approx. 5.4% as compare to current market value, it appears that HL should float the two divisions separately.

- (b) The following additional information and analysis would be relevant in the process of decision making:
- (i) Other details of items included in the profit and loss statement and information such as expected future growth could have been useful in determining the operating cash flows more accurately.
  - (ii) The model uses operating cash flows. A more reliable estimate of value might be free cash flows, taking into account the investment needs of both divisions.
  - (iii) The cash flow forecasts as they stand, appear to take no account of uncertainty. It would have been helpful to see best-worst estimates, simulations or other techniques that incorporate uncertainty.
  - (iv) The risk profiles of the companies have not been considered.
  - (v) Individual divisions might be more vulnerable to takeovers because of their smaller size.
  - (vi) The views of the shareholders shall be important in reaching a final decision.
  - (vii) How will the decision impact on the company's ability to negotiate better terms with the suppliers, financial institutions, etc?
  - (viii) The interests of other stakeholders may have to be taken into account – what will employees feel about the split, will there be fewer management opportunities available, and how will creditors view their security?

#### Annexure A – Value of HX

	Year	1	2	3 onward	Total
		Rupees in million			
Profit before tax and depreciation		39.00	42.00	44.00	
Depreciation		12.00	11.00	13.00	
Profit before tax		27.00	31.00	31.00	
Tax (30%)		(8.10)	(9.30)	(9.30)	
Profit after tax		18.90	21.70	21.70	
Add back depreciation		12.00	11.00	13.00	
One time costs		(8.50)	-	-	
<b>Net cash inflow</b>		<b>22.40</b>	<b>32.70</b>	<b>34.70</b>	
Discount factors (12% [W1])		0.8929	0.7972	6.6432	<b>W2</b>
Present value of net cash inflows		20.00	26.07	230.52	<b>276.59</b>

**W1: Adjustment of inflation in the discount rate**

$$\frac{1 + \text{money rate}}{1 + \text{inflation rate}} = \frac{1.18}{1.05} = 12.38\% \text{ say } 12\%$$

**W2: Present value factor from year 3 to infinity**

$$= \frac{1}{0.12} - 0.8929 - 0.7972 = 6.6432$$

**Annexure B – Value of HY**

	Year	1	2	3 onward	Total
		Rupees in million			
Profit before tax and depreciation		26.00	34.00	36.00	
Depreciation		9.00	10.00	11.00	
Profit before tax		17.00	24.00	25.00	
Tax (30%)		(4.25)	(6.00)	(6.25)	
Profit after tax		12.75	18.00	18.75	
Add back depreciation		9.00	10.00	11.00	
One time costs		(8.50)	-	-	
<b>Net cash inflow</b>		<b>13.25</b>	<b>28.00</b>	<b>29.75</b>	
Discount factors (10% [W3])		0.9091	0.8265	8.2644	<b>W4</b>
Present value of net cash inflows		12.05	23.14	245.87	<b>281.05</b>

**W3: Adjustment of inflation in the discount rate**

$$\frac{1 + \text{money rate}}{1 + \text{inflation rate}} = \frac{1.18}{1.07} = 10.28\% \text{ say } 10\%$$

**W4: Present value factor from year 3 to infinity**

$$= \frac{1}{0.1} - 0.9091 - 0.8265 = 8.2644$$

## 14.7 URD PAKISTAN LIMITED

To: The Management

From: Chief Financial Officer

Date: June 8, 2016

Subject: Report on selection of financing option

In response to your advice to explore the financing options for the acquisition of 100 % shareholding in CHI Limited, we have carried out an analysis to determine the debt equity ratio and price of our shares after the acquisition under the following options:

- ☐ Where the acquisition is financed through debt only
- ☐ Where the acquisition is financed by debt and equity in the ratio of 60:40.

Analysis of financing options

The following calculations suggest that both the options are feasible to the company as the acquisition of CHI Limited would result in increase in the shareholders wealth as shown below.

		Existing (Without acquisition)	Option 1 (acquisition thru 100% debt)	Option 2 (acquisition thru 60% debt and 40% equity)
Debt equity ratio after acquisition	<b>W1</b>	42 : 58	59 : 41	47 : 53
Per share price (Rs.)	<b>W3</b>	52.50	64.00	57.75
Increase in shareholders' wealth because of acquisition (Rs. in million)	<b>W4</b>	-	460.00	388.50

The relevant workings are enclosed as annexure.

Under option 1, the shareholders' wealth would increase by Rs. 460 million as compared to the projected position under the existing conditions. However, accepting option 1 would increase the debt equity ratio of the company.

If we are willing to accept the higher gearing level, option 1 should be selected. Otherwise, we should opt for option 2 as in that case there is only a slight increase in debt equity ratio which is more than adequately compensated by a significant increase in the shareholders' wealth.

### Other factors to be considered

Besides the increase in profitability and shareholders wealth, URD should also consider the following aspects:

#### ***Stability of cash flows/high risk due to financial leverage***

A company with stable cash flows can handle more debt because there is constant stream of cash inflows to cover periodic interest payments. Hence, in case the company is satisfied with the stability of future cash flows, it can opt for option 2.

#### ***Future plans***

The company may have future plans of further expansion. While comparing the option (i) and (ii) the management should assess that if it plans to obtain further financing in the near future, it may not be feasible to opt for 100% debt financing at this stage.

#### ***Stock market conditions***

In case the company decides to go for option 2, it should study the stock market conditions to ensure that it would be able to generate sufficient interest in the right issue, before making any commitments as regards investment in the new venture.

#### ***Due Diligence***

It seems that URD is relying on the audited accounts for making the above decision. Even if the audited accounts show a true and fair view, it is not necessary that CHI would be in a position to repeat the performance in future years. It is therefore recommended that URD should carry out a proper due diligence exercise before making a final decision.

## ANNEXURE TO THE REPORT

### W1: Debt equity ratio after acquisition

	Existing (Without acquisition)	Option 1 (acquisition thru 100% debt)	Option 2 (acquisition thru 60% debt and 40% equity)
Debt (Rs. in million)	1,500	*13,075	*2,445
Equity (Rs. in million)	(W2) 2,100	2,100	*32,730
Debt equity ratio	42 : 58	59 : 41	47 : 53

\*1  $1,500 + 1,575 (W2)$

\*2  $1,500 + 1,575 (W2) \times 60\% = 2,445$

\*3  $2,100 + 1,575 (W2) \times 40\% = 2,730$

**W2: Value of URD and CHI**

	<b>Rs. in million</b>	
	<b>URD</b>	<b>CHI</b>
Net profit after tax	300.00	250.00
Number of shares outstanding (Rs. 400m ÷ Rs. 10)	40.00	
Earnings per share (300 ÷ 40)	7.50	
P/E ratio (Rs. 52.5m/Rs. 7.5)	7.00	x 90%
Value of the company	2,100.00	1,575.00

**W3: Post-acquisition price under each option**

*If the acquisition is financed by debt only*

	<b>Rs. in million</b>
Net profit after tax-URD	300.00
Net profit after tax-CHI	250.00
Additional Interest expense (Rs. 1,575m <b>(W2)</b> x 18% x 65%)	(184.28)
Revised profit after tax	365.72
Value of URD after acquisition (Rs. 365.72 x 7 <b>(W2)</b> )	2,560.04
Post-acquisition value per share after (Rs. 2,560.04m ÷ 40m shares)	64.00

*If the acquisition is financed by debt and equity in the ratio of 60:40.*

Net profit after tax-URD	300.00
Net profit after tax-CHI	250.00
Additional interest expense (Rs. 1,575 <b>(W2)</b> x 60% x 17% <b>(W4)</b> x 65%)	(104.42)
Revised profit after tax	445.58

	<b>Shares in million</b>
Existing shares in issue	40.00
Number of right shares to be issued (Rs. 1,575 <b>(W2)</b> x 40% ÷ 45)	14.00
Total number of shares to be outstanding after right issue	54.00
Revised EPS after right issue (Rs. 445.58 million (W4) ÷ 54m shares)	PKR 8.25
Revised market value after right issue (Rs. 8.25 x 7)	PKR 57.75

**W4: Market Capitalization**

	<b>Option 1</b> (acquisition thru 100% debt)	<b>Option 2</b> (acquisition thru 60% debt and 40% equity)
Market capitalization		
– Option 1: (40 x 64)	2,560.00	
– Option 2: (54 x 57.75)		3,118.50
Less: Funds injected by the shareholders (14 x 45 )	-	(630.00)
Less: Existing market capitalization	(2,100.00)	(2,100.00)
Increase in shareholders wealth	<u>460.00</u>	<u>388.50</u>

**14.8 FF INTERNATIONAL****Advantages of growth by acquisition**

- (a) (i) The company may be able to grow much faster than would be possible through purely organic development. This is particularly true if the company is seeking to expand into a new product or market area when acquisition will allow the company to gain technical skills, goodwill and customer contracts which would take it a long time to develop by itself.
- (ii) A larger company with a better spread of products, customers and markets faces a lower level of operating risk than a small company which may be more dependent on a small number of customers and suppliers. Acquisition will therefore allow the company to reduce its operating risk more quickly. This effect is enhanced if the company is using acquisition as a mean of diversification into new product/market areas.
- (iii) Acquisition may permit the company to make operating economies through the rationalization and elimination of duplication in areas such as research and development, debt collection and corporate relations.
- (iv) Acquisition may allow the company to achieve a better level of asset backing if it has a high ratio of sales to assets.

**Disadvantages of growth by acquisition**

- (i) If the acquisition is being made for strong strategic reasons, there may be competition between bidding companies which may force the price to rise to a level which may not be justifiable on financial grounds.
- (ii) Acquisition may involve significant reorganizations cost which may result in lower earnings at least in the short term.



- (iii) The acquisition may lead to inequalities in returns between the shareholders of the bidding and the target companies. Quite often the shareholders in the target company do disproportionately well as compared to the shareholders in the bidding company.

(b)

Determination of Optimal Sales Level				
	Existing sales	Price increased by		Price decreased by
		5%	10%	10%
Market share	30%	23%	20%	45%
	Rs. m	Rs. m	Rs. m	Rs. m
Market size (Rs. 1,000 ÷ 30%) × 1.1	3,667	3,667	3,667	3,667
Sales (Market Share × Market Size) × 1.1	1,100.00	843.41	733.40	1,650.15
Add/(Less): Effect of price change	-	42.17	73.34	(165.02)
Net sales	1,100.00	885.58	806.74	1,485.13
Less: Variable cost of sales (Rs. 363 ÷ 1,100) × Sales without price effect	(363.00)	(278.33)	(242.02)	(544.55)
Less: Variable selling and admin exp (Rs. 250 × 20% *1.1) ÷ 1,100 × Sales	(55.00)	(42.17)	(36.67)	(82.51)
	682.00	565.08	528.05	858.07
Less: Incremental fixed costs				
Depreciation - New plant & mach. (150m ÷ 5)	-	-	-	(30.00)
Interest expense (Rs. 150m × 15%)	-	-	-	(22.50)
<b>Incremental profit</b>	<b>682.00</b>	<b>565.08</b>	<b>528.05</b>	<b>805.57</b>

\* (Rs. 430m - Rs. 100m)

The company can achieve the optimal sale level by reducing 10% price.

**Determination of cash flow gap**

Cash flow	Year 1	Year 2	Year 3	Year 4	Year 5
Growth rate	10%	10%	10%	10%	10%
Operating profit excluding depreciation <b>(W1)</b>	634.52	697.97	767.77	844.55	929.01
One time cost of employees lay off	(100.00)	-	-	-	-
Net operating cash flow	534.52	697.97	767.77	844.55	929.01
Fin. charges - Long term loan <b>(W2)</b>	(127.50)	(102.00)	(76.50)	(51.00)	(25.50)
Financial charges - Short term loan (1,000 × 14%)	(140.00)	(140.00)	(140.00)	(140.00)	(140.00)
Net cash flow before taxation	267.02	455.97	551.27	653.55	763.51
Taxation <b>(W3)</b>	(17.11)	(97.79)	(126.38)	(157.07)	(190.05)
Net cash flow	249.91	358.18	424.89	496.48	573.46
Reduction in short term debt	(300.00)	-	-	-	-
Reduction in long term debt <b>(W2)</b>	(170.00)	(170.00)	(170.00)	(170.00)	(170.00)
Increase in working capital <b>(W4)</b>	(194.05)	(59.40)	(65.34)	(71.88)	(79.07)
(Deficit ) to be filled in by cash	(414.14)	128.78	189.55	254.60	324.39
Net deficit	(414.14)	(285.36)	(95.81)		

**W1: Determination of operating profit at optimal sales level**

	Rs. in million
Contribution margin	805.57
Less: Fixed costs of sales (other than depreciation) (Rs. 25m × 1.1)	(27.50)
Less: Selling and admin expenses	
Payroll costs [Rs. 160m × 75% × 1.1]	(132.00)
Other fixed costs ((Rs. 250m × 80%) - 25m - 160m) × 1.1 × 70%	(11.55)
Operating profit (excluding depreciation)	<b>634.52</b>

**W2: Financial charges on long term loan**

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening balance – principal	700.00	680.00	510.00	340.00	170.00
Addition	150.00	-	-	-	-
	850.00	680.00	510.00	340.00	170.00
Repayment	(170.00)	(170.00)	(170.00)	(170.00)	(170.00)
Closing balance	680.00	510.00	340.00	170.00	-
Mark-up expense @ 15%	127.50	102.00	76.50	51.00	25.50

**W3: Taxation**

	Year 1	Year 2	Year 3	Year 4	Year 5
Net cash flow before taxation	267.02	455.97	551.27	653.55	763.51
Less: Depreciation (75+25+30)	(130.00)	(130.00)	(130.00)	(130.00)	(130.00)
Taxable income	137.02	325.97	421.27	523.55	633.51
Carry forward tax losses	(80.00)	-	-	-	-
<b>Tax profit/(loss)</b>	<b>57.02</b>	<b>325.97</b>	<b>421.27</b>	<b>523.55</b>	<b>633.51</b>
Tax @ 30%	17.11	97.79	126.38	157.07	190.05

**W4: Increase in working capital**

	Existing	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	1,000.00	1,485.13	1,633.64	1,797.00	1,976.70	2,174.37
Increase in sales		485.13	148.51	163.36	179.70	197.67
Additional working capital required (40% of increased sales)		194.05	59.40	65.34	71.88	79.07

**(c) Determination of maximum bid price**

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Net operating cash flows (from above)	-	249.91	358.18	424.89	496.48	573.46
Add: Financial charges		267.50	242.00	216.50	191.00	165.50
Add: Cash flow deficit	-	(414.14)	128.78	189.55	95.81	-
Add: Changes in working capital		(194.05)	(59.40)	(65.34)	(71.88)	(79.07)
Terminal value*	-	-	-	-	-	5,968.52
Cash flows	-	(90.78)	669.56	765.60	711.41	6,628.41
Discounting factor at 18%	1	0.8475	0.7182	0.6086	0.5158	0.4371
PV	-	(76.94)	480.88	465.94	366.95	2,897.28
<b>NPV (Maximum bid price)</b>	<b>4,134.11</b>					

$$*(573.46 + 165.5) \times (1+5\%) \div (18\% - 5\%)$$

## CHAPTER 15 – FOREIGN EXCHANGE RATES

### 15.1 INTEREST RATE PARITY

The rates are quoted as direct rates.

The direct quotes interest rate parity formula is as follows:

$$F = S \times \frac{1 + i_d}{1 + i_f}$$

(a)  $\text{GBP/USD} = 1.8000 \times (1.035/1.05) = 1.7743$

(Note: the interest rate is lower for the dollar than for sterling, therefore the dollar should increase in value over time against sterling.)

$$\text{GBP/EUR} = 1.5000 \times (1.025/1.05) = 1.4643$$

$$\text{EUR/USD} = 1.2000 \times (1.035/1.025) = 1.2117$$

(b)  $\text{GBP/USD} = 1.8000 \times (1.035/1.05)^3 = 1.7240$

$$\text{GBP/EUR} = 1.5000 \times (1.025/1.05)^3 = 1.3954$$

$$\text{EUR/USD} = 1.2000 \times (1.035/1.025)^3 = 1.2355$$

## CHAPTER 16 – INTERNATIONAL INVESTMENT DECISIONS

### 16.1 CASH FLOWS FROM A FOREIGN PROJECT

Year	Expected exchange rate	Cash flows in francs	Cash flows in £
0	5.00	(45,000,000)	(9,000,000)
1	$5.00 \times (1.05/1.03)^1$	10,000,000	1,960,784
2	$5.00 \times (1.05/1.03)^2$	20,000,000	3,846,154
3	$5.00 \times (1.05/1.03)^3$	25,000,000	4,716,981
4	$5.00 \times (1.05/1.03)^4$	10,000,000	1,851,852

**Tutorial note:** You may have calculated the exchange rate to three or more decimal places. Here, the exchange rate has been estimated to just two decimal places.

These cash flows in sterling should be discounted at the WACC.

Year	Cash flow	Discount factor	PV
	£	9%	£
0	(9,000,000)	1.000	(9,000,000)
1	1,960,784	0.917	1,798,039
2	3,846,154	0.842	3,238,462
3	4,716,981	0.772	3,641,509
4	1,851,852	0.708	1,311,111
NPV			+ 989,121

The NPV in sterling is positive. The project is financially viable and should be undertaken.

### 16.2 LAHORE PHARMA PLC

- (a) Determination of the expected future exchange rates based on the information that ringgit is expected to appreciate by 2% per annum. Value of ringgit today in terms of rupees is Rs. 22 per ringgit. This is expected to appreciate by 2% per annum. Therefore:

Year	Rs.
0	Spot = 22.00
1	$22(1.02)$ = 22.44
2	$22(1.02)^2$ = 22.89
3	$22(1.02)^3$ = 23.35

In order to determine the cost of capital in ringgit using Interest Rate Parity, the following formula is adopted.

$$\frac{1+RF}{1+RD} = \frac{S}{F}$$

where RF= Foreign Rate, RD = Domestic Rate, S = Spot Rate and F = Future Rate

$$\frac{1+RF}{1+0.10} = \frac{22}{22.44}$$

$$22.44 (1+RF) = 22(1.1)$$

$$22.44RF = 22(1.1) - 22.44$$

$$\therefore RF = \frac{22(1.1) - 22.44}{22.44} = \frac{24.2 - 22.44}{22.44}$$

$$RF = 7.8\% \cong 8\%$$

Computation of NPV in ringgits.

Year	Cash flow (ringgit'm)	Discount factor (8%)	Present value (ringgit'm)
0	(160)	1.0000	(160.000)
1	80	0.9259	74.072
2	96	0.8573	82.301
3	64	0.7938	50.803
Net present value			47.176

Since the NPV at the required rate of return gives a positive value, the project is viable.

- (b) Reasons why business organisations engage in cross-border investment include the following:
- (i) To take advantage of new markets e.g coca-cola, electronics etc
  - (ii) To seek raw material e.g. Us Oil companies establishing business in nations where there are oil deposits.
  - (iii) In search of new technology.
  - (iv) Avoidance of political and regulatory hurdles.
  - (v) Diversification.
  - (vi) Tax avoidance.
  - (vii) Possible benefits from variations in exchange rates.
  - (viii) Protection of profit margin.
  - (ix) Depriving another firm of any abnormal profit

### 16.3 FOREIGN INVESTMENT

- (a) Calculate the NPV of the project in the currency of the investment, using a discount rate appropriate to the investment.

The annual tax allowance on the cost of the equipment is 25% of 1,000,000 Francs = 250,000 Francs each year for 4 years.

This will result in tax savings of 100,000 Francs ( $40\% \times 250,000$  Francs) each year in years 2 – 5.

Year	0	1	2	3	4	5
	FR	FR	FR	FR	FR	FR
Equipment	(1,000,000)					
Tax saved on capital allowances			100,000	100,000	100,000	100,000
Cash profit		500,000	500,000	500,000	500,000	
Tax on cash profit			(200,000)	(200,000)	(200,000)	(200,000)
Net cash flow	(1,000,000)	500,000	400,000	400,000	400,000	(100,000)
DCF factor at 16%	1.000	0.862	0.743	0.641	0.552	0.476
Present value	(1,000,000)	431,000	297,200	256,400	220,800	(47,600)

**NPV = + 157,800**

(b) **Dividend payments**

Year	1	2	3	4	5
	FR	FR	FR	FR	FR
Cash profit	500,000	500,000	500,000	500,000	
Tax on profit	(200,000)	(200,000)	(200,000)	(200,000)	
Tax saving from capital allowance	100,000	100,000	100,000	100,000	
Profit after tax	400,000	400,000	400,000	400,000	
Dividend (50%)	200,000	200,000	200,000	200,000	800,000
Retained	200,000	200,000	200,000	200,000	

(c)

Year	1	2	3	4	5
	FR	FR	FR	FR	FR
Dividend in FR	200,000	200,000	200,000	200,000	800,000
Exchange rate	$3 \times (1.10/1.04)$ = 3.1731	$3 \times (1.10/1.04)^2$ = 3.3561	$3 \times (1.10/1.04)^3$ = 3.5498	$3 \times (1.10/1.04)^4$ = 3.7546	$3 \times (1.10/1.04)^5$ = 3.9712
Dividend in \$	63,030	59,593	56,341	53,268	201,450

- (d) The cost of buying the equipment in Year 0 = FR1,000,000/3.00 = \$333,333

Year		Cash flow	Discount factor at 10%	PV
		\$		\$
0	Equipment	(333,333)	1.000	(333,333)
1	Dividend	63,030	0.909	57,294
2	Dividend	59,593	0.826	49,224
3	Dividend	56,341	0.751	42,312
4	Dividend	53,268	0.683	36,382
5	Dividend	201,450	0.621	125,100
<b>NPV</b>				<b>(23,021)</b>

The project is not worthwhile because it has a negative NPV in dollars, even though it has a positive NPV in Francs. This is because:

- ☐ the restriction on dividend payments delays returns to the parent company
- ☐ the Franc is expected to fall in value against the dollar over the next five years

## 16.4 GOLD LIMITED

	Years	0	1	2	3	4	5
<b>Evaluation of investment in Bangladesh</b>							
				<b>BDT in million</b>			
Total contribution (W1)				490.05	718.74	790.62	869.68
Less: Fixed overhead (Expense x Inflation %)				(423.50)	(465.85)	(512.44)	(563.68)
Operating cash flows				66.55	252.89	278.18	306.00
Tax at 35%				(23.29)	(88.51)	(97.36)	(107.10)
Tax savings on depreciation (W3)				16.73	13.38	10.71	8.56
Land	(80.00)						
Building	(30.00)	(82.50)					
Plant and machinery		(126.50)					
Working capital (W4)		(22.00)	(111.10)	(13.31)	(14.64)		(16.11)
After tax realizable value (W7)							322.16
Net cash flow	(110.00)	(231.00)	(51.11)	164.45	176.89		513.48
Exchange rate BDT / PKR (W2)	0.8400	0.8250	0.8103	0.7958	0.7816		0.7676
Net cash flow (PKR in million)	(130.95)	(280.00)	(63.68)	206.65	226.32		668.94
Discount factor (@ 15.12%) (PKR in million) (W5)	1.00	0.87	0.75	0.66	0.57		0.49
Present value (PKR in million)	(130.95)	(243.22)	(47.76)	136.39	129.00		327.78
<b>Net present value (PKR in million)</b>							<b>171.24</b>



	Years	0	1	2	3	4	5
<b>Evaluation of investment in Sri Lanka</b>							
		<b>LKR in million</b>					
Pre-tax cash flow (annual increase by 8% from year 0)			29.16	40.82	44.09	47.62	51.43
Tax @ 25%			(7.29)	(10.21)	(11.02)	(11.91)	(12.86)
Cost of acquisition	(90.00)						
Plant and machinery	(18.00)						
Working capital (W4)	(36.00)	(2.88)	(3.11)	(3.36)	(3.63)		(3.92)
After tax net realizable value							167.9
Net cash flow	(144.00)	18.99	27.50	29.71	32.08		202.55
Exchange rate LKR / PKR (W2)	1.3250	1.2777	1.2320	1.1880	1.1456		1.1047
Net cash flow from SISL in (PKR in million)	(108.68)	14.86	22.32	25.01	28.00		183.35
Additional tax @ 5% (W6) (PKR in million)	-	(1.14)	(1.66)	(1.85)	(2.07)		(2.34)
Net cash flow (PKR in million)	(108.68)	13.72	20.66	23.16	25.93		181.01
Discount factor (@ 15.12)(W5)(PKR in million)	1.00	0.87	0.75	0.66	0.57		0.49
Present value (PKR in million)	(108.68)	11.94	15.49	15.29	14.78		88.70
<b>Net present value (PKR in million)</b>		<b>37.52</b>					

**W1: Contribution margin – Bangladesh**

Sales price	300,000					
Less: Variable costs	(165,000)					
Contribution margin per unit (BDT)	135,000	-	163,350	179,685	197,654	217,419
Production / sales units			3,000	4,000	4,000	4,000
Total contribution (BDT in million)			490.05	718.74	790.62	869.68

**W2: Computation of exchange rates for the next 5 years**

<b>BDT / PKR</b>	0.8400	0.8250	0.8103	0.7958	0.7816	0.7676
<b>LKR / PKR</b>	1.3250	1.2777	1.2320	1.1880	1.1456	1.1047

Average mid market exchange rate BDT / PKR

Year 0:  $0.8300 + 0.8500 = 1.680 \div 2 = 0.8400$

Year 1-5: Previous year  $\times 1.10/1.12$

Average mid market exchange rate LKR / PKR

Year 0:  $1.3100 + 1.3400 = 2.650 \div 2 = 1.3250$

Year 1-5: Previous year  $\times 1.08 / 1.12$

	Years	0	1	2	3	4	5
<b>W3: Tax depreciation (BDT in million)</b>							
Opening balance			30.00	239.00	191.20	152.96	122.37
Machinery		-	126.50				
Building		30.00	82.50				
		30.00	239.00	239.00	191.20	152.96	122.37
Less: 20% depreciation allowance				47.80	38.24	30.59	24.47
		30.00	239.00	191.20	152.96	122.37	97.90
Tax saved at the rate of 35%				16.73	13.38	10.71	8.56

#### W4 : Working capital

<b>Bangladesh</b>		<b>BDT in million</b>					
Working capital $\times$ inflation factor			22.00	133.10	146.41	161.05	177.16
Increase in working capital			22.00	111.10	13.31	14.64	16.11
<b>Sri Lanka</b>		<b>LKR in million</b>					
Working capital $\times$ inflation factor		36.00	38.88	41.99	45.35	48.98	52.90
Increase in working capital		36	2.88	3.11	3.36	3.63	3.92

#### W5: WACC as discount factor

Cost of equity	$0.70 \times 18\% = 12.60\%$
Cost of debt	$0.30 \times 12\% \times 70\% = 2.52\%$
WACC	15.12%

**W6 : Additional tax for income from Sri Lanka**

Tax rate applicable in Pakistan is 5% higher than Sri Lanka. So income from Sri Lanka will be subject to 5% additional tax.

**----- LKR in million -----**

Pre-tax cash flow in LKR (as above)	-	29.16	40.82	44.09	47.62	51.43
Exchange rate (W2)	1.33	1.28	1.23	1.19	1.15	1.10
Pre-tax cash flow in PKR	-	22.78	33.19	37.05	41.41	46.75
Additional Tax in Pakistan @ 5%		1.14	1.66	1.85	2.07	2.34

**W7: After tax realizable value**

	<b>Bangladesh (BDT)</b>	<b>Sri Lanka (LKR)</b>
After tax realizable value of investment	145.00	115.00
Realization of working capital	177.16	52.90
	<u>322.16</u>	<u>167.90</u>

**Conclusion:**

Gold Limited should invest in Bangladesh as it gives higher NPV.

**16.5 GHAZALI LIMITED**

To: Board of Directors

Date: 7 December 2016

Subject: Evaluation of proposed investment in Country Y

**(a) Net present value of the investment**

The financial evaluation of the Country Y Project is based on estimates of the future nominal cash flows of the investment, in both Country X and Y. All foreign cash-flows are converted to CX and total is discounted at a shareholders' required rate i.e. 22% per annum. The theory of purchasing power parity has been used to estimate future currency exchange rates. This predicts that if currencies are allowed to float freely on the market, they will adjust in the long run to compensate for differences in countries' inflation rates.

The results show that the investment has an expected net present value of approximately CX 81.252 million, which indicates that it is worthwhile and should add to shareholder value.

**Calculations**

	Growth	Inflation	Y E A R S			
			0	1	2	3
Exchange rate (PY x 1.2 / 1.07)			45.000	50.470	56.600	63.480
			<b>CX in million</b>			
Cash flows in Country X	5%	7%	(7.000)	(0.535)	(0.601)	(0.675)
Cash flows in Country Y		20%	(17.778)	4.042	6.360	7.894
<b>Total nominal cash flows</b>			(24.778)	3.507	5.759	7.219
Discount factor @ 30.54% [(1.22x1.07)-1]			1.000	0.766	0.587	0.450
Present value			(24.778)	2.686	3.381	3.249
Net present value as computed above			(15.462)			
Country X - NPV from Year 2 to perpetuity [(0.675 x 1.1235) ÷ (0.3054 - *0.1235)] x 0.450			(1.876)			
Country Y - NPV from Year 4 to perpetuity [(7.894 x 1.26) ÷ (0.3054 - **0.26)] x 0.450			98.59			
			<b>81.252</b>			

**\*Growth rate for Country X from year 4 to perpetuity [(1.07x1.05)-1]=12.35%**

**\*\*Growth rate for Country Y from year 4 to perpetuity [(1.20x1.05)-1]=26%**

**(b) Risks and uncertainties**

- (i) Large margins of potential error in the exchange rate prediction
- (ii) A slow payback: in present value terms the project will probably not break even until Year 8 or 4.
- (iii) The economic uncertainties in Country Y which may affect adversely on rate of inflation.
- (iv) Inappropriate projection of future cash flows specially the cash flows to be generated in Country Y and cash flows expectation to perpetuity.

(c) **Management strategies**

*To counter the increase in local taxes*

- (i) Negotiate tax concessions in advance
- (ii) Use transfer price strategies including royalties and management, to minimize the impact of variation in Country Y taxable profits and dividends

*To counter the imposition of exchange controls*

- (i) Make extensive use of local currency loans for financing
- (ii) Arranging currency swaps
- (iii) Back to back loans with other multinational companies and banks with complimentary cash needs

## CHAPTER 17 – MANAGING FOREIGN EXCHANGE RISK (I)

### 17.1 FOREIGN EXCHANGE

- (a) A hedge against the risk can be obtained by entering into a forward rate agreement to buy \$750,000. The forward rate is the forward rate that favours the bank. This is 1.8535 (and not 1.8543).

The cost of buying the dollars will be  $\$750,000 / 1.8535 = \text{£}404,639.87$ .

- (b) Subtract a premium, add a discount.

Spot rate	1.3025
Premium	(0.0018)
Forward rate	<u>1.3007</u>

The \$450,000 will be sold in exchange for  $\text{€}345,967.56$  ( $450,000 / 1.3007$ ).

- (c) Forward rates = 1.9757 – 1.9763

The rate for a company to buy sterling (sell dollars) is 1.9763.

Cost of buying  $\text{£}750,000 = 750,000 \times 1.9763 = \$1,479,750$ .

### 17.2 MONEY MARKET HEDGE

- (a) The company will receive \$600,000 in six months, and will want to receive sterling and pay dollars.

It can do this with a money market hedge by borrowing US dollars now. The interest rate for six months in dollars is  $3.5\% \times 6/12 = 1.75\%$ . It will need to borrow now:

$\$600,000 / 1.0175 = \$589,680.59$ .

It can immediately exchange these dollars into sterling at the spot rate of 1.8800, to obtain:

$\$589,680.59 / 1.8800 = \text{£}313,659.89$ .

After six months, the dollar loan will be repayable with interest. The total repayment will be \$600,000, and the payment can be made from the \$600,000 received from the customer.

- (b) The company can do anything with the sterling it receives now from the hedging transaction. If it chose to invest the cash for six months at 5% per year (2.5% for six months), the investment of  $\text{£}313,659.89$  would increase to:

$\text{£}313,659.89 \times 1.025 = \text{£}321,501.39$ .

To avoid opportunities for arbitrage between the money markets and the forward FX markets, the six-month forward exchange rate would therefore need to be:

$\$600,000 / \text{£}321,501.39 = 1.8662$ .

## 17.3 DUNBORGEN

### Forward exchange contract

The six-month forward rate is 1.566 – 1.574.

Dunborgen would need to buy \$500,000, and the bank would charge a rate of \$1.566.

The cost to Dunborgen in euros in six months' time =  $500,000/1.566 = €319,285$ .

### Money market hedge

The spot exchange rate is 1.602 – 1.606

Dunborgen could borrow euros now, convert them into dollars and put the dollars on deposit for six months.

The six month interest rate for US dollar deposits =  $2.0\% \times 6/12 = 1.0\%$ .

To have \$500,000 in six months time, Dunborgen would need to deposit:

$\$500,000 \times (1/1.01) = \$495,050$ .

The cost in euros of buying \$495,050 spot =  $495,050/1.602 = €309,020$ .

It is assumed that the euros to purchase the dollars spot would be obtained by borrowing for six months at 4.8%. Interest for six months would be  $4.8\% \times 6/12 = 2.4\%$ .

The cost in euros to Dunborgen of a money market hedge, for comparison with the cost of a forward contract, would therefore be:

$€309,020 \times 1.024 = €316,436$ .

### Comparison of hedging methods

A money market hedge would be less expensive in this case, and is therefore recommended as the method of hedging the currency risk exposure.

## 17.4 CURRENCY SWAP

- (a) Small company will want to borrow 3 million zants, but can borrow in sterling at a rate that is 2% lower than the rate that the Zantland counterparty can obtain. The Zantland counterparty presumably wants to borrow in sterling (the equivalent of 3 million zants), but can borrow in zants at a rate that is 0.5% lower than the rate that Small Company can obtain.

This provides an opportunity for credit arbitrage of  $2\% + 0.5\% = 2.5\%$ .

The bank would take 0.5% in fees, leaving 2% of net credit arbitrage for the swap counterparties to share. Small Company would have three-quarters of this amount, which is 1.5%.

The swap arrangement might therefore be as follows:

	<b>Small Company</b>	<b>Zantland counterparty</b>
	%	%
Borrow direct	(6.5)	(ZIBOR + 1.5)
Swap		
Pay	ZIBOR	6.5
Receive	6.0	ZIBOR
Net cost	<u>ZIBOR + 0.5%</u>	<u>8.0</u>

Small company would pay 1.5% less than by borrowing direct (at ZIBOR + 2%) and the Zantland counterparty would borrow at 0.5% less than by borrowing sterling direct at 8.5%.

- (b) It is assumed that 15% is the appropriate discount rate for evaluating the project's cash flows in sterling. (A DCF rate of 15% would be very low for evaluating the cash flows in zants, considering the expected high rate of inflation in Zantland.)

It is also assumed that the swap will be undertaken, and in Year 0 Small Company will spend £333,333 (3 million zants at the spot rate of 9.00). At the end of Year 3, it is assumed that Small Company will receive the same amount (£333,333) on the termination of the currency swap, and a further 3,000,000 zants for the remainder of the sale price of the operations centre.

The project cash flows will therefore be as follows:

**Year**

0	£(333,333)	
1	200,000 zants	at the end of Year 1 spot rate
2	200,000 zants	at the end of Year 2 spot rate
3	200,000 zants	at the end of Year 3 spot rate
3	3,000,000 zants	at the end of Year 3 spot rate
3	3,000,000 zants	at the swap rate of 9.00, therefore £333,333.

**Year**

**Spot rate**

	<b>Best case</b>	<b>Worst case</b>
	10% inflation	50% inflation
0	9.00	9.00
1	9.90	13.50
2	10.89	20.25
3	11.98	30.38



Year	Cash flow	DCF factor at 15%	Best case		Worst case	
			Cash flow	PV	Cash flow	PV
	zants		£	£	£	£
0		1.000	(333,333)	(333,333)	(333,333)	(333,333)
1	200,000	0.870	20,202	17,576	14,815	12,889
2	200,000	0.756	18,365	13,884	9,877	7,467
3	3,200,000	0.658	267,112	175,760	105,332	69,308
3	3,000,000	0.658	333,333	219,333	333,333	219,333
NPV				+ 93,220		(24,336)

### Conclusion

On the basis of the assumptions used, the project would have a positive NPV if inflation in Zantland exceeds inflation in the UK by 10% per year, but will have a negative NPV if inflation in Zantland exceeds inflation in the UK by 50% per year.

There is consequently an element of risk in the project due to uncertainty about the spot exchange rate, and this risk element should be assessed more closely before a decision is taken about the investment.

## 17.5 MOMIN INDUSTRIES LIMITED

- (a) If shipment is made in accordance with the Schedule

### Purchases

Month	Per ton cost (bhat)	Qty. (ton)	Amount (bhat)	Conv. rate	Rupees
June (Buy one month forward)	50,000	4,000	200,000,000	2.33	466,000,000
July (Buy two month forward)	50,000	6,000	300,000,000	2.31	693,000,000
					<b>1,159,000,000</b>

**Sales**

Month	Per ton revenue (US \$)	Qty. (ton)	Amount (US\$)	Conv. rate	Rupees
July (Sell two month fwd.)	2,000	4,000	8,000,000	65.77	526,160,000
Aug. (Sell three month fwd.)	2,000	6,000	12,000,000	66.10	793,200,000
					<b>1,319,360,000</b>
Profit on transactions (sales minus purchases)					160,360,000
Less: Commission costs (0.01%)					(247,836)
					<b>160,112,164</b>

- (b) If the shipment is delayed for a period of two month

**Purchases**

Month	Per ton cost (bhat)	Qty. (ton)	Amount (bhat)	Conv. rate	Rupees
June (Buy one month forward)	50,000	4,000	200,000,000	2.33	466,000,000
July (Buy two month forward)	50,000	6,000	300,000,000	2.31	693,000,000
July (Cancelled at spot)	50,000	(6,000)	(300,000,000)	2.29	(687,000,000)
July (Buy 2 months forward)	50,000	6,000	300,000,000	2.28	684,000,000
					<b>1,156,000,000</b>

**Sales**

Month	Per ton revenue (US \$)	Qty. (ton)	Amount (US\$)	Conv. rate	Rupees
July (Sell two month forward)	2,000	4,000	8,000,000	65.77	526,160,000
Aug. (Sell three month forward)	2,000	6,000	12,000,000	66.10	793,200,000
July (Buy 1 month forward)	2,000	(6,000)	(12,000,000)	65.96	(791,520,000)
July (Sell 3 month forward)	2,000	6,000	12,000,000	66.38	796,560,000
					<b>1,324,400,000</b>

Month	Per ton revenue (US \$)	Qty. (ton)	Amount (US\$)	Conv. rate	Rupees
Profit on transactions (sales minus purchases)					168,400,000
Less: Commission costs (0.01%)					(475,044)
					167,924,956

(c) If shipment is cancelled on July 31, 2016

### Purchases

Month	Per ton cost (Bhat)	Qty. (ton)	Amount (bhat)	Conv. Rate	Rupees
June (Buy one month forward)	50,000	4,000	200,000,000	2.33	466,000,000
July (Buy two month forward)	50,000	6,000	300,000,000	2.31	693,000,000
<b>July (Cancelled at spot)</b>	50,000	(6,000)	(300,000,000)	2.29	(687,000,000)
					<b>472,000,000</b>

### Sales

Month	Per ton revenue (US \$)	Qty. (ton)	Amount (US\$)	Conv. rate	Rupees
July (Sell two month forward)	2,000	4,000	8,000,000	65.77	526,160,000
Aug. (Sell three month fwd.)	2,000	6,000	12,000,000	66.10	793,200,000
July (Buy 1 month forward)	2,000	(6,000)	(12,000,000)	65.96	(791,520,000)
					<b>527,840,000</b>
Profit on transactions (sales minus purchases)					55,840,000
Less: Commission costs (0.01%)					(247,836)
					55,592,164

## 17.6 QALAT INDUSTRIES LIMITED

Net Position	Three months	Six months
Export – Receivable	€98,500	€77,000
Import - (Payable)		€(223,500)
Net position – Receivable/(Payable)	€98,500	€ (146,500)

### (i) Forward Market

#### Three months contract

Rs.

Receipt of export amount at the end of third month

€ 98,500x123.62	12,176,570
-----------------	------------

#### Six months contract

Net payment at the end of sixth month

€ 146,500x123.54	18,098,610
------------------	------------

### (ii) Money Market

#### Three months payment

Since the company is expecting to receive €. Therefore, to hedge currency rate risk we need to convert the same into definite Rupee receivables.

Borrow in Euro and invest in Rupee, so that at the end of third month repay Euro borrowing from export proceeds and receive a definite Rupee amount.

€

Borrow a sum which has a compound value of € 98,500 at the end of third month:  $98,500 \div (1 + 5\% \div 4)$

	97,284
--	--------

Rs.

Convert € to Rupees at spot (€ 97,284 × Rs. 124.22) for investment

	12,084,618
--	------------

Invest for three months now which after 3 months would amount to:  $\text{Rs. } 12,084,618 \times (1 + 6.5\% \div 4)$

	12,280,993
--	------------

#### Six month payments

Since the company is expecting to pay €. Therefore, to hedge currency rate risk we need to convert this payable into definite Rupee payables.

Borrow in Rupee a sum equivalent to the present value of € 146,500. Invest that Euro sum, so that at the end of sixth month Euro will be available for net import payment and we will have a definite Rupee payable.

Investment required for a sum which has compound value of € 146,500 at the end of sixth month:

	€
$146,500 \div (1 + 3\% \div 2)$	144,335

Rs.

To invest, borrow equivalent Rupee to buy Euro at spot (€ 144,335 × Rs. 124.52)

	17,972,594
--	------------

Rs. 17,972,594 used for buying € 145,335 would require a definite rupee repayment of compound value at the end of sixth month:  $17,972,594 \times (1 + 11\% \div 2)$

	18,961,087
--	------------

**Recommendation:**

Feasible option for 3 month net payment -----&gt; Money Market

Feasible option for 6 month net payment -----&gt; Forward Cover

**17.7****SILVER LIMITED****(a) Net receipt due at the end of first quarter**

	US \$
Receipt due	1,020,000
Payment due	(775,000)
	<u>245,000</u>

**(i) Net receipt under forward contract**

$$= 245,000 \times (\text{MYR } 3.03 - \text{MYR } 0.071)$$

$$= 245,000 \times 2.959$$

$$= 724,955$$

**(ii) Net receipt under money market hedge**

$$\text{Borrowed in US \$} = \frac{245,000}{1 + \left(\frac{7.2\%}{4}\right)} = \frac{245,000}{1.018} = 240,668$$

$$\text{Received now in MYR} = 240,668 \times 3.03 = \text{MYR } 729,224$$

$$\text{Received in 3 months time} = 729,224 (1 + (6.6\%/4)) = \text{MYR } 741,256$$

**Net payment due at the end of second quarter**

	US \$
Receipt due	1,224,000
Payment due	(1,347,000)
	<u>(123,000)</u>

**(i) Net payment under forward contract**

$$= 123,000 \times (\text{MYR } 3.11 - \text{MYR } 0.164)$$

$$= 123,000 \times 2.946$$

$$= 362,358$$

(ii) **Net payment under money market hedge**

$$\text{Lent in US \$} = \frac{123,000}{1 + \left(\frac{5.8\%}{2}\right)} = \frac{123,000}{1.02900} = 119,534$$

$$\text{Paid now in MYR} = 119,534 \times 3.11 = 371,751$$

$$\text{Paid in 6 months time} = 371,751 \times \left(1 + \left(\frac{7.9\%}{2}\right)\right) = 386,435$$

**Conclusion:**

- ❑ For the first quarter, SL would be better off with money market hedge as it would receive more MYR than with a forward contract.
  - ❑ For the second quarter, forward exchange contract produces a lower net payment in MYR.
- (b) SL wishes to lend and so will buy 5 (MYR 15,000,000 / MYR 3,000,000) interest rate February Futures.
- (i) If interest rates fall by 0.75% and March Futures price increases by 1%, the net hedging position of the interest rate future would be as follows:

		MYR
Future outcome	MYR 15,000,000 x 6/12 x 1%	75,000
Receipt in spot market	(MYR 15,000,000 x 5.25% x 6/12)	393,750
<b>Net outcome</b>		<b>468,750</b>
Target outcome (6% x 6/12 x MYR 15,000,000).		450,000
Gain on hedging through interest rate futures		18,750

- (ii) If interest rates rise by 1% and March Futures price decreases by 1%, the net hedging position of the interest rate future would be as follows:

		MYR
Future outcome	15,000,000 x 6/12 x 1%	(75,000)
Receipt in spot market	(MYR 1,500,000 x 7% x 6/12)	525,000
<b>Net outcome</b>		<b>450,000</b>
Target outcome		450,000
No gain or loss (100% efficient)		-

## 17.8

## KHALDUN CORPORATION

## (a) USA

The full receipt i.e. US \$ 1.50 will be hedged.

*Hedging through Forward Contract*

KC would sell US \$ 1.5 million three months forward at Rs. 87.0 per US \$ and receive Rs. 130.5 million.

*Hedging through Money Market*

To obtain US \$ 1.5 million, borrow now:  $(1.5 \text{ million} \div [1+(5.20\% \times 3/12)]) =$  \$ 1.48

US \$ will be converted into Rs. at spot: US \$ 1.48 million x Rs. 86.56 = Rs. 128.11

Rs. 128.11 million will be invested in Pakistan: Rs.  $128.11 \times [1+(8.5\% \times 3/12)]$  Rs. 130.83

## UK

The receipts and payments can be netted off :  $(£ 5.10 - £ 4.0) = £ 1.10$

*Hedging through Forward Contract*

KC should buy £ 1.1 million three months forward at Rs. 136.18 per £ and pay Rs. 149.8 million.

*Hedging through Money Market*

To earn £ 1.1 million, invest now:  $£ 1.1 \text{ million} \div [1+(5.00\% \times 3/12)] =$  £ 1.09

Purchase £ at spot rate : £ 1.09 x Rs. 135.13 Rs. 147.29

Borrow Rs. 147.29 million in Pak at 10.5%: Rs.  $147.29 \text{m} \times [1+(10.5\% \times 3/12)] =$  Rs. 151.16

(b) Payments	Receipts			Total
	KC-(Pak)	KA-(USA)	KB-(UK)	
	Rs. in million			
KC-(Pak)	-	131.00	688.30	819.30
KA-(USA)	130.02	-	390.06	520.08
KB-(UK)	539.84	242.93	-	782.77
Total receipts	669.86	373.93	1,078.36	2,122.15
Total payments	(819.30)	(520.08)	(782.77)	(2,122.15)
<b>Net payment / (receipts)</b>	<b>149.44</b>	<b>146.15</b>	<b>(295.59)</b>	<b>-</b>

Without multilateral netting, the group companies would have required to pay Rs. 2,122.15 million as shown in the above table. On account of multilateral netting, the amounts payable and receivable were netted and as a result the amount required to be paid/received was reduced to Rs. 295.59 million i.e. 13.93% of the gross amount, resulting in savings of transaction/hedging costs.

## CHAPTER 18 – MANAGING FOREIGN EXCHANGE RISK (II): CURRENCY FUTURES

### 18.1 CURRENCY FUTURES

- (a) The company must make a payment in US dollars in May. It must therefore buy dollars to make the payment.

Using futures, the company will therefore buy dollars and sell euros. It will therefore sell euro/US dollar futures, which are for €125,000 each.

At the futures price of 1.2800, the amount of euros to sell in exchange for \$640,000 is:

$$\$640,000 / 1.2800 = \$500,000.$$

The number of contracts to sell is therefore:  $\$500,000 / \$125,000$  per contract = 4.0 contracts.

The company will sell 4 June contracts at 1.2800.

- (b) It will close its position in May, when the futures price is 1.2690.

The value of 1 tick for this contract is  $125,000 \times \$0.0001 = \$12.50$ .

Original selling price	1.2800
Buying price to close the position	1.2690
Gain per contract	0.0110

Total gain on futures position = 4 contracts  $\times$  0.011  $\times$  \$125,000 = \$5,500.

The French company must pay \$640,000 to its supplier. It has \$5,500 profit from closing the futures position. It therefore needs an additional  $(\$640,000 - \$5,500) = \$634,500$ .

It must buy these dollars at the spot rate of 1.2710. The cost in euros will be  $\$634,500 / 1.2710 = \text{€}499,213$ .

The effective exchange rate for the payment of \$640,000 is therefore:  $\$640,000 / \text{€}499,213 = \text{US\$}1.2820/\text{€}1$ .

This is close to the price at which the futures were originally sold. However, the hedge is not perfect because the position was closed before the settlement date for the contract.

### 18.2 MORE CURRENCY FUTURES

- (a) The US company must make a payment in sterling in January. It will sell the sterling it receives in exchange for dollars.

Using futures, the company will therefore sell sterling and buy dollars. It will therefore sell sterling/US dollar futures, which are for £62,500 each.

The number of contracts to sell is therefore:  $\text{£}400,000 / \text{£}62,500$  per contract = 6.4 contracts.

The company will therefore sell either 6 or 7 March contracts at 1.8600.



In the answer in (b), it is assumed that the company will sell 6 March sterling/US dollar futures.

- (b) The US company will close its position in January, when the futures price is 1.8420.

The value of 1 tick for this contract is  $62,500 \times \$0.0001 = \$6.25$ .

Original selling price	1.8600
Buying price to close the position	1.8420
Gain per contract	<u>0.0180</u>

Total gain on futures position = 6 contracts  $\times$  180 ticks  $\times$  \$6.25 = \$6,750.

The US company will receive £400,000 which it will sell at the spot rate of 1.8450.

	\$
From sale of £400,000 spot at \$1.8450/£1	738,000
Profit on futures position	<u>6,750</u>
Total income	<u>744,750</u>

The effective exchange rate for the £400,000 received is therefore:

$\$744,750 / £400,000 = \text{US\$}1.8619 / \text{£}1$ .

This is close to the price at which the futures were originally sold. However, the hedge is not perfect because the position was closed before the settlement date for the contract.

### 18.3 BASIS

- (a) On 1st March: Days to settlement of the June futures contracts = 31 + 30 + 31 + 60 = 122 days.

#### On 1 March

Spot rate	1.8540
Futures price	<u>1.8760</u>
Basis	<u>0.0220</u>

The basis is 220 points, with the futures rate higher than the spot rate.

The basis at the end of June when the futures reach settlement will be 0.

It is assumed that basis will decrease to zero at a constant rate per day. The basis will therefore reduce by  $(220 \text{ points} / 122 \text{ days}) = 1.80328 \text{ points per day}$ .

At close of trading on 30th April, there are  $(31 + 30)$  61 days remaining to the settlement of the June futures. The expected basis at this date is therefore:

$1.80328 \text{ points per day} \times 61 \text{ days} = 110 \text{ points}$ .

**At the end of 30th April**

Spot rate	1.8610
Expected basis	0.0110
Expected futures price (higher)	1.8720

- (b) At close of trading on 15th June, there are 15 days remaining to the settlement of the June futures. The expected basis at this date is therefore:

1.80328 points per day × 15 days = 27 points.

**At the end of 30th April**

Spot rate	1.8690
Expected basis	0.0027
Expected futures price (higher)	1.8717

**18.4 IMPERFECT HEDGE AND BASIS**

- (a) There is a loss on the underlying currency exposure, because sterling weakens in value between 20th April and 20th July.

	\$
At 20th April: expected value of £625,000 receivable (at 1.8050)	1,128,125
At 20th July: actual value of £625,000 received (at 1.7700)	1,106,250
Loss on underlying currency exposure	21,875

The futures position is opened on 20th April by selling futures contracts (selling British pounds and buying dollars). The US company should sell 10 contracts (£625,000/£62,500 per contract). When the position is closed on 20th July, there is a gain on the position.

	\$
20th April: Open position – Sell at	1.7800
20th July: Close position – Buy at	1.7600
Gain on underlying currency exposure	0.0200

Total gain (10 contracts) = 10 contracts × 200 ticks per contract × £6.25 per tick = \$12,500.

The futures position has failed to provide a perfect hedge, resulting in a net 'loss' of \$9,375.

<b>Effective exchange rate</b>	<b>\$</b>
Revenue from sale of £625,000 spot on 20th July (at 1.7600)	1,100,000
Gain on futures position	12,500
Total dollar income	1,112,500

Effective exchange rate = \$1,112,500/£625,000 = \$1.7800.

- (b) The reason why the hedge is not perfect in this case is explained by the existence of basis. When the futures position was opened, the basis was 250 points ( $1.8050 - 1.7800$ ). When the position was closed, the basis was 100 points ( $1.7700 - 1.7600$ ). The spot price has moved in value during the three months by more than the movement in the futures price, by 150 points. The value of this difference is \$9,375 ( $10 \text{ contracts} \times 150 \text{ ticks per contract} \times \text{£}6.25 \text{ per tick}$ ).

## 18.5 CURRENCY HEDGE

### (a) Hedging with a forward exchange contract

Only the net exposure should be hedged. This is a net payment of  $\text{€}(2,650,000 - 540,000) = \text{€}2,110,000$ .

The entity will need to buy euros in three months' time. The three-month forward rate for the contract would be 1.4443 (the rate more favourable to the bank).

Cost in sterling =  $\text{€}2,110,000 / 1.4443 = \text{£}1,460,915$ .

### (b) Money market hedge

The company must pay  $\text{€}2,110,000$  in three months' time. To create a money market hedge, it must therefore buy euros spot and invest them for three months at 3.4% per year. The amount of euros invested, plus accumulated interest, must be worth  $\text{€}2,110,000$  after three months.

It is assumed that the three-month investment rate for euros is  $3.4\% \times 3/12 = 0.85\%$ .

The amount of euros to invest now is therefore  $\text{€}2,110,000 / 1.0085 = \text{€}2,092,216$ .

These must be purchased spot at 1.4537, and the cost in sterling will be:

$\text{€}2,092,216 / 1.4537 = \text{£}1,439,235$ .

With a forward FX contract, the payment of  $\text{£}1,460,915$  will be made in three months' time. With a money market hedge, the payment of  $\text{£}1,439,235$  would happen immediately. It can therefore be argued that an additional cost of a money market hedge is the loss of interest (opportunity cost) from investing  $\text{£}1,439,235$  for three months at 5.6% per year. The lost interest would be  $\text{£}1,439,235 \times 5.6\% \times 3/12 = \text{£}20,149$ .

The overall cost of a money market hedge would therefore be  $\text{£}1,439,235 + \text{£}20,149 = \text{£}1,459,384$ .

### (c) Currency futures hedge

The company must pay euros. It needs to buy euros to make the payments. The futures are denominated in euros; therefore the company will buy futures.

The number of contracts required =  $\text{€}2,110,000 / \text{€}100,000 \text{ per contract} = 21.1$  contracts. The company should probably buy 21 contracts.

The payments are due in October. The company should therefore buy futures with the next settlement date following. It should buy December contracts at 0.6929.

The remaining €10,000 that is not hedged by futures can be purchased forward at 1.4443, at a cost of £6,924.

If the basis is 0 when the futures position is closed in October, the effective exchange rate for the €2,100,000 will be £0.6929 = €1, or £1 = €1.4432.

The net cost in sterling will be:

	£
€2,100,000 at \$1.4432/£1	1,455,100
€10,000 at €1.4443/£1	6,924
Total cost in sterling	<u>1,462,024</u>

The money market hedge is the cheapest method of hedging.

## CHAPTER 19 – MANAGING FOREIGN EXCHANGE RISK (III): OPTIONS

### 19.1 TRADED EQUITY OPTIONS

- (a) The investor should buy put options on TBA shares.

Strike price	Cost per option	Number of options purchased with £12,000	
		£	
950	(2,000 shares × £0.15)	300	40
1,000	(2,000 shares × £0.50)	1,000	12

The investor could purchase 12 put options at a strike price of 1,000 (£10) or 40 put options at a strike price of 950 (£9.50).

**Tutorial note:**

The investor's decision will depend on how far he expects the share price to fall. The options with a strike price of 1,000 (£10) are currently in the money but the investor can only buy 12 such contracts. As the share price falls, the intrinsic value of these options rise but the intrinsic value of the options with a strike price of 950 (£9.50) will remain at zero until the share price falls below £9.50. For any fall below this the investor will gain more from these 40 contracts than he would from the 12 other contracts.

The share price at which the investor would be indifferent between the two options can be found as follows:

Let  $x$  = the share price at which each course of action would yield the same return.

The investors return would be equal when:

$$12(1,000 - x) = 40(950 - x)$$

$$12,000 - 12x = 38,000 - 40x$$

$$28x = 26,000$$

$$x = 928.57 (£9.29)$$

If the investor expects the share price to fall below this he should invest in 40 put options with a strike price of 950.

If the investor expects the share price to fall but not below £9.29 he should invest in 12 put options with a strike price of 1,000.

- (b) If the share price is 910 at expiry and the investor still holds the options, the options will be exercised. It is assumed that he buys the options at 950.

Traded equity options are settled by physical delivery. The investor would need to buy shares at 910 and exercise the option to sell them at 950.

	£
Buy 40 × 2,000 shares at 910	728,000
Buy 40 × 2,000 shares at 950	760,000
Profit on exercise	32,000
Cost of options	12,000
Net profit on speculative investment	20,000

(**Note:** This calculation of the profit ignores the time value of money. The options are paid for when they are bought, but the profit is made only when the options are exercised).

Traded equity options can be bought and sold on the exchange, and the investor is likely to sell the put options before they expire, making a profit on the sale. As the options become increasingly in-the-money, their market value will increase.

## 19.2 Currency options

### (a) Hedging risk exposure

In September, the UK company will want to sell dollars and buy sterling (to convert its dollar receipts into sterling).

Since it wants to buy sterling in six months' time, it should buy call options with a September expiry.

If the strike price is \$1.8500, the sterling equivalent of \$2 million = £1,081,081 (2,000,000/1.85).

The contract size is £31,250; therefore for a perfect hedge, the company would want to buy 34.6 contracts (1,081,081/31,250).

Since this is not possible, it should buy either 34 or 35 contracts. In the answer that follows, it is assumed that the company will buy 35 options.

Premium cost =  $35 \times 31,250 \times \$0.019 = \$20,781.25$ .

To pay the premium, the company would have to buy \$20,781.25 spot, at a sterling cost of £11,340.38.

### (b) Expiry

At the expiry date, the options are in-the-money if the spot exchange rate is 1.9200. They will therefore be exercised, at a profit of \$0.07 per £1 (1.9200 – 1.8500).

Gain on exercise of 35 option contracts =  $35 \times 31,250 \times \$0.07 = \$76,562.50$ .

The total dollar income of the company will therefore be \$2,076,562.50.

This can be exchanged into sterling at the spot rate, to obtain £1,081,543 (\$2,076,562.50/1.9200).

The option premium cost was £11,340, therefore ignoring the time value of money, the net revenue for the company is £1,081,543 – £11,340 = £1,070,203.

This gives an effective exchange rate for the \$2 million dollar receipts of 1.8688 (2,000,000/1,070,203).

### 19.3 DEF SECURITIES LIMITED (DEF)

DEF is not hedging a position but has entered into options contracts with a view to making a profit on the deal.

For a call option, this would involve exercising the call option (buying the shares) and then selling the shares at the spot rate on the open market.

For a put option, this would involve exercising the option (selling the shares) and then buying shares at the spot rate on the open market in order to complete the deal.

This is referred to as squaring a position. Of course DEF would only do this if the options were in the money at the date that they are exercisable. It must determine this by comparing the prices at which the option is exercised to the spot price of the underlying security.

#### Complications

This example provides information about futures rates. Thus the company could square off the transactions with actual shares or by entering into futures contracts (which in effect result in actual shares at a locked in price).

Note that the call option on the SPL shares is an American option. This means that it can be exercised at any time up to the end of its duration.

The put option on the DESC shares is a European option. This means that it can only be exercised at a specified date.

#### Workings

	<b>SPL (spot rate)</b>	<b>SPL (future rate)</b>
	<b>Rupees</b>	<b>Rupees</b>
<b>Call option on SPL shares</b>		
Sale proceeds on the open market		
(Rs. 170 x 100,000)	17,000,000	
(Rs. 173 x 100,000)		17,300,000
Less: Cost of acquisition (from exercising the option)		
(Rs. 155 x 100,000)	(15,500,000)	(15,500,000)
<b>Gain/ (loss) if option is exercised</b>	<b>1,500,000</b>	<b>1,800,000</b>
<b>Put option on DESC shares</b>		
Sale proceeds (from exercising the option)		
(Rs. 3.50 x 5,000,000)	17,500,000	17,500,000
Less: Cost of acquisition on the open market		
(Rs. 4.25 x 5,000,000)	(21,250,000)	
(Rs. 4.35 x 5,000,000)		(21,750,000)
<b>Gain/ (loss) if option is exercised</b>	<b>(3,750,000)</b>	<b>(4,250,000)</b>

**Conclusion:**

The best strategy for the company is:

DEF should square its position in SPL shares by exercising the option and selling the shares at the future price as it gives the highest return.

DEF should not exercise option of DESC shares as this will result in loss to the company.

**19.4 ALPHA AUTOMOBILES LIMITED****Method 1: Hedge using forward contract**

AAL will have to buy JPY to make this payment

Amount to pay in three months' time	JPY 175,000,000
Forward contract amount [JPY 175,000,000 × 1.9493] =	Rs. 341,127,500

**Method 2: Hedge using money market**

To earn JPY 1 million, invest now $[JPY 175,000,000 \div (1 + (3\% \div 3))]$	JPY 173,267,327
Purchase JPY at spot (Rs. 173,267,327 × Rs. 1.9339)	Rs. 335,081,683
Borrow rupees to buy JPY (Rs. 335,081,683 × (1 + (8% ÷ 3)))	Rs. 344,017,195

**Method 3: Futures market hedge**

Futures can mature at the given dates only. Since the amount is to be paid on September 30, the contract with maturity date of October 2016 would be chosen.

No of futures contracts to buy (JPY 175,000,000 ÷ JPY 100,000)	1,750
Buy 1,750 futures of Sep. 2016 (Rs. 1.9421 × 100,000 × 1,750)	Rs. 339,867,500
Financing cost of margin (1,000 × 1,750 × 8% × 3/12)	Rs. 35,000
	Rs. 339,902,500



#### Method 4: Hedging using an option

Since we need to pay in JPY, we would have to buy call option expiring after the transaction date i.e. October 31, 2016.

No. of options contracts to buy ( $\text{JPY } 175,000,000 \div \text{JPY } 250,000$ )	700
Buy 700 contracts of Sep 2016 ( $\text{Rs. } 250,000 \times 1.9315(W - 1) \times 700$ )	Rs. 338,012,500
Financing cost of premium ( $0.0115 \times 250,000 \times 700 \times 8\% \times 3/12$ )	Rs. 40,250
	Rs. 338,052,750

#### W1: Determination of Exercise Price

The cheapest option including premium cost from October 2016 contracts is worked out as follows:

Exercise price	Premium	Total cost	Remarks
Rs			
1.90	0.0355	1.9355	
1.91	0.0232	1.9332	
1.92	0.0115	<b>1.9315</b>	Cheapest

#### Conclusion

Hedging using option is the cheapest option and should be selected.

## CHAPTER 20 – MANAGING INTEREST RATE RISK

### 20.1 FRA

- (a) The company wants to borrow in three months' time for a period of six months; therefore to create a hedge with an FRA, it must buy a 3v9 FRA.

The interest rate for the FRA is 3.97%.

- ❑ The company will borrow in three months' time at the current LIBOR rate plus 0.50%.
- ❑ The FRA will be settled in three months' time.
  - If the six-month LIBOR rate is higher than 3.97%, the company will receive a payment from the bank to settle the FRA. The amount of this payment is the value of the difference between the FRA rate of 3.97% and the LIBOR rate.
  - If the six-month LIBOR rate is lower than 3.97%, the company will make a payment to the bank to settle the FRA, for the value of the difference between the two rates.

The effect of the FRA is therefore to 'lock in an effective interest rate of  $3.97\% + 0.50\% = 4.47\%$ .

**Tutorial note:** For example, if the LIBOR rate in three months is 5.5%, the situation will be as follows:

	%
Company borrows at LIBOR + 0.50%	6.00
Company receives from settlement of FRA (5.50 – 3.97)	(1.53)
Effective interest cost	<u>4.47</u>

This is the FRA rate + 0.50%.

- (b) An FRA works on the same principles as an interest rate coupon swap. The main difference is that an FRA is for one interest period only, although a company can arrange a series of FRAs. A coupon swap is longer-term, and covers several settlement dates.

### 20.2 SWAP

The company should enter into a four-year interest rate coupon swap in which it receives the floating rate and pays the fixed rate (5.25%).

The effective interest rate will change from floating rate to fixed rate, as follows:

	%
Bank loan interest (LIBOR + 1.25)	
Swap	
Pay	(5.25)
Receive	LIBOR
Effective rate	<u>(6.50)</u>

## 20.3 CREDIT ARBITRAGE

	%
Entity A can borrow more cheaply at a fixed rate by $(7.25 - 6.35)$	0.90
Entity A can borrow more cheaply at a floating rate by $(1.25 - 0.75)$	0.50
Difference	0.40
Bank's profit	0.10
Net benefit to share between the two entities	0.30

If the entities share the benefit equally, each will be able to reduce its effective cost of borrowing by  $(0.30/2)$  0.15%.

- Entity A wants to borrow at a floating rate. It can borrow directly at LIBOR + 0.75%. By borrowing at a fixed rate and swapping into a floating rate, its effective interest rate will be  $\text{LIBOR} + 0.75\% - 0.15\% = \text{LIBOR} + 0.60\%$ .
- Entity B wants to borrow at a fixed rate. It can borrow directly at 7.25%. By borrowing at a floating rate and swapping into a fixed rate, its effective interest rate will be  $7.25\% - 0.15\% = 7.10\%$ .

For Entity A, the arrangement could be as follows:

	%
Borrow at a fixed rate	(6.35)
Swap payments	
Pay	(LIBOR)
Receive (balancing figure)	5.75
Effective interest cost	(LIBOR + 0.60)

For Entity B, the arrangement would be as follows:

	%
Borrow at a fixed rate	(LIBOR + 1.25)
Swap payments	
Pay (balancing figure)	(5.85)
Receive	LIBOR
Effective interest cost	(7.10)

The bank's profit would come from the difference between the fixed rate received from Entity B (5.85%) and the fixed rate paid to Entity A (5.75%).

This assumes that the two Entities each arrange their swap with the bank, and not directly with each other.

## 20.4 CREDIT ARBITRAGE

Company X		Company Y	
	%		%
Borrow:		Borrow:	
Fixed rate	(7.25)	Floating rate	(LIBOR + 1.50)
Swap		Swap	
Receive fixed	6.27	Pay fixed	(6.30)
Pay floating	(LIBOR)	Receive floating	LIBOR
Net cost	(LIBOR + 0.98)	Net cost	(7.80)
Cost of variable rate borrowing	(LIBOR + 1.25)	Cost of fixed rate borrowing	(8.00)
Saving in cost	0.27	Saving in cost	0.20

## 20.5 HEDGING WITH STIRS

The company wants a hedge against the risk of higher interest rates. It should therefore sell short-term interest rate futures.

The borrowing period will begin in February; the company should therefore buy March futures, which have the next settlement date following the start of the loan period.

The planned borrowing period is 5 months, but with futures, the notional deposit period is only 3 months. To get round this difficulty, the number of futures contracts should be adjusted.

$$\text{The number of March futures to sell} = \frac{\text{£4.5 million}}{\text{£500,000}} \times \frac{5 \text{ months}}{3 \text{ months}}$$

= 15 contracts.

### Conclusion

The company should sell 15 March short sterling futures.

## 20.6 MORE HEDGING WITH STIRS

- (a) The company wants a hedge against the risk of higher interest rates. It should therefore sell short-term interest rate futures.

The borrowing period will begin in February; the company should therefore buy March futures, which have the next settlement date following the start of the loan period.

The planned borrowing period is 4 months, but with futures, the notional deposit period is only 3 months. To get round this difficulty, the number of futures contracts should be adjusted.

$$\text{The number of March futures to sell} = \frac{\text{\$12 million}}{\text{\$1 million}} \times \frac{4 \text{ months}}{3 \text{ months}}$$

= 16 contracts.

### Conclusion

The company should sell 16 March eurodollar futures at 93.70.

(b) When the futures are sold, the basis is:

Spot LIBOR rate (100 – 5.5)	0.9450
Futures price	0.9370
Basis	<u>0.0080</u>

It is now the end of October. The March futures will reach settlement date in five months' time.

If we assume that the basis will reduce from 80 points at the end of October to 0 by the end of March at an equal amount each month, by the end of January the basis should be:

$$\frac{2 \text{ months to settlement}}{5 \text{ months original time to settlement}} \times 80 \text{ points} = 32 \text{ points}$$

The futures price is lower than the spot price.

At the beginning of February, if the three-month LIBOR rate is 7.5%, the futures price should be:

Spot LIBOR rate (100 – 7.5)	0.9250
Basis	0.0032
Futures price	<u>0.9218</u>

The futures position will be closed out, as follows:

Selling price in October	0.9370
Buying price to close	0.9218
Gain	<u>0.0152</u>

The gain is 152 points or 1.52%

The futures hedge is a perfect hedge, and the effective cost of borrowing can therefore be calculated as follows:

	\$
Borrow \$12 million at	7.50
Gain on futures position	(1.52)
Net effective borrowing cost	<u>5.98</u>

The net effective borrowing cost is 5.98%.

(Note: This differs from the rate in the futures contracts sold in October. In October, the interest rate in the sold futures was 6.30% (100 – 93.70). The difference is 32 points, which is the amount of the basis risk. Here, the company has benefited from the basis to obtain a lower borrowing cost).

## 20.7 FRAS AND FUTURES

### (a) FRAs

The company can use an FRA to fix the interest rate receivable on £8.2 million. A 4v9 FRA is required, and the bank will offer a rate of 4.52%.

The company will therefore fix a rate of 4.52% for LIBOR and if it can invest at LIBOR + 0.40% this means that the effective investment rate will be 4.92%.

### Futures

The company wants to fix an interest rate for income, so it should buy futures. The money for investment will be received at the end of July, so September futures should be used.

The company should buy  $(£8.2 \text{ million} / £500,000) \times (5 \text{ months} / 3 \text{ months}) = 27.33$  futures contracts, say 27 futures, and the price is 95.35.

### (b) FRAs

At the end of July when the £8.2 million, the company will invest the money for 5 months. If it can still obtain a rate of LIBOR + 0.40%, it will invest the money at 4.65%.

The FRA contract must also be settled, as follows:

	%
Pay LIBOR	(4.25)
Receive	4.52
Profit on settlement	0.27

The company will receive a payment on settlement of the FRA equivalent to 0.27% in interest, which means that its effective interest income from investing the money for 5 months will be  $4.65\% + 0.27\% = 4.92\%$ .

### Futures

When the futures contracts were purchased on 1st April, basis was  $95.35 - 95.00 = 0.35$ . This is 0.05833 per month ( $0.35 / 6 \text{ months}$ ). Assuming basis changes by a constant amount each month, the expected basis at the end of July (2 months to the end of September) is 0.117.

The expected futures price at the end of July if LIBOR is 4.25% is therefore:  $95.75 + 0.117 = 95.867$ .

The futures position will be closed as follows:

Close: sell at	95.867
Purchase price	95.350
Profit	0.517

Total profit on 27 contracts =  $51.7 \times £12.50 \times 27 = £17,449$ .

The company can invest £8.2 million + £17,449 for 5 months at 4.65% (LIBOR + 0.40%) and total interest will be £159,213 ( $£8,217,449 \times 4.65\% \times 5/12$ ).

On the money received of £8.2 million, this represents an effective interest rate of  $(£159,213/£8.2 \text{ million}) \times (12/5) = 0.047$  or 4.7%.

In this particular case, FRAs would be a better way of hedging the interest rate risk than futures.

## 20.8 INTEREST RATE HEDGE

### (a) Futures

The company wants a hedge against the risk of a rise in two-month interest rates. It should therefore sell futures. Since the interest period will be 2 months and futures are for a three-month deposit, the quantity of futures sold should be:

$(£21 \text{ million}/£500,000) \times 2/3 = 28$  contracts.

The loan period will begin in mid-June; therefore sell 28 June contracts, at a price of 94.610.

### Options on futures

The company will want options to sell futures; therefore it should buy put options on 28 June futures. The premium cost will depend on the strike price chosen. (Since the options are needed for two months, apply a factor of  $\times 2/12$ ).

Strike price	Premium
94750 $(£21,000,000 \times 0.500\% \times 2/12)$	£17,500
95000 $(£21,000,000 \times 0.850\% \times 2/12)$	£29,750

### FRA

The company should buy a 3v5 FRA, for a notional principal amount of £21 million. The FRA rate will be 5.38%.

(Note: The FRA rate is more favourable than the futures rate of 5.39% ( $100 - 94.610$ ). The company would therefore prefer to buy an FRA than sell futures. However, it might prefer to buy put options on futures rather than buy an FRA).

In mid-June, the company will borrow £21 million for two months. If the LIBOR rate is 6%, it will borrow at 6.75% (LIBOR + 0.75%) for two months.

### Futures

The futures price in mid-June can be estimated as follows:

June futures price in mid-March	94.610
LIBOR rate in mid-March	95.000
Basis in mid-March	0.390

In mid-March, there were 3.5 months to settlement of the June futures. In mid-June, there are 0.5 months remaining to settlement. Basis is assumed to have reduced in size by mid-June to:

$(0.5/3.5) \times 39 \text{ points} = 5.6 \text{ points}$ , say 5 points.

LIBOR rate in mid-June	94.000
Basis in mid-June	00.005
Estimated futures price in mid-June	93.995

The company will close its position by buying 28 June futures at 93.995.

Original selling price	94.610
Buying price to close	93.995
Gain (ticks)	00.615

The total gain on the futures position:

$= 28 \text{ contracts} \times 61.5 \text{ ticks per contract} \times £12.50 \text{ per tick}$   
 $= £21,525$ .

(The gain on the futures position offsets the cost of the increase in the interest rate above the rate fixed by the futures contract  $(6\% - 5.39\% = 0.61\%)$ . The extra borrowing cost is  $£21 \text{ million} \times 0.61\% \times 2/12 = £21,350$ . The difference of £175 is due to the basis risk).

### Options on futures

The company will exercise its options to sell futures at the strike price for the option, and will then close the futures position, giving a gain on closing the futures position.

	Strike price 94750	Strike price 95000
Option strike price to sell	94.750	95.000
Buying price to close	93.995	93.995
Gain (ticks)	0.755	1.005



	Strike price 94750	Strike price 95000
Total gain:		
28 × 75.5 ticks × £12.50	£26,425	
28 × 100.5 ticks × £12.50		£35,175

However, after taking into account the cost of the option premiums, the net gain is reduced.

FRA

The company's FRA bank will make a payment equivalent to  $(6\% - 5.38\%) = 0.62\%$  per year on £21 million for two months, to settle the FRA.

The gain on the FRA will offset the higher interest cost of borrowing.

## 20.9 DEFINITIONS

### (a) Interest rate swaps

An interest rate swap is an agreement between two parties to exchange interest rate payments. The objective might be to:

- ☐ Switch from paying one type of interest to another
- ☐ Raise less expensive loans
- ☐ Securing better deposit rates

In essence, party A agrees to pay the interest on party B's loan, whilst party B agrees to pay the interest on party A's loan.

### (b) Forwards

A forward contract is a binding agreement to exchange a set amount of goods at a set future date at a price agreed today.

Forward contracts are used by business to set the price of a commodity well in advance of the payment being made. This brings stability to the company who can budget with certainty the payment they will need to raise.

Forwards are particularly suitable in commodity markets such as gold, agriculture and oil where prices can be highly volatile.

Forward contracts are tailor-made between the two parties and therefore difficult to cancel (as both sides need to agree). A slightly more flexible approach would be to use futures

### (c) Futures

Futures share similar characteristics to Forward contracts i.e.:

- ☐ Prices are set in advance
- ☐ Futures hedges provide a fixed price
- ☐ Futures are available on commodities, shares, currencies and interest rates.

However, futures are standardised contracts that are traded on an open futures market (unlike forward contracts which are unique to the two counterparties).

(d) **Options**

An option gives the owner the right, but not the obligation to trade 'something'. The 'something' might be shares, a foreign currency or a commodity.

There are two types of options:

- ☐ Exchange traded options – these are standardised and traded in an open market
- ☐ Over the counter (OTC) options – these are bespoke and the terms are agreed specifically between the two counterparties.

Options have both an intrinsic value and a time value.

The holder of an option has two choices:

- ☐ Exercise the right to buy (a call option) or sell (a put option) at the pre-determined price (the exercise price)
- ☐ Not exercising this right – i.e. allowing the option to lapse.

(e) **Caps, collars and floors**

- ☐ A cap is a ceiling agreed to an interest rate
- ☐ A floor is a lower limit set for an interest rate
- ☐ A collar combines both caps and floors thus maintaining the interest rate within a particular range.

## 20.10 IMRAN LIMITED

(a) Rate of interest is	KIBOR+2	
Since KIBOR is swapped at	11%	
So the fixed rate of interest to Imran Limited (11% + 2%)	13%	
Monthly payment = 70 million x 13% x 6/12	4,550,000	
(b) (i) If KIBOR is 13.5% then:	<b>Rupees</b>	
The bank which has provided the credit will receive (70 million x 15.5% x 6/12)	5,425,000	(A)
The bank which has offered the Swap arrangement will pay to Imran Limited (70 million x 2.5% x 6/12)	875,000	(B)

**Imran Limited**

Net payable by Imran Limited	A - B	4,550,000
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(ii) If KIBOR is 9% then

**Rupees**

The bank which has provided the credit will receive (70 million x 11% x 6/12)	3,850,000	(A)
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The bank which has offered the Swap arrangement will receive from Imran Limited (70 million x 2% x 6/12)	700,000	(B)
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**Imran Limited**

Net payable by Imran Limited	A + B	4,550,000
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