



**‘A’ LEVEL**

**ACCOUNTING**  
**Volume Two**

**Publication staff**

**Publishing Director**

Sam Madzingira.

**Copy Proof Readers**

Curriculum Development Unit  
Zimbabwe

**General Editor**

Edson Madzingira

## Foreword

I had the opportunity of discussing this book with several educationists, teachers and students when it was in the process of making, and I felt at once that it was likely to prove unusually useful. It gathers together a great deal of information which must otherwise be delved for in many books and all this is arranged judiciously and on practical lines. The authors' outlook might be described as one of liberal common sense clarity, simplicity of expression, and examination - skills - focused. Our study packs are there to offer a canvas for Zimbabweans to showcase their best ideas to help transform the country into a knowledge- based society where citizens are free to express their creativity, knowledge and ingenuity. We have set challenging objectives, but we believe that only by striving to achieve the highest, can we elevate ourselves above the elements which tend to hold our country back. However, if you see anything where you feel we may have failed to deliver, and where we may have failed on issues such as content, depth, relevance and usability, please let us know by using the contact numbers

(09) 61226/61247, 0773 247 358; or Box 2759 Byo; email at [turnupcollege@yahoo.com](mailto:turnupcollege@yahoo.com). We are here to listen and improve.

In my days as a teacher and as a student I should have welcomed this book warmly because:

- (i) It approaches the syllabus wholistically
- (ii) It uses simplified expression
- (iii) It has an in-depth coverage of content
- (iv) It provides examination skills at the earliest stage of studying
- (v) It provides local, international and commonplace examples; illustrations and case studies.
- (vi) It provides intelligent questions and answers of the examination type on a chapter by chapter basis
- (vii) Last but not least, it provides a clear platform for self-evaluation as one prepares for the final examinations.

I have no doubt that learners and educators would as well find this book to be the best. It is certainly a manual for success. Every one would find it worthy to have his /her own copy. I should not be surprised if the Turn-up College Study Pack became the best resource in school and out of school.

# TABLE OF CONTENTS

CHAPTER	PAGE
FOREWORD .....	2
ACKNOWLEDGEMENTS.....	7
PREFACE .....	8
<b>CHAPTER 1.....</b>	<b>9</b>
<b>INTRODUCTION TO MANAGEMENT ACCOUNTING .....</b>	<b>9</b>
CHAPTER OBJECTIVES .....	9
DEFINITIONS .....	9
DIFFERENCES BETWEEN THE BRANCH OF COST MANAGEMENT ACCOUNTING AND THE BRANCH OF FINANCIAL ACCOUNTING.....	10
PLANNING AND CONTROL .....	11
COST ANALYSIS .....	11
INDIRECT COSTS OR OVERHEADS.....	11
THE FOLLOWING ARE THE COMMON CLASSIFICATIONS OF COSTS,BY .....	12
EXAMINATION TYPE QUESTIONS.....	13
<b>CHAPTER 2.....</b>	<b>15</b>
<b>OVERHEAD ABSORPTION .....</b>	<b>15</b>
CHAPTER OBJECTIVES .....	15
INTRODUCTION .....	15
CHARACTERISTICS OF DIRECT COSTS .....	15
CHARACTERISTICS OF INDIRECT COSTS .....	15
DIRECT COSTS OR PRIME COSTS .....	16
THE FIVE STEP OVERHEAD ABSORPTION PROCESS .....	17
SECONDARY APPORTIONMENT.....	18
RECIPROCAL SERVICES DEPARTMENTS.....	19
THE CONTINUOUS DISTRIBUTION METHOD .....	19
OVERHEADS ANALYSIS SHEET.....	19
BASIS OF ABSORPTION .....	20
EXAMINATION TYPE QUESTIONS .....	30
MULTIPLE CHOICE QUESTIONS .....	30
STRUCTURED QUESTIONS.....	32
CASE STUDY .....	33
<b>CHAPTER 3.....</b>	<b>39</b>
<b>MARGINAL AND ABSORPTION COSTING.....</b>	<b>39</b>
CHAPTER OBJECTIVES .....	39
INTRODUCTION .....	39
ARGUMENTS FOR ABSORPTION COSTING APPROACH .....	40
ARGUMENTS FOR MARGINAL COSTING APPROACH .....	40
MARGINAL COSTING STATEMENT.....	43

COMPARISON OF ABSORPTION AND MARGINAL COSTING.....	43
EXAMINATION TYPE QUESTIONS .....	47
MULTIPLE CHOICE QUESTIONS .....	47
STRUCTURED QUESTIONS .....	47
CASE STUDY .....	49
<b>CHAPTER 4.....</b>	<b>57</b>
<b>MARGINAL COSTING AND SHORT-TERM DECISION MAKING .....</b>	<b>57</b>
CHAPTER OBJECTIVES .....	57
INTRODUCTION .....	58
MARGINAL COSTING DEFINED .....	60
MARGINAL COSTING AS AID TO DECISION-MAKING .....	60
GUIDELINES IN ANALYSING DECISIONS TO BE TAKEN IN MARGINAL COSTING .....	61
THE FOUR SCENARIOS .....	61
ASSUMPTIONS BEHIND CVP ANALYSIS.....	69
BREAK – EVEN ANALYSIS .....	73
MARGIN OF SAFETY .....	76
PROFIT VOLUME CHART .....	76
HOW TO DRAW A PROFIT CHART.....	76
ADVANTAGES OF BREAK-EVEN CHARTS.....	77
THE LIMITATIONS OF THE BREAK EVEN POINT .....	77
STRUCTURED QUESTIONS .....	81
<b>CHAPTER 5.....</b>	<b>94</b>
<b>BUDGETING .....</b>	<b>94</b>
CHAPTER OBJECTIVES .....	94
INTRODUCTION .....	94
BENEFITS OF BUDGETS .....	94
MANAGEMENT BY EXCEPTION AND RESPONSIBILITY ACCOUNTING.....	95
PREPARING BUDGETS.....	95
WHAT IS A BUDGET? .....	96
FUNCTIONAL BUDGETS .....	96
OPERATING BUDGETS .....	100
THE CASH BUDGET .....	102
FORMAT OF A CASH BUDGET .....	104
DETERMINATION OF CREDIT PERIOD .....	104
TRADE IN OF A NON-CURRENT ASSET .....	105
MASTER BUDGET .....	108
PREPARATION OF FINANCIAL BUDGETS, CASH & MASTER BUDGET.....	109
ZERO-BASED BUDGETING .....	113
ACTIVITY –BASED BUDGETING.....	113
STRUCTURED QUESTIONS .....	115
CASE STUDIES .....	118
<b>CHAPTER 6.....</b>	<b>126</b>
<b>STANDARD COSTING &amp; VARIANCE ANALYSIS.....</b>	<b>126</b>
CHAPTER OBJECTIVES .....	126

INTRODUCTION .....	126
TYPES OF STANDARDS .....	126
VARIANCE ANALYSIS .....	127
PURPOSES OF STANDARD COSTING .....	127
ADVANTAGES OF STANDARD COSTING .....	127
DIRECT MATERIAL COST VARIANCE .....	128
DIRECT LABOUR COST VARIANCE .....	132
SALES VARIANCES .....	135
CAUSES OF SALES VARIANCE .....	136
INTER-RELATIONSHIP OF VARIANCES .....	136
FIXED AND FLEXIBLE BUDGETS .....	136
DISADVANTAGE OF STANDARD COSTING .....	137
RECONCILIATION OF ACTUAL AND BUDGETED PROFIT .....	138
WORK BACK FROM VARIANCES TO STANDARD COST .....	141
EXAMINATION TYPE QUESTIONS .....	142
MULTIPLE CHOICE QUESTIONS .....	142
STRUCTURED QUESTIONS .....	146
CASE STUDY .....	147
<b>CHAPTER 7.....</b>	<b>152</b>
<b>JOB COSTING AND SPECIFIC ORDER COSTING .....</b>	<b>152</b>
CHAPTER OBJECTIVES .....	152
INTRODUCTION .....	152
ALLOCATION OF OVERHEADS .....	152
BUDGETED OVERHEADS .....	152
BUDGET OVERHEADS VERSUS ACTUAL OVERHEADS .....	153
A RECONCILIATION OF BUDGETED AND ACTUAL PROFIT .....	154
STRUCTURED QUESTIONS .....	156
CASE STUDY .....	158
<b>CHAPTER 8.....</b>	<b>161</b>
<b>PROCESS COSTING AND CONTINUOUS COSTING.....</b>	<b>161</b>
CHAPTER OBJECTIVES .....	161
INTRODUCTION .....	161
ALLOCATION OF COSTS .....	161
FEATURES OF PRODUCTS IDENTIFIABLE WITH PROCESS COSTING .....	161
CHARACTERISTICS WHICH DISTINGUISH PROCESS COSTING FROM JOB COSTING .....	162
NORMAL LOSSES .....	162
ABNORMAL PROCESS LOSSES AND GAINS .....	162
CALCULATION OF COST PER UNIT IN PROCESS COSTING .....	163
WORK IN PROGRESS AND THE CONCEPT OF EQUIVALENT UNITS .....	166
VALUATION OF WIP .....	168
JOINT PRODUCTS BY- PRODUCTS AND WASTE PRODUCTS .....	170
BY PRODUCTS .....	171
WASTE PRODUCT .....	172
EXAMINATION TYPE QUESTIONS .....	174
MULTIPLE CHOICE QUESTIONS .....	174
STRUCTURED QUESTIONS .....	176
CASE STUDY .....	177

<b>CHAPTER 9</b> .....	<b>179</b>
<b>CAPITAL EXPENDITURE APPRAISAL</b> .....	<b>179</b>
CHAPTER OBJECTIVES .....	179
INTRODUCTION .....	179
TRADITIONAL METHODS .....	180
ADVANTAGES OF PAYBACK .....	180
DISADVANTAGES OF PAYBACK .....	180
ACCOUNTING RATE OF RETURN (ARR) .....	182
CHANGES IN REVENUE AND EXPENDITURE .....	182
THE TIME VALUE OF MONEY.....	183
DISCOUNTED CASH FLOW (DCF).....	184
THE NET PRESENT VALUE (NPV) METHOD .....	184
INTERNAL RATE OF RETURN (IRR) .....	185
NON-FINANCIAL FACTORS TO CONSIDER IN INVESTMENT APPRAISAL.....	188
EXAMINATION TYPE QUESTIONS .....	189
MULTIPLE CHOICE QUESTIONS .....	189
STRUCTURED QUESTIONS .....	191
CASE STUDIES .....	192

## **Acknowledgements**

My special gratitude goes to all the members of the publication staff and contributors. Particularly I thank Mr Edson Madzingira who did much of the research. More so I thank the copy typists Miss Chiedza Muchena and Crystabell Mudzingwa for typing up all the manuscripts that came from different contributors.

We have taken every effort to try and get hold of the copyright holders of any information we have reproduced without acknowledgement. We will appreciate the help from anyone to enable us contact the copyright holders whose permission we have not yet obtained.

## **Preface**

The vision of the Study Pack project is to create a self-sufficient information base for the student. With this aim in mind this Study Pack provides all the necessary topical material in a simplified manner. There after that the Study Pack provides a wide range of examination-type questions at the end of each topic area comprising multiple choice questions, structured questions, and cases studies.



# CHAPTER 1

## INTRODUCTION TO MANAGEMENT ACCOUNTING

### Chapter objectives

After studying this chapter *the student should be able to:*

1. Distinguish between the branch of cost and management accounting and the branch of financial accounting.
2. Identify and describe the elements involved in decision-making, planning and control processes
3. Identify and justify the functions of cost and management accounting
4. Know the three major subdivisions of the subject
5. Explain how cost and management accounting can assist management.

In this opening chapter, we shall be looking at the different forms accounting takes, namely cost accounting, management accounting and financial accounting.

### Definitions

R. Storeys define cost accounting as accounting for the costs of a product, a service or an operation, i.e. past costs, the present costs and the future costs.

Management accounting is defined as that branch of accounting which provides the information requirements of management, thereby helping the management team to run the affairs of the business, operation or function effectively and efficiently.

In short, Drury describes management accounting as the branch of accounting which is concerned with the provision of information to people within the organization to help them make better decisions and improve the efficiency and effectiveness of existing operations.

It can be noted from the above definitions that Cost and management accounting is a key part of the internal information system of an organization and is equally applicable to manufacturing firms, service industries and government departments etc.

In summary, we can say that cost and Management accounting provides vital financial information to management in three inter-related areas which are

- a) Cost analysis and cost ascertainment- deals with the allocation of costs between cost of goods sold plus inventories for internal and external profit reporting.
- b) Planning and control- it provides relevant information to help managers make better decisions.
- c) Decision making and performance appraisal: It provides information for planning, controlling and performance measurements.

Cost accounting is thus concerned with actual costs incurred and the estimation of future costs. Management accounting is concerned with providing information on past and present performance as well as the estimation of future performance. Cost accounting is in fact recognized as being part of the much wider ranging term, management accounting. For the purposes of the syllabus, this sub-division between cost and management accounting is not particularly useful, therefore throughout this cost and management accounting study pack, we shall be using the terms interchangeably and they shall be taken to mean the same thing.

Financial Accounting, on the other hand, accounts to the owners of the business and management as well as various other parties interested in the operations of the business the actual financial transactions for a past accounting period. This is achieved through the issue of financial statements such as the annual comprehensive statement of income and the statement of financial position. Financial accounting is a legal necessity for limited companies that are required to comply with the Companies Act of 1985 and 1989.

**Differences between the branch of cost management accounting and the branch of financial accounting.**

1. Legal requirements

There is a statutory requirement for limited companies to produce annual financial accounts regardless of whether or not management considers it necessary or useful. On the other hand, cost and management accounting is entirely optional and information should be produced only if it is considered that the benefits of producing the information outweigh the cost of collecting that information.

2. Focus on individual parts or segments of the business

Financial accounting information describes the whole of the business, whereas cost and management accounting focuses on small parts of the organization and measures the economic performance of decentralized operating units e.g. cost of a product or service, profitability of a department etc.

3. General accepted accounting principles

Financially accounting statements must be prepared to conform to legal requirements and the generally accepted accounting principles established by the IAS and FRS. These requirements are essential to ensure uniformity and consistency which is a pre-requisite for financial statements. In contrast, management accounts are in turn required to adhere to generally accepted accounting principles when providing managerial information for internal use. Instead, they focus on the need to provide information that is useful for managers relating to their decision-making, planning and control functions.

#### 4. Time dimension

Financial accounting is a report on past performance in an organization, whereas cost and Management accounting is concerned with both the future and past information.

#### 5. Report Frequency

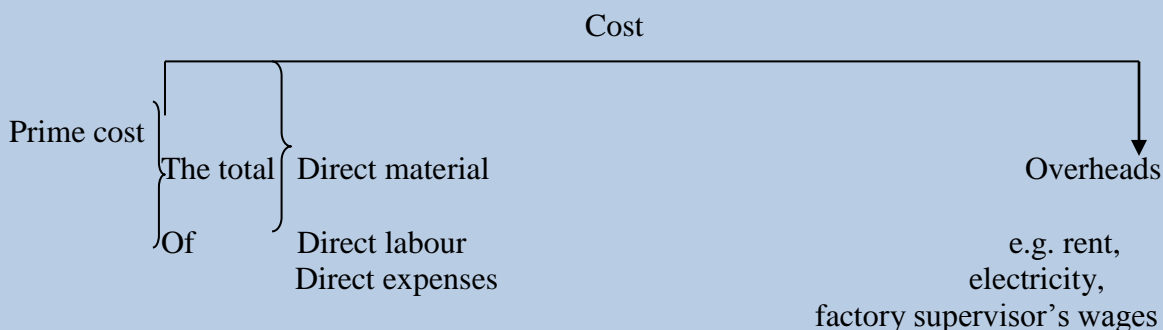
A detailed set of financial accounts are published annually and less detailed financial accounts could also be published semi- annually. Management requires information for decision making quickly, therefore management accounting reports on various activities may be prepared on daily, weekly or monthly intervals

### **Planning and control**

Panning is a primary/basic management task which entails deciding in advance what is to be done and how it is to be done. Control takes place when managers take measures to ensure that operations adhere to the plans and make any adjustments that may be necessary. We will discuss more about planning and control in later chapters.

### **Cost Analysis**

Cost- A cost is an amount of expenditure. Cost is always related to an object or unit e.g. the cost of a phone call, a pair of shoes etc. These units which are described in terms of cost are known as cost units. Cost can primarily be classified as direct and indirect.



### **Indirect Costs or Overheads**

These are all costs which cannot be directly linked to any unit of output. Alternatively we can simply say any unit of output. Alternatively we can simply say indirect costs are any costs which cannot be identified as direct costs.

T. Lucey defines a cost centre as a production or service location, function, activity or item of equipment whose costs may be attributed to cost units. This is according to In simple terms, a cost centre is any entity to which costs may be attributed e.g. a canteen, which generates costs.

### **Conversion cost**

This term is used to describe the process of changing raw materials from one stage to another in the production process. It could entail changing the raw materials either to finished goods or semi-finished goods.

### **Self-Testing Questions**

1. Define management and cost accounting.
2. What is the relationship between planning and control?
3. What is a cost centre and what is its purpose?
4. What is the relationship between costing, management accounting and financial accounting?

### **The following are the common classifications of costs,by**

1. Nature
2. Function
3. Fixed and variable costs
4. Direct and indirect costs
5. Product and period costs
6. Relevant and irrelevant costs and revenues

### **Classification by nature**

In cost and management accounting we classify by nature e.g. material, labour, overheads

### **Classification by function**

We classify costs by function in financial accounting when preparing financial statements.

### **Fixed and variable costs**

We classify costs as fixed and variable costs when we want to predict how cost would behave. Managers for planning purposes must be able to anticipate what would happen if there is a change in the level of activity. The manager must know by how much the cost would change.

**Fixed cost-** is a cost that remains constant in total regardless of changes in the level of activity within the relevant range. E.g. rent, rates, insurance (of premises), depreciation etc. if the activity increases or decreases they remain constant.

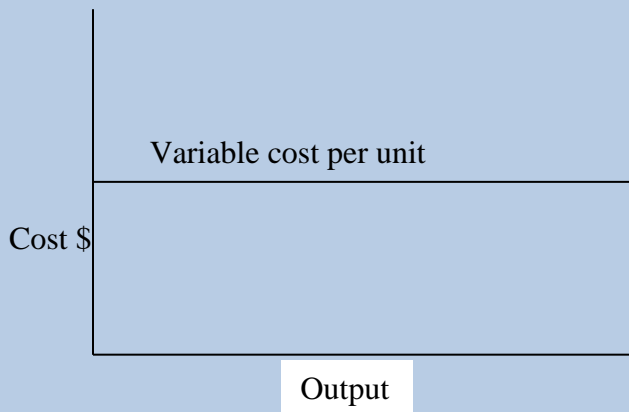
### **Variable cost**

These are costs which vary in total according to the level of activity. e.g. direct material ,direct labour, variable overheads

### **However direct costs per unit do not vary with the level of activity**

The above can be shown on a diagram.

Total variable cost

**Variable cost per unit****2. Direct and indirect costs**

We classify costs as direct and indirect when we want to determine the cost of an item or activity. A direct cost is a cost which can be economically traced to a particular cost unit e.g. direct material, direct labour and direct expenses. Indirect cost is a cost which cannot be traced to a cost unit.

**3. Product and Period costs**

We make this distinction when we want to determine the cost of products. Product costs are costs which are incurred in the purchase or manufacture of goods. They are included in inventory valuation. Period costs are those costs which are treated as expenses in the period in which they are incurred. They are not included in inventory valuation.

**4. Relevant and irrelevant costs and revenues.**

We classify these costs in making decisions. We need to know whether they are relevant to a certain decision. Colin Drury defines relevant costs and revenues as those future costs and revenues that will be changed by a decision, whereas irrelevant costs and revenues as those that will not be affected by the decision.

In making a decision, managers have to choose between alternatives. It is only costs that will differ that will be considered. The difference in costs between two alternatives is known as a differential cost while a difference in revenue is known as a differential revenue.

Costs which are the same in each alternative are not relevant for decision making. There are also costs which have already been incurred and are not relevant for decision-making these are known as sunk costs (*historical/past costs*)

When you choose an alternative you lose the benefits of the alternative for gone. The benefit that is given up when one alternative is chosen is known as the opportunity cost.

**Examination type Questions**

Multiple choice

1. What is the purpose of cost accounting?

- A. To aid in decision – making
- B. To calculate the value of property, plant and equipment
- C. To give a true and fair view of a company's financial situation.
- D. To value the contribution made by a firm's workforce.

2. The following data relate to two output levels of a department.

Machine hours	17 000	18 500
Overheads	\$493 000	\$503 500

The variable overhead rate per hour is \$7.00. The amount of fixed overhead is

- A. \$10 500
  - B. \$119 000
  - C. \$374 000
  - D. \$493 000
3. Fixed costs are conventionally deemed to be
- A. Constant per unit of output
  - B. Constant in total when production volume changes
  - C. Outside the control of management
  - D. Those unaffected by inflation.
4. The profit shown in the financial accounts was \$634 000 but the cost accounts showed a different figure. The following inventory valuations were used:

Inventory Valuations	Cost Accounts	Financial Accounts
	\$	\$
Opening inventory	141 040	166 940
Closing inventory	273 960	229 344

What was the profit in the cost accounts?

- A. \$652 716
- B. \$563 484
- C. \$704 516
- D. \$615 284

# CHAPTER 2

## OVERHEAD ABSORPTION

### Chapter objectives

After studying this chapter the student should be able to:

1. State the characteristics of direct costs and cite examples.
2. Prepare an overhead analysis sheet using: Simultaneous method and Continuous distribution method.
3. Calculate the overhead absorption rates for the two different production departments using the most appropriate absorption bases.
4. Re-apportion the service department costs to production departments (cost centres).
5. Calculate the absorption rates for two different departments.
6. Calculate the selling price per unit of two different products.

### Introduction

Overheads are total indirect costs e.g. indirect material like consumables, indirect wages, like supervisory wages, indirect expenses like rent and rates.

In a manufacturing business, there are various types of costs which ought to be included in the price of the end product so as to recover all expenses as well as to add up some mark up over and above the total cost of the product. This form of costing is called `total costing` or `absorption costing` because all costs, both direct and indirect, are absorbed into the product cost.

### Characteristics of direct costs

- These are easy to allocate to each cost unit
- They are always variable, i.e. they increase/ decrease proportionally with the level of output.
- They are all included in both marginal and absorption costing.
- Can fall under any of the following categories:
  - ✓ Direct materials
  - ✓ Direct labour
  - ✓ Direct expenses
- Examples include the following:
  - ✓ Timber for furnisher production
  - ✓ Varnish for furniture production
  - ✓ Contact glue for furniture
  - ✓ Wages paid to the carpenters

### Characteristics of indirect costs

- These are costs which cannot be economically identified with each cost unit but are incurred factory – wide or business – wide.
- The costs can be either variable or fixed.
- Are only included in marginal costing if they are variable.

- In absorption costing, they are all included.
- Can fall under any of the following categories:
  - ✓ Indirect materials
  - ✓ Indirect labour can be fixed or variable
  - ✓ Indirect expenses
- Examples include the following:
  - ✓ Lubricating oil for the grinding machine
  - ✓ Solvent such as thinners for cleaning out
  - ✓ Stationery (pencils, drawing paper, e.t.c) consumed in the production process.
  - ✓ Factory supervisor's salary
  - ✓ Canteen's staff salaries
  - ✓ Workshop staff transport
  - ✓ Factory rental and water expenses
  - ✓ Factory electricity
  - ✓ Depreciation of manufacturing machinery

### **Direct costs or prime costs**

Direct costs are simply charged into cost units, there is no use of overhead absorption techniques. Again direct costs are never called overheads but their total is called prime cost.

### **Example 1**

The following costs are incurred in Timber Wise Manufacturing Company in the production of a executive office chair.

Timber                            2 metres at \$10 per metre  
 Labour                            3 hours at \$12 per hour

Direct expenses are \$5 per chair

The factory is rented on a lease agreement basis at a monthly rent of \$5 00.00 is paid. Staff is provided with tea and lunch from the company's canteen. Machinery is utilized at the rate of 30 minutes per chair. It depreciates at \$40 per chair.

### **Required:**

Calculate the direct cost of each chair.

### **Solution**

#### Prime cost calculations

Direct material	=	\$10 x 2	=	\$20
Direct Labour	=	\$12 x 3	=	\$36
Direct expenses			=	<u>\$ 5</u>
Prime cost per chair				<u><u>\$61</u></u>

### **Indirect Costs**

Although the above chair has a direct cost of \$61, it might not even be profitable to sell it at \$90. Now the question is, at least how much should be charged for each chair in order to realise 20% profit?



This now requires us to absorb all the other indirect costs like factory rent water, electricity, canteen costs, and supervisor's salary over and above the prime (direct) cost. They cannot be charged directly to a cost unit but can only be charged to cost units through the cost centre.

The actual figures for these overheads are only available at the end of an operating period yet we need to price our products for the future. As a result we use budgeted (estimated) figures not actual figures.

### **Important definitions**

CIMA defines:

#### **Allocation**

The allotment of the whole items of cost to cost centres e.g. supervisor for cost centre.

#### **Apportionment**

It is the allotment of proportions of cost to cost centres e.g. rent and rates, depreciation of plant and machinery.

### **The five step overhead absorption process**

In calculating overhead absorption rates, the following logical steps should be followed.

#### **STEP 1**

Identify the business` departments (excluding Marketing, Administrative and finance functions) into two categories - production department and service department.

##### (a) Production Departments

Those departments which make a direct contribution into the final product (cost per unit).

##### (b) Service departments

Those departments, which render a service to production department yet, they do not directly contribute to the actual production/manufacture of end products.

### **Example**

#### Production department

- cutting department in furniture industry
- painting department
- joinery department
- finishing department
- assembly department in car manufacturing.

#### Services department

- canteen department
- engineering/maintenance department
- stores department

It is very critical and essential for a management accountant to have a thorough understanding of the business` production processes so that one can easily classify overheads into relevant cost centres.

**STEP 2**

**Allocate** those discrete overheads which can be directly identified with any cost centre or department, for example if we have three production departments A, B and C, and one service department. Given that production department A is the cutting and planning, production, department, B is the joinery department and production department. C is the finishing department. If only production department A uses all machinery then all the depreciation of machinery (electrical and saws) will be charged directly to production department A. This is called allocation.

**STEP 3 Primary apportionment**

**Apportion** the remaining overheads amongst the departments which obtain benefits from such costs. For example, factory rent expense is incurred for the benefit of all production departments as well as service departments. Rental costs should be apportioned or shared amongst all those departments using a suitable ratio. Rent can be apportioned on the basis of floor area i.e. square metre (m<sup>2</sup>) occupied by each department. Therefore floor area is called the basis of apportionment.

Note that each overhead should be apportioned on its most appropriate basis. In examination, data, which can be used to apply various bases of apportionment, will be provided but you should use your own prudent judgment to choose and apply an appropriate basis.

At the end of this stage you will obtain a total of overheads for each production and service department. These totals will be used in step number 4.

**Example 2**

	Production Departments			Services Departments		
	A	B	C	Canteen	Stores	Total
Rent	20 000	10 000	10 000	5 000	5 000	40 000
Indirect Labour:	10 000	10 000	22 000	10 000	2 500	54 500
Depreciation etc.	20 000	10 000	10 000	5 000	2 500	47 500
<b>Total Overheads</b>	<b>50 000</b>	<b>30 000</b>	<b>42 000</b>	<b>20 000</b>	<b>10 000</b>	<b>152 000</b>

**STEP 4****Secondary Apportionment**

Service departments do not produce products. They exist to provide a service to production departments. The estimated costs should be recovered by the business and must be reapportioned to production departments. The total overheads under the service departments should be apportioned over the production departments. In the table above, \$20 000 and \$10

000 for the canteen and the stores department respectively should be shared/apportioned amongst the three production departments, A, B and C.

The basis of apportionment should be carefully established for each service cost centre. For example, the \$20 000 canteen total overheads can be apportioned on the basis of the total number of employees in each department.

### Reciprocal services departments

**Reciprocal departments** are service departments which render services to each other. In situations where there is one service department it is easy to apportion but where we have more than one service department which service each other the apportionment is little more complex and there are a number of methods which can be used. The two major ones are the **continuous distribution** and the **simultaneous method**.

### The continuous distribution method

When using this method you first determine the basis of apportioning the existing service departmental overheads. For example the number of employees could be used to apportion canteen overheads and the number of stores requisitions can be used to apportion stores departmental overheads.

Calculate departmental overhead absorption rates. After apportioning service cost department's overheads, the overhead analysis sheet looks like this:

### Overheads Analysis Sheet

	PRODUCTION DEPARTMENTS			SERVICE PARTMENTS		
	A	B	C	CANTEEN	STORES	TOTAL
Total Overheads (after step 3)	50 000	30 000	42 000	20 000	10 000	152 000
Step 4 will total say:	+12 000	+8 000	+10 000	(20 000)	(10 000)	-
<b>Total after Step 4</b>	<b>62 000</b>	<b>38 000</b>	<b>52 000</b>	-	-	<b>152 000</b>

### STEP 5

After the factory overheads have been allocated and apportioned, and services apportioned to production departments as above, the final step is to charge these overheads to cost units. The correct costing term is absorption (i.e. overheads are absorbed by cost units).

In order to affect this,

- (i) calculate the overhead absorption rate
- (ii) apply this rate to cost units

The overhead absorption rate is applied on actual basis of absorption e.g. actual labour hours, actual machine hours, and actual units of production, and prime cost, units incurred, material cost incurred, labour cost incurred.

**Example 3**

Annual budgeted direct hours			30 000 hrs
Annual budgeted overheads			\$60 000
Direct labour worked in the month			4 000 hrs
Formula for OAR	=		$\frac{\text{Budgeted overhead}}{\text{Budgeted activity}}$
Overhead absorption rate	=	=	$\frac{\$60\,000}{30\,000\text{ hrs}}$
		=	\$2/labour hr

Therefore overheads absorbed in the month is 4 000 hr x \$2/labour hr = \$8 000

Now step 5 is meant to calculate the rate at which each production department would charge out its total overhead to any cost unit that will pass through that department.

An Overhead Absorption Rate (OAR) is calculated as follows:

$$\text{OAR} = \frac{\text{Total budgeted overhead for the cost centre}}{\text{Total expected level of activity for the cost centre.}}$$

**Basis of Absorption**

The numerator is basically the outcome of step 4. The denominator is the one that varies with the department. For example if department B is labour intensive. Assuming that in department B is labour intensive, it is advisable to adopt a basis of dollars (\$) per direct labour hour.

Lets assume that 19 000 direct labour hours are expected to be worked in department B.

Therefore the OAR for department B is:  $\text{OAR} = \frac{\text{Total budgeted overheads}}{\text{Total activity}}$

$$\begin{aligned} \text{OAR} &= \frac{\$38\,000}{19\,000\text{ direct labour hours}} \\ &= \mathbf{\$2\text{ per direct labour hour}} \end{aligned}$$

Please note that if you calculate an answer as only \$2, it is wrong because it does not specify the basis of absorption.

Say Department A is capital intensive (i.e. it uses more of machinery) and a total of 20 000 machine hours are expected to be worked over a period.

**Required**

Calculate the overhead absorption rate appropriate for this department.

**Solution**

$$\text{Overhead absorption rate} = \frac{\$62\,000}{20\,000\text{ hrs}}$$

OAR = \$3.10 per Machine hour.

### **Basis of overhead absorption**

There are six basis of overhead absorption which are:-

1. Direct labour hour rate =  $\frac{\text{Budgeted total overheads per cost centre}}{\text{Estimated direct labour hours}}$
2. Direct labour cost rate =  $\frac{\text{Budgeted total overheads per cost centre X 100}}{\text{Estimated direct labour cost}}$
3. Unit produced rate =  $\frac{\text{Budgeted total overheads per cost centre}}{\text{Estimated total number of units of output}}$
4. Machine hour rate =  $\frac{\text{Budgeted total overheads per cost centre X 100}}{\text{Estimated machine hours}}$
5. Prime cost rate =  $\frac{\text{Budgeted total overheads per cost centre X 100}}{\text{Estimated prime cost}}$
6. Material cost rate =  $\frac{\text{Budgeted total overheads per cost centre X 100}}{\text{Estimated material cost}}$

The most common ones in practice and in examinations are the first four bases. For examination purposes you may be asked to use a specific basis or come up with a basis depending on provided information.

The other overheads are normally added to total production cost as a percentage of sales e.g. selling and distribution costs and administration.

The total cost would be determined as follows :

- Prime cost = direct material + direct labour + direct expenses
- Production cost = Prime costs + production overheads
- Total Cost = Production costs + selling, distribution and administration costs.

### **Example 4**

Madzingira (*Pvt*) Ltd has two production departments (X and Y) and one service department (Z). Estimated overhead costs for the month of December have been allocated and apportioned from an overhead analysis sheet as follows.

	Production Departments		Service Department
	X	Y	Z
	\$	\$	\$
Total overheads	36 000	30 000	12 000

The service departments are to be apportioned to production department as follows:

$$X = 60\% \quad Y = 40\%$$

In department X overheads are absorbed per labour hour and in Y per unit.

Budget for the period

Hourly rate of pay	X=\$2,50 , Y\$ 3,60
Labour hours	14 500
Production	5800 (units)

The following variable costs are incurred

	Department X	Department Y
Material	\$24 000	\$21 000
Labour	\$18 000	\$27 600
Machine hours	9 000	6 000
Variable overheads cost	\$15 000	\$12 000
Units produced	6 000	7 500

Madzingira Ltd adds 25% on cost to arrive at the selling price. Product A is produced in department X, whilst product B is produced in department Y

### **Required:**

- Re apportion the service department costs to production departments (cost centres).
- calculate the overhead absorption rates for departments X and Y
- Calculate the selling price per unit of product A and B.

### **Solution**

	X\$	Y\$	Z\$
(a) Total Overheads	36 000	30 000	12 000
Re apportionment	<u>7 200</u>	<u>4 800</u>	<u>(12 000)</u>
	43 200	34 800	0

**Solution**

(b) Absorption rates

Departments	<b>X</b>	<b>Y</b>
Overheard Rates	<u>\$43 200</u>	<u>\$34 800</u>
	14 500 labour hours	5 800 units
	\$2.97 per labour hour	\$6 per unit

(c) **Selling Cost per unit**

		<b>A</b>		<b>B</b>
Material cost per unit	<u>\$24 000</u>	\$4.00	<u>\$21 000</u>	\$2.80
	6 000 units		7 500 units	
Labour cost	<u>\$ 18 000</u>	\$3.00	<u>\$27 600</u>	\$3.68
	6000		7 500 units	
Variable overheads	<u>\$15 000</u>	\$2.50	<u>\$12 000</u>	\$1.60
	6000		7 500	
Fixed overhead calculated		\$8.91		\$6.00
2,97 x 3		<hr/>		<hr/>
		18.41		14.08
Mark up 25%		<u>\$4.60</u>		<u>\$3.52</u>
Selling price per unit		\$23.01		\$17.6

**Example 5**

Competence Manufacturing LTD's management accountant has just completed the company's annual budget for the coming year. The company manufactures only one type of product using two production departments supported by two services departments; the maintenance and canteen departments.

The following total costs were provided in the budget:

	Total				
	\$				
Factory Rent	20 000				
Heating & Lighting	50 000				
Indirect Wages	120 000				
Depreciation of plant	80 000				
Insurance of Plant	20 000	Production Departments		Service Dept	
Supervisors` Salary	60 000	<b>A</b>	<b>B</b>	<b>Manta.</b>	<b>Canteen</b>
±					
Direct materials	340 000	200 000	140 000		
Indirect materials	44 100	20 000	15 000	2 900	6 200
Quality Control Consultancy	20 000	12 000	6 000	2 000	-
Direct labour Cost	200 000	135 000	65 000		

The following information has been provided from the budget.

	<b>Production Dep't</b>		<b>Service Dept</b>	
	A	B	Maintenance	Canteen
Floor area covered (M <sup>2</sup> )	120	100	20	10
Book Value of Plant (\$)	480 000	390 000	150 000	180 000
Number of employees (indirect)	20	10	6	4
Direct labour hours	42 000	12 000	-	-
Machine hours	10 000	38 000	-	-
Percentage of Canteen costs	55%	40%	5%	-
Percentage of Maintenance costs	30%	60%	-	10%

Before the management accountant could start on the overhead absorption and the calculation of overhead absorption rates, she has been promoted to become a finance manager of the company's new branch in Gwanda.

### Required

5. As the acting cost accountant you have been requested to start up by preparing an overhead analysis sheet using:
  - (i) Simultaneous method
  - (ii) Continuous distribution method.
  
6. Calculate the overhead absorption rates for the two production departments using the most appropriate absorption bases.



**SOLUTION**

## (i) Overhead Analysis Sheet

Basis of Apportionment		Production Depts .		Services Dep't		Total
		A	B	Maint.	Cant.	
Factory Rent	Floor Area	9 600	8 000	1 600	800	20 000
Heating & Lighting	Floor Area	24 000	20 000	4 000	2 000	50 000
Indirect wages	No. of Employees	60 000	30 000	18 000	12 000	120 000
Depreciation of Plant	Value of Plant	32 000	26 000	10 000	12 000	80 000
Insurance of plant	Value of plant	8 000	6 500	2 500	3000	20 000
Supervisor's Salary	No. of Employees	30 000	15 000	9 000	6 000	60000
Indirect Materials	Direct Allocation	20 000	15 000	2 900	6 200	44100
Quality Control (consultancy)	Direct Allocation	12 000	6 000	2 000	-	20000
<b>Total Overheads</b>		<b>195600</b>	<b>126 500</b>	<b>50 000</b>	<b>42 000</b>	<b>414100</b>
<b><u>Secondary Apportion</u></b>						
- Maintenance		15 709	31417	(52 362)	5 236	-
- Canteen		25 980	18 894	2 362	(47 236)	-
<b>Total Production Overheads</b>		<b>237289</b>	<b>176811</b>	<b>-</b>	<b>-</b>	<b>414 100</b>

**Please Note** that we have not included direct labour cost, direct material cost and direct expenses in the overheads analysis sheet because they are not overheads.

b) Overhead absorption rates Department Production

	<b>A</b>	<b>B</b>
Total Production Overheads	\$237 289	\$176 811
Total hours (A- Labour; B machine)	42 000	38 000

O.A.R. = \$5.65 per Direct Labour hour    \$4,65 per machine hour

### Workings

Service Cost Centre reapportionment

Let the Canteen Costs = C

Let the Maintenance costs = M

$$\begin{aligned} \therefore M &= \$50\,000 + 5\% C \\ C &= \$42\,000 + 10\% M \end{aligned}$$

$$M = \$50\,000 + 5\% (42\,000 + 10\% M)$$

$$M = 50\,000 + 2\,100 + 0,005 M$$

$$M - 0,005M = 52\,100$$

$$\begin{aligned} 0,995M &= \frac{52\,100}{0,995} \\ M &= \underline{\underline{\$52\,362}} \end{aligned}$$

$$C = \$4\,200 + 10\% (52\,362)$$

$$C = \$42\,000 + 5\,236$$

$$C = \underline{\underline{\$47\,236}}$$

(ii) **Continues distribution method**

	Production Department		Service Department		TOTAL
	A	B	Maintenance	Canteen	
Total Overheads	195 600	126 500	50 000	42 000	414 100
1 <sup>st</sup> Apportionment -Maint	15 000	30 000	(50 000)	5000	-
2 <sup>nd</sup> Apportionment-canteen	210 600 25 850	156 600 18800	47 000 2350	414 100 (47 000)	-
3 <sup>rd</sup> Apportionment-Maint	236 450 705	175 300 1410	2350 (2350)	- 235	414 100 0
4 <sup>th</sup> Apportionment - Canteen	237155 129	176710 94	- 12	235 (235)	414 100 -
5 <sup>th</sup> Apportionment – Maint	237 284 4	176 804 8	12 - (12) -	414 100 -	
	237 288	176812	-	-	414 100

**Over and under absorption**

Overheads absorbed are based on budgeted activity, in most cases the overhead budgeted is more or less than the actual overhead incurred. This brings the problem of how to deal with under absorption and over absorption.

When overheads incurred are greater than overheads absorbed. This is known as **under absorption** and when lower it is known as **over absorption**.

Under-absorption results in a loss to be debited to the income statement; over-absorption results in a profit to be credited to the income statement.

**Example 6**

A company which manufactures a product has two production departments - X and Y and two service departments - canteen and personnel. The budgeted costs, which relate to the four departments, are shown below.

	<u>Production</u>	<u>Departments</u>	<u>Canteen</u>	<u>Personnel</u>
	X	Y		
Direct materials	\$2 080 000	\$1 120 000		
Direct labour	\$3 200 000	\$1 723 200		
Indirect labour	\$ 160 000	\$ 240 000	\$480 000	\$320 000
Direct labour hrs	160 000	448 000		
Machine hrs	336 000	80 000		
Floor area (m <sup>2</sup> )	500	300	400	200
No. of employees	20	30	10	15
Cost of machinery	\$2 400 000	\$800 000	\$240 000	\$160 000

Other overheads, which cannot be allocated to specific department, are:

Rent and rates \$224 000

Heat and light \$392 000

Inspection \$480 000

Depreciation is charged at 10% on the original cost of the machines.

- (a) (i) Using appropriate bases of charge, prepare an overhead analysis sheet for the four departments, showing the total for each department.

Cost	Basis	Total	Dept X	Dept Y	Canteen	Personnel
Indirect labour	allocation	1200 000	160 000	240 000	480 000	320 000
Indirect materials	allocation	264 000	144 000	120 000	-	-
Depreciation Machines	Cost of	360 000	240 000	80 000	24 000	16 000
Rent and Rates	Floor area	140 000	80 000	48 000	64 000	32 000
Heat and light	Floor area	392 000	140 000	84 000	112 000	56 000
Inspection	No. of Employees	480 000	192 000	288 000	-	-
			956 000	860 000	680 000	424 000

- (ii) **Re-apportion the service departments' overheads to the production departments. Calculations to be made to the nearest \$.**

Canteen Costs	No of				
	Employees	<u>209 232</u>	<u>313 848</u>	(680 00)	156 920
		1 165 232	1 173 848	-	580 920
		<u>232 368</u>	<u>348 552</u>		<u>(580 920)</u>
<u>2 920 000</u>		<u>1 397 600</u>	<u>1 522 400</u>		<u>0</u>

- (iii) **Calculate the overhead absorption rate for each production department**

$$\begin{aligned}
 \text{Dept X OAR} &= \frac{\text{Budgeted Overheads}}{\text{Budgeted Machine hrs}} \\
 &= \frac{\$1\,397\,600}{336\,000 \text{ machine hours}} \\
 &= \mathbf{\$4.16 \text{ per machine hour}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Dept Y OQR} &= \frac{\text{Budgeted Overheads}}{\text{Budgeted Labour hrs}} \\
 &= \frac{\$1\,522\,400}{448\,000 \text{ labour hours}} \\
 &= \mathbf{\$3.40 \text{ per direct labour hr}}
 \end{aligned}$$

- (iv) **Justify the bases used to calculate the overhead absorption rates in (iii) above.**

Overhead absorption rates are normally based on the most significant of the cost drivers. In Dept X, the best method of recovering overheads through products is the machine hour rate because there are more machine hours than direct labour hours. This means that production processes are highly mechanized. The bulk of the overheads are therefore made up of depreciation and other machinery related costs.

Dept Y has more direct labour hrs than machine hrs. This indicates that most of the overheads will be labour related. It therefore makes sense to use the direct hour overhead absorption rate.

- (b) The following data relates to job 123 AB.

	<b>Dept X</b>	<b>Dept Y</b>
Direct materials	\$3 200	\$1 600
Direct labour hours	160	400
Rate per direct labour hour	\$4,00	\$3,00
Machine hours	320	80

A selling and distribution charge of 40% of the total production cost of the job is added to arrive at the selling price.

Calculate the selling price of job 123 AB.

	\$
Direct materials (3 200 + 1 600)	4 800.00
Direct labour (160 x 4 + 400 x 3)	1 840.00
Prime cost	6 640.00
Overheads (320 x 4.16 + 400 x 3.40)	2 691.20
Total production cost	9 331.20
<u>add</u> selling + dist. Charge (0.4 x 9 331.20)	<u>3 732.48</u>
Selling price	<u>13 063.68</u>

### Examination type questions

#### Multiple choice questions

- Why is overhead absorption used in a manufacturing business?
  - To enable overheads to be apportioned to cost centers.
  - To establish costs per unit of product
  - To control overhead expenditure.
  - To establish net realisable value of inventory.
- A company uses a predetermined overhead recovery rate based on machine hours. Budgeted factory overheads for the year amounted to \$360 000, but actual factory overheads incurred were \$369 000. During the year, the company absorbed \$357 000 of factory overhead on 119 000 actual machine hours. What was the company's budgeted level of machine hours for the year?
  - 116 098
  - 119 000
  - 120 000
  - 123 000
- A company absorbs overheads on the machine hour basis which were budgeted at 11 250 with overheads of \$517 500. Actual results were 10 980 hours with overheads of \$509 384. Overheads were:
  - Under – absorbed by \$4 304
  - Over – absorbed by \$4 304
  - Under – absorbed by \$8 116
  - Under – absorbed by \$8 116
- A company absorbs overheads on labour hours. In a period, actual labour hours were 17 285, actual overheads were \$248 250 and there was under- absorption of \$6 260. What was the budgeted level of overheads?
  - \$241 990
  - \$248 250

C. 254 510

D. It cannot be calculated from the information provided.

5. The cost accountant of CPM Ltd has already allocated and apportioned fixed overheads for the period although she has yet to reapportion the service center costs. Information for the period is as follows.

	Production departments		Service department		Total
	1	2	Stores	Maintenance	
Apportioned	\$8 750	\$16 375	\$3 150	\$4 225	\$32 500
Work done By: <b>Stores</b>	60%	30%	-	10%	100%
<b>Maintenance</b>	75%	20%	5%	-	100%

What are the total overheads included in production department 1 if the reciprocal method is used to reapportion service center costs?

- A. \$13 809.00  
 B. \$14 085.50  
 C. \$14 199.00  
 D. \$14 226.50
6. Daka Ltd makes two products X and Y. both products pass through the assembly department. In January it makes 800 units of product X and 1 200 units of product B. The assembly department expenditure for the month was

\$	
Direct materials	12 000
Direct labour	16 000
Indirect labour	18 000
Rent	36 000
Heat and light	12 000
Insurance of premises	6 000
Machinery depreciation	9 000

What are the overheads to be absorbed by each unit of product X?

- A. \$40.50  
 B. \$54.00  
 C. \$54.50  
 D. \$72.67
7. What may result in an under- absorption of fixed overheads?  
 A. Absorption based on actual expenditure and actual activity.  
 B. Activity above budget  
 C. Activity below budget  
 D. Expenditure below budget.





**Question 2**

A company operates a factory with four departments. Two production departments – A and B. and two service departments – C and D. The budgeted costs for the coming financial year are as follows:

	<b>Total</b>	<b>Production Departments</b>		<b>Maintenance Services</b>	<b>Power House</b>
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<u>Indirect</u>		\$	\$	\$	\$
Indirect Materials	26 650	7 455	12 070	3 325	3 800
Indirect Labour	114 450	17 670	22 905	57 050	16 825
Rent and rates	35 650				
Supervision	16 500				
Plant depreciation	41 250				
	<u>234 500</u>				

You ascertain the following information:

	<b>Production A</b>	<b>Dept. B</b>	<b>Maintenance Services</b>	<b>Power House</b>
No. of employees	20	40	10	5
Area (sq meters)	1 500	2 500	500	100
Plant valuations (\$000)	32 500	12 500	6 000	4 000
Direct labour hours	1 600	2 400		
Machine hours	5 540	1 160		
Maintenance hours	900	300	-	-
Units of power used	2 100	600	300	-

**REQUIRED:**

- Analyse the above overheads between the four departments showing clearly the bases of apportionment you have used and re- apportion the costs of the service departments over the 2 production departments using appropriate bases.
- Calculate an overhead absorption rate for Dept based on machine hours and an overhead absorption rate for Dept B based on direct labour hours.

**Case Study****INSTRUCTIONS**

Each scenario in this case study describes an event in the life of a business and is followed by a question.

Answer all questions, in the order in which they are set.

### SCENARIO 1

Mother Ltd Co. has a social club, which provides social and leisure activities for all its employees and their families. The club's accounting year ends on 31 December each year. The following balances were obtained for the two years ended 31 December 2000 and 2001 respectively:

<b>31 December</b>	<b>2000</b>	<b>2001</b>
	\$	\$
Property, plant and equipment (net book value)	256	359
	800	040
Amounts owed by the club:		
Wages – maintenance staff	16 480	7 500
- coffee bar attendant	2 280	2 520
Electricity	660	780
Rent	4 320	4 920
Creditors- maintenance	9 120	12 600
- coffee bar	2 280	2 100
Inventory -coffee bar	1 260	1 110
Subscriptions due & unpaid	95 400	99 600

20% of the cost of electricity and rent is charged to the coffee bar.

The Receipts and Payments Account for the year ended 31 December 2001 was as follows:

Balance b/d	97 200	Wages- maintenance	308 400
Coffee bar takings	332 400	Wages-coffee bar	127 200
Subscriptions	940 800	Equipment	198 000
Sale of glasscutter	6 000	Fixtures	78 000
		Maintenance	282 600
		Electricity	57 000
		Rent	196 800
		Purchases for coffee bar	115 800
		Balance c/d	<u>12 600</u>
	-		<u>1 376 400</u>
	<u>1 376 400</u>		

The glasscutter had been bought in 1998 for \$12 000. Depreciation is calculated at 20% per annum on a straight-line basis and is applied in the year of purchase but not in the year of sale.

#### Question 1

- Calculate the accumulated fund on 1 January 2001. [4]
- Prepare the coffee bar Trading Account for the year ended 31 December 2001. [4]
- Prepare the club's income and expenditure account for the year ended 31 December 2001. [9]

- d) Prepare the club's balance sheet as at 31 December 2001. [5]
- e) (i) State two accounting methods of treating donations received by the club. [4]  
 (ii) Distinguish between a receipt & payment account and an income & expenditure account. [4]
- Show all workings for your answers.

## SCENARIO 2

The accountant of Mother craft Ltd Co. fell ill at the end December 2001 and so away on sick leave. Annual stock-taking was not done then, until 7 January 2002 by an inexperienced member of staff. The managing director felt that the inventory figure of \$460 250 was too low and ordered an investigation. It was discovered that the following had occurred during the week ended 7 January 2002 and had not been accounted for in the closing inventory calculation:

- i. Goods with a selling price of \$5 200 had been sent to a customer on approval. If not sold, the customer has the right to return the goods.
- ii. Goods costing \$47 000 had been received from the supplier.
- iii. Sales of \$93 800 had been made and invoiced to customers.

The sales included:

- a) An overcharge of \$800
- b) Sales of \$30 000 on special offer at a margin of 10%.
- c) Damaged goods, which had cost \$12 500 and were sold for \$14 000.

The standard rate of gross profit is 25% of sales.

### Question 2

- a) Calculate the correct value of closing inventory at 31 December 2001. [13]
- b) IAS 2 relates to the treatment of inventory and inventories. Using your knowledge of IAS 2, define the following:
  - i. Cost [3]
  - ii. Net realisable value [3]
  - iii. Cost of purchase [3]
  - iv. Cost of conversion [3]

## SCENARIO 3

Mother craft Ltd Co. has approached their bank manager to negotiate for a loan as they intend to venture into manufacturing. He asked for their cash flow statement so that their liquidity could be assessed. The balance sheets of Mother craft Ltd Co. on 31 December are given below:

	<b>2003</b>		<b>2002</b>	
	\$000	\$000	\$000	\$000
<u>Property, plant and equipment</u>				
Plant and equipment		5 600		4 550
Fixtures and Fittings		<u>3 220</u>		<u>2 520</u>
		<b>8 820</b>		<b>7 070</b>
Investments				350
<u>Current Assets</u>				
Inventory	1 680		1 456	
Debtors	5 600		4 130	
Short term investments	700		-	
Cash	140		56	
	<b>8 120</b>		<b>5 642</b>	
<u>Less Current liabilities</u>				
Trade creditors	1 708		1 512	
Bank overdraft	1 232		1 470	
Taxation	1 680		1 540	
Proposed dividends	<u>1 400</u>		<u>1 120</u>	
	<u>6 020</u>		<u>5 642</u>	
Net current assets		<u>2 100</u>		<u>-</u>
		10 920		7 420
<u>Long-term liabilities</u>				
Loan		(2 520)		(840)
		<b>8 400</b>		<b>6 580</b>
<u>Financed by:</u>				
Ordinary shares of \$14 each		2 800		2 100
Share premium		2 240		2 100
Revaluation Reserve		1 400		1 260
Profit and loss		1 960		1 120
		<b>8 400</b>		<b>6 580</b>

Additional information

- i. During the year \$1 050 000 was paid as interest and \$350 000 received as interest.
- ii. \$420 000 was raised through the sale of investments

iii. The following relates to plant and equipment at 31 December.

	2003	2002
	\$000	\$000
Cost	10 360	8 610
Accumulated depreciation	4 760	4 060
Net book value	5 600	4 550

Plant which cost \$1 260 000, was sold for \$518 000. The accumulated depreciation was \$560 000. The accumulated depreciation was \$560 000.

### Question 3

- a) State four benefits of preparing a cash flow statement. [4]  
 b) 'The cash flow statement is prepared on a cash basis rather than on an accrual basis'  
 i. Explain the accrual basis. [2]  
 ii. Explain the cash basis. [2]  
 c) Prepare a cash-flow statement in accordance with IAS 7. [19]

### SCENARIO 4

The bank has approved the loan requested by Mother craft ltd and the manufacturing infrastructure has been put into place. The company manufactures three types of high quality hand-made brief cases, small, medium and large. These are manufactured in two departments, the cutting department and the stitching department. There are also two service departments; maintenance and canteen. The estimated data for the year ending 31 December 2004 is as follows:

	Small	Medium	Large
Estimated production (units)	10 000	9 000	4 400
Machine hours required	6	8	10
Unit selling price	250	280	310
Direct materials	60	70	80
Direct labour –cutting department	34	36	40
Direct labour – stitching department	10	12	14

Estimated overheads for the year ending 31 December 2004

	Cutting	Stitching	Maintenance	Canteen	Total
Space costs					\$180 000
Depreciation- equipment					\$400.000
Allocated overheads	\$88 400	\$95 200	\$30 000	\$36 000	<u>\$249 600</u>
					<u>\$829 600</u>

Additional information

	<b>Cutting</b>	<b>Stitching</b>	<b>Maintenance</b>	<b>Cutting</b>
Floor area (m <sup>2</sup> )	5 000	6 000	2 000	2 000
Number of employees	12	9	4	5
Cost of equipment (\$)	1 400 000	1 700 000	500 000	400 000

**Question 4**

- a) Prepare an overhead analysis sheet for the year ending 31 December 2004 detailing overheads for the cutting and stitching departments. Canteen costs are shared among all the other departments on the basis of number of employees. Maintenance cost are shared between the production departments on the basis of 70% to stitching and 30% to cutting. [17]
- b) Calculate the overhead recovery rate for :
- i. The cutting department based on direct wages. [3]
  - ii. The stitching department based on machine hours. [3]
- Show all workings:
- c) Give reasons for the two different methods used in (b) above. [2]
- d) Calculate the total unit cost of one Medium brief case. [5]

# CHAPTER 3

## MARGINAL AND ABSORPTION COSTING

### Chapter objectives

After studying this chapter *the student should be able to:*

1. State the arguments for the absorption costing approach
2. State the arguments for the marginal costing approach
3. Outline the main differences between marginal and absorption costing
4. Calculate inventory valuations using marginal and absorption costing

### Introduction

Absorption costing is recommended for the preparation of all financial accounting statements and for tax purposes as it takes all costs, (marginal and fixed), into account. The accounting statements make no distinction between fixed and variable costs in absorption or full costing. As a result closing inventories reflect both the fixed and variable cost element.

Marginal costing on the other hand does not take into account the fixed costs of production in the valuation of closing inventory. Fixed costs are treated as period costs and are therefore written off in the income statement of each accounting period. Inventories are valued at marginal costs only.

The main difference between two costing systems lies in the treatment of fixed overheads. Total absorption (*full* costing) values inventory at total cost of production. Under marginal costing inventory is valued at variable cost of production, fixed costs are written off as periodic expenses when they arise. The following is a pro – forma marginal (direct or variable) costing statement:

Sales	xxx	xxx
Less: Direct materials	xxx	
Direct labour	xxx	
Variable manufacturing overheads	xxx	
Variable selling expenses	xxx	
Variable administrative expenses	<u>xxx</u>	<u>xxx</u>
Marginal income/ contribution		xxx
<u>Less fixed costs</u>		
Manufacturing costs	xxx	
Selling expenses	xxx	
Administrative costs	<u>xxx</u>	<u>xxx</u>
Net profit		xxx

The following is a pro – forma absorption or full costing statement:

Sales		xxx
Less: Direct materials	xxx	
Direct labour	xxx	
Variable manufacturing overheads	xxx	
Variable selling expenses	xxx	
Variable administrative expenses	<u>xxx</u>	<u>xxx</u>
<u>Less fixed costs</u>		
Manufacturing costs	xxx	
Selling expenses	xxx	
Administrative costs	<u>xxx</u>	<u>xxx</u>
Net profit	xxx	

### Valuation of inventories using:

$$\text{Absorption costing} = \frac{\text{Variable} + \text{Fixed production Costs}}{\text{No of units produced}}$$

$$\text{Marginal costing} = \frac{\text{Marginal(Variable) production costs}}{\text{No. of units produced}}$$

### Arguments for absorption costing approach

1. Production fixed costs are an inherent part of production and so should be included in inventory valuation.
2. IAS 2 and tax authorities recommends the use of full costing absorption costing for the preparation of financial statements
3. Chances of underpricing of products are reduced as full costs are taken into account unlike in marginal costing.

### Arguments for marginal costing approach

1. It is simple to operate



2. Under-and over absorption of overhead is avoided as fixed costs are ignored
3. Fixed costs are appropriately written off in the period they are uncurrred as they are period costs.
4. Accounts prepared under this approach bear a closer relationship with the actual cash position, which is more realistic
5. It is most suitable where short-run decisions have to be made.

### Example 1

Mudzingwa Ltd. manufactures a single product with a selling price of \$18 per unit. Budgeted information for the first accounting period of 2000 was as follows:

	<b>Units</b>
Sales	25 000
Production	30 000
Closing inventory	20 000

Fixed production overheads are budgeted at \$60 000 per period and opening inventory was \$165 000. The company has estimated its total cost per unit of the product for 2000 as follows:

	\$
Direct material	3
Direct wages	4
Variable overhead	<u>2</u>
Total variable cost	9
Fixed cost	<u>2</u>
	11

Selling and administration overheads are budgeted at \$20 000 per period

### Required:

Prepare a budgeted operating statement under

- (a) Marginal Costing
- (b) absorption costing
- (c) comment on the results

### Solution

Marginal Costing

\$	\$	
Sales	(\$18x25000)	450 000
Less Variable Cost of Sales		
Opening inventory	165 000	
Variable cost of production (30 000 x 9)	<u>270 000</u>	
	435 000	
Less Closing inventory (20 000 x 9)	<u>180 000</u>	<u>255 000</u>
Contribution		195 000
Less fixed costs		60 000
Less Selling & Administration Costs		<u>20 000</u>

Profit		115 000
Absorption costing	\$	\$
Sales		450 000
Less Cost of Goods Sold		
Opening inventory	165 000	
<u>Production cost:</u>		
Variable (\$30 000 x 9)	270 000	
Fixed (\$30 000 x 2)	<u>60 000</u>	
	495 000	
Closing inventory(20 000x11)	<u>220 000</u>	<u>275 000</u>
Gross profit		175 000
Selling and administration		<u>20 000</u>
Net profit		155 000

(c) The comparison of the net profit calculated under these two methods reveals that a difference of \$40 000 is attributed to fixed production costs being included in closing inventory under the absorption costing method (ie 20 000x \$2).

### Example 2

The accounting records of Nyaradzo Ltd shows the following costs data for the year ended 31 December 2002:

	<u>Units</u>
Opening inventory	6 000
Production	100 000
Sales	90 000
Selling price / unit	\$11.00
Variable costs per unit	
Selling expenses	\$2.50
Administration costs	\$1.50
Manufacturing costs	\$4.00
Fixed costs	
Manufacturing costs	\$50 000.00
Selling & administration costs	\$30 000.00

### Required

1. Prepare an income statement for the year ended 31 December 2002 according to the absorption costing and marginal costing method.
2. Reconcile the net profit calculated between the two methods of costing.

**Solution**

## Absorption costing statement

	\$	\$	\$
Sales (90 000 x \$ 11 per unit)			990 000
<u>Less variable costs of production</u>			
Selling expenses (90 000 x 2.50)		225 000	
Administration costs (100 000 x 1.50)		150 000	
Manufacturing costs (100 000 x 4)		400 000	
		<u>775 000</u>	
<u>Fixed costs of production</u>			
Manufacturing costs	50 000		
Selling and administration costs	30 000	80 000	
Total cost of production		<u>855 000</u>	
Less closing inventory (880 000 / 100 000 x 10 000)		88 000	767 000
Net profit			<u><u>223 000</u></u>

**Marginal costing statement**

	\$	\$	
Sales (90 000 x 11)		990 000	
<u>Less variable costs of production</u>			
Selling expenses (90 000 x 2.50)		225 000	
Administration costs (100 000 x 1.50)		150 000	
Manufacturing costs (100 000 x 4)		400 000	
Total marginal cost of production		<u>775 000</u>	
Less closing inventory (800 000 / 100 000 x 10 000)		80 000	695 000
Total contribution			<u>295 000</u>
<u>Less fixed costs</u>			
Manufacturing costs	50 000		
Selling & administration costs	30 000	80 000	
Net profit			<u><u>215 000</u></u>

**Comparison of absorption and marginal costing****Example 3**

Rio Manufacturing started in business on 1 April 2003 and incurred the following costs during the first three years.

Year ending 31 March	2004	2005	2006
	\$	\$	\$
Direct Materials	120 000	99 800	104 400
Direct Labour	96 000	88 000	90 000
Variable overheads	48 000	60 000	80 000
Fixed costs	80 000	81 200	82 600

Sales during the first three years were all at \$40 per unit.

Production each year (units)	000	000	000
Sales each year (units)	14 000	14 000	15 000

(a) Prepare a statement showing the gross profit for each of the three years if the company used.

- (i) The Marginal Costing approach to valuing inventory.
- (ii) The absorption costing approach to valuing inventory.

Year 1	Marginal Costing		Absorption Costing	
	\$	\$	\$	\$
Sales		560 000		560 000
Less: Variable costs				
Direct materials	120 000		120 000	
Direct labour	96 000		96 000	
Variable overheads	<u>48 000</u>		<u>48 000</u>	
	264 000		264 000	
<u>Less closing inventory</u>				
<u>2 000</u> x 264 000				
16 000	<u>33 000</u>			
<u>2 000</u> x 344 000				
16 000			<u>43 000</u>	
	231 000		221 000	
Fixed costs	<u>80 000</u>		<u>80 000</u>	
Total production cost	<u>311 000</u>		<u>301 000</u>	
Gross Profit	249 000		259 000	

	<b>Marginal</b>	<b>Costing</b>	<b>Absorption</b>	<b>Costing</b>
	\$	\$	\$	\$
Sales	560 000		560 000	
<u>Less: Variable costs</u>				
Direct materials	99 800		99 800	
Direct labour	88 000		88 000	
Variable Overheads	<u>60 000</u>		<u>60 000</u>	
Total variable costs	247 800			
+ Opening inventory	<u>33 000</u>		280 800	
<u>Less Closing Inventory</u>				
<u>2 000 x 247 800</u>				
14 000	<u>35 400</u>			
	245 400			
Fixed costs	<u>81 200</u>	81 200		
	<u>326 600</u>			

Total production cost	329 000	
+ O. Inventory	<u>43 000</u>	
	372 000	
<u>Less Closing Inventory</u>		
<u>2 000</u> x 329 000		
14 000	<u>23 500</u>	
	<u>233 400</u>	<u>325 000</u>
		<u>235 000</u>

<b>Year 3</b>	<b>Marginal</b>	<b>Costing</b>	<b>Absorption</b>	<b>Costing</b>
	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
Sales		600 000		600 000
<u>Less variable costs</u>				
Direct materials	104 400		104 400	
Direct labour	90 000		90 000	
Variable overheads	<u>80 000</u>		80 000	
Total variable costs	274 400			
+ opening inventory	<u>35 400</u>			
	309 800			
- closing inventory				
<u>1 000</u> x 274 400				
14 000	19 600			
	290 200			
Fixed costs	<u>82 600</u>	82 600		
		<u>372 800</u>		
Total production cost			357 000	
+ Opening. Inventory			<u>47 000</u>	
			404 000	
Less Closing. Inventory 1000 x 357 000				<u>25 500</u>
				14 000
			<u>378 500</u>	
Gross Profit	<u>227 200</u>		<u>221 500</u>	

**b) Why is the marginal costing approach not suitable for analyzing long-term decision?**

- The marginal costing approach is concerned with the amounts by which selling price exceeds marginal cost i.e. contribution.
- If the selling price exceeds marginal cost the product makes a contribution to the fixed costs of the business.
- Decisions concerning the viability of a product, the fixing of a selling price, the acceptance of an order below the normal selling price, make or buy decisions and the optimum use of scarce resources are short term decisions and may be made on marginal cost.
- Long- term decisions must be based on the need to cover total fixed costs over the longer term.

Corporate plans usually require a specified rate of return on capital ∴ long-term decisions must be based on total cost and profit

**Examination type questions****Multiple choice questions**

1. Anne Ltd manufactures a single product. The budgeted selling price and variable cost details for the product are shown below.

	\$
Selling price	30.00
Variable costs per unit	
Direct materials	7.00
Direct labour	8.00
Variable overhead	4.00

Budgeted fixed overhead costs are \$120 000 per annum, charged at a constant rate each month. Budgeted production is 30 000 units per annum. In a month when actual production was 2 400 units and exceeded sales by 180 units the profit reported under absorption costing was:

- A     \$13 320  
 B     \$15 140  
 C     \$15 540  
 D     \$16 400
2. A company made 17 500 units at a total cost of \$48 each. Three quarters of the costs were variable and one quarter fixed. 15 000 units were sold at \$75 each. There was no opening inventory. By how much would the profit calculated using absorption costing principles differ from the profit if marginal costing principles had been used?
- A     The absorption costing profit would be \$67 500 less.  
 B     The absorption costing profit would be \$30 000 less.  
 C     The absorption costing profit would be \$30 000 greater.  
 D     The absorption costing profit would be \$405 000 greater.
3. Y Ltd makes a single product whose total cost per unit is budgeted to be \$90. This includes fixed cost of \$16 per unit based on a volume of 10 000 units per period. In a period when sales volume was 9 000 units and production volume being 11 500 units and the actual profit under absorption costing being \$84 000, under marginal costing, the profit for the period would have been:
- A     \$20 000  
 B     \$44 000  
 C     \$100 000  
 D     Cannot be calculated without more information.

**Structured questions****Question 1**

Outline four differences between absorption (total) costing and marginal (variable) costing. A company which manufactures motor vehicle tyres provided the following information for the two years ended 31 August 2004 and 2005.

	<u>2004</u>	<u>2005</u>
	<u>Units</u>	<u>Units</u>
Sales	4 200	4 400
Production	4 500	4 800
	\$	\$
Selling price per unit	141	153
Direct materials per unit	30	36
Direct labour per unit	45	54
Variable production overhead per unit	21	27
Fixed costs: Manufacturing	108 000	129 600
: Administration & Distribution		
Costs	34 200	41 040

There was no opening inventory of finished goods in the year ended 31 August 2004. Inventory is valued on a first in, first out basis.

- (i) Calculate the closing inventory for each year using the absorption costing method.
  - (ii) Prepare comparative profit statements for the two years using absorption costing.
- (b) (i) Calculate the closing inventory for each year using the marginal costing method.
  - (ii) Prepare comparative profit statements for the two years using marginal costing.
- (c) Discuss why direct labour might be classified as a fixed cost.

### Question 2

The following budgeted information relates to a company that sells one product.

	January	February
Sales in units	18 000	32 000
Production in units	25 000	25 000
		\$
Selling price per unit		32
Cost per unit		
Materials		10
Direct labour		6
Variable production cost		4
Fixed production costs: \$150 000 per month.		

There is no opening inventory and company policy is to absorb fixed overheads on the basis of direct labour cost.

- (a) Prepare the profit and loss statements for the months of January and February on the basis of :
  - (i) marginal costing
  - (ii) absorption costing



- (b) Calculate the inventory valuation at the end of January under each method
- (c) Prepare a statement reconciling the profit obtained under marginal costing with that obtained under absorption costing.

## CASE STUDY

### Case study 1

## INSTRUCTIONS

The case study on pages 2 to describes a series of events in the life of a business. The questions that follow each scenario should be answered in the order in which they are set.

## SCENARIO 1

Many Ndlovu has been in business as a retail sole trader for several years. She is worried about her constant bank overdraft as she thinks she is operating at a loss. She asks you to prepare her a statement showing her profitability for the year ended 31 December 2 000 and a balance sheet as at that date so that she can use these statements to discuss the possibility of forming a partnership business with her assistant, John Khumalo. She provides you with the following trial balance as at 31 December 2 000.

	Debit	Credit
	\$	\$
Property at Cost	360 000	
Equipment at cost	230 000	
Provision for depreciation (as at 1 Jan 2 000)		
- property		50 000

- equipment		130 000
Stock at 1 January 2 000	109 600	
Sales		1 620 000
Purchases	1 038 400	
Discounts allowed	13 480	
Discounts received		17 680
Wages and salaries	209 440	
Bad debts	6 880	
Loan interest	6 240	
Carriage outwards	21 240	
Other operating expenses	155 200	
Trade debtors	184 800	
Trade creditors		134 400
Provision for bad debts		1 120
Bank overdraft		58 000
Drawings		115 720
Loan (13%)		48 000
Capital as at 1 January 2 000		<u>392 404</u>
	<u>2 451 604</u>	<u>2 451 604</u>

The following additional information as at 31 December 2 000 is available.

- Stock at the close of business was valued at \$103 600.
- Depreciation for the year ended 31 December 2 000 has yet to be provided as follows:
  - Property: 1% using the straight line method
  - Equipment: 15% reducing balance method

Calculations for depreciation should be rounded off to the nearest \$.
- Wages and salaries are accrued by \$560.
- 'Other operating expenses' include certain expenses prepaid by \$2 000 and others accrued by \$800.
- It has been agreed that further debts amounting to \$2 840 are to be written off against specific customers and the closing provision is to be adjusted to 5% of the revised debtor's figure.
- Goods on sale or return have been treated as sales. These cost \$12 000 and were invoiced to the customer for \$16 000.
- During the year the proprietor has taken goods costing \$4 160 from the business for her own use.
- Unrecorded in the ledger is the sale on credit on 1 July 2 000 of a piece of equipment for \$15 000. This equipment had been purchased on 1 January 1998 for \$30 000. The debt will be settled on 1 January 2001.

**QUESTION 1**

- a) Prepare a Trading, Profit and Loss Account for the year ended 31 December 2 000.
- b) Prepare a Balance Sheet as at 31 December 2 000 showing the working capital.

**SCENARIO 2**

Many does not understand why she has a bank overdraft in spite of making a profit which is more than 100% of her bank overdraft. She asks you to explain why this is so. She also ask you to advise her on what to do in order to eradicate the bank overdraft. She is worried by the fact that she finds it difficult to meet her short term obligations as she is always operating on an overdraft.

**Question 2**

Draft a report explaining to Mary why she has a bank overdraft in spite of being profitable and suggest how she can manage her short- term obligations.

**SCENARIO 3**

After having successfully followed your Advice for a couple of years, Mary has a healthy working capital position and believes that she is now confident enough to venture into a partnership business with John Khumalo her assistant. The partnership business commences on 1 January 2003.

Under the partnership agreement, Mary's business is valued at \$3 600 000 and was transferred to the partnership as her initial capital John paid \$1 200 000 into the partnership as his capital. In addition the partnership agreement also included the following items.

- i) A goodwill account is not to be maintained in the book.
- ii) Interest on partners' capital will be credited to partners at the rate of 10% per annum.
- iii) John is to be credited with a salary of \$25 000 per month.
- iv) The balance of profits and losses will be shared between Mary and John in the ratio 3:2.
- v) A capital and current account is to be maintained for each partner.

The summarized balance sheet of Mary Ndlovu as at 31 December 2002 was as follows:

	\$	\$
Fixed assets: Property and equipment		
At valuation on 31.12.2002		1 800 000
Net Current assets		
Stock	300 000	
Debtors	360 000	
Balance at bank	120 000	
	780 000	

Less creditors	240 000	540 000
		2 340 000
Capital		2 340 000

The following information has been extracted from the partnership accounting records.

	\$
Net profit	1 080 000
Cash drawings:	
Mary	600 000
John	360 000

### Question 3

Write up the following accounts for the year ended 31 December 2003:

- Profit and loss appropriation account
- Capital account for each partner in columnar form
- Current account for each partner in columnar form

### SCENARIO 4

In January 2004, Mary and John decided to expand their retail business by diversifying into manufacturing one of their retail products, Ginx in order to maximize profits. The information in the table below related to the production and sale of Ginx.

	Units
Sales	20 000
Production	25 000
Unit data	
Selling price	500
Direct materials	100
Direct labour	120
Variable expenses	75,0
Total fixed costs	1 200 000

Mary and John have asked you, their consultant cost accountant, to produce statements showing a calculation of the projected profit on Ginx for the year ended 31 December 2004 using both the marginal costing and the absorption costing approaches.

### Question 4

- Prepare two statements showing the different ways of calculating the profit on the production and sale of Ginx by the partnership business.
- Explain to Mary and John why these two methods gave different results. Use data from the Statements to illustrate your explanation.
- Outline three merits of the
  - Marginal costing system
  - Absorption costing system

### Case study 2

Each scenario in this case study describes an event in the life of a business and is followed by a question. Answer all questions. You are advised to answer the questions in the order in which they are set.

**Scenario 1**

J. Harris is in business as a trader. A trial balance extracted as at 31 January 2001 was as follows:

	Dr		Cr
	\$		\$
Purchases	212 000		
Sales	251 200		
Returns inwards and outwards	680		1 740
Salaries and wages	20 500		
Rent, rates and insurance	4 300		
Repairs and renewals	3 750		
Bad debts	670		
Provision for doubtful debts at 1 February 2000	1 400		
Stock on hand at 1 February 2000	68 150		
Fixtures and fittings (NBV) At 1 February	7 000		
Additions on 30 September 2000	1 200		
Motor vehicles:			
At 1 February 2000 (NBV)	4 600		
Sale of vehicle (book value at 1 February 2000 - \$400)			600
Sundry debtors and creditors	23 050		19 260
Cash at bank	19 100		
J. Harris Capital account at 1 February 2000	103 800		
J. Harris Drawings account	13 000		
	<u>378 000</u>		<u>378 000</u>

The following additional information is to be taken into account

- i) Included in the sales figure are goods on sale or return which cost \$1 200 and which have been charged out with profit added at 20% of sale price.
- ii) Amounts owing not entered in the books were:
  - Rent \$180
  - Sundry expenses \$450
- iii) Amounts prepaid were:
  - Rates \$300
  - Insurance \$50
- iv) Stock on hand on 31 January 2001 was valued at \$77 250.
- v) Provision for doubtful debts is to be adjusted to \$1700
- vi) Depreciation is to be provided for as follows:

Fixtures and fittings – 10% per annum

Motor vehicle – 25% per annum

- vii) Included in the item repairs and renewals is motor vehicles which was done on 1 February 2000.

### Question 1

- a) Prepare a trading and profit and loss account for the year ended 31 January 2001.
- b) Prepare a balance sheet as at 31 January 2001.

### Scenario 2

During the year ended 31 January 2003, J. Harris had converted his business into a partnership with P. Grange and S. Jones. The partnership agreement stipulates that profits should be apportioned in the ratio of J. Harris 3, P. Grange 2 and 3 Jones 1 after allowing interest on capital at 12% per annum and crediting J. Harris with a salary of \$60 000.

The following information relates to their first financial year in the partnership business.

1. J. Harris transferred capital of \$200 000 into the partnership business.  
  
P. Grange brought in \$160 000, and  
  
S. Jones \$80 000
2. Cash drawings during the year were:  
  
J. Harris \$15 600  
  
P. Grange \$18 000  
  
S. Jones \$9 600
3. The draft profit and loss account for the year showed a net trading profit of \$246 880.
4. Included in the motor expenses account for the year was a bill for \$1 200 relating to P. Grange's private motoring expenses.
5. No entries had been made in the accounts to record the following:
  - (a) As a result of Cash flow problems during May 2002 P. Grange invested a further \$40 000 as capital with effect from 1 May 2002, and on the same date, Jones brought into the business additional equipment at an agreed valuation of \$24 000. Furthermore, in order to settle a debt, Jones had privately undertaken some

work for foster, a creditor of the partnership. Foster accepted the work as full settlement of the \$8 000 the partnership owed her for materials.

- (b) J. Harris had accepted a holiday provided by Miller, a debtor of the partnership. The holiday which was valued at \$4 000 was accepted in full settlement of a debt of \$10 000 that Miller owed to the partnership and was unable to pay.
- (c) J. Harris' salary was reviewed on the 1<sup>st</sup> of August to \$75 000 per annum.
- (d) Each partner had taken goods for his own use during the year at cost as follows:

	\$
J. Harris	5 600
P. Grange	8 400
S. Jones	8 400

Note: It is the policy of the firm to depreciate equipment at the rate of 10% per annum based on the cost of equipment held at the end of each financial year.

### Question 2

- a) Prepare the profit and loss appropriation account for the year ended 31 January 2003, showing clearly the corrected net trading profit at the end of the first years' trading.
- b) The capital and current accounts of Harris, Grange and Jones for the year ended 31 January 2003.

### Scenario 3

During the year ended 31 January 2004, control accounts were introduced to prove the accuracy of its debtors and creditors ledgers on a monthly basis. On 1 January 2004, the following balances existed in the partnership accounting records, and the control accounts agreed.

	Debit	Credit
	\$	\$
Debtors ledger control account	188 360	2 140
Creditors ledger control account	120	89 410

The following are the totals of transactions which took place during January 2004, as extracted from the partnership records.

	\$
Credit sales	101 260
Credit purchases	68 420
Sales returns	9 160
Purchases returns	4 280
Cash received from customers	91 270
Cash paid to suppliers	71 840
Cash discounts allowed	1 430

Cash discounts received	880
Bad debts written off	460
Refunds to customers	300
Contra settlements	480

At 31 January 2004, the balances in the debtors and creditors ledgers, as extracted totalled.

	Debit	Credit
	\$	\$
Debtor's ledger balances	?	2 680
Creditors' ledger balances		?

An initial attempt to balance the two ledgers shows that neither of them agreed with the control account.

The differences were found to be due to the following:

- A credit balance of \$680 had been omitted when listing the debtors ledger balances.
- A contra settlement of \$500 had not been included in the totals of transactions prepared for the contra accounts.
- Five copies of sales invoices had erroneously been entered in the purchases day book and posted the amounts to a new purchases ledger. The total of these invoices was \$1 360.
- A \$20 cash refund to a customer was made out of petty cash, and had not been included in the summary of transactions given above. The \$20 was entered to the debtors ledger as if it had been a cash receipt from the customer.

### Question 3

- Prepare the debtors' ledger and creditors' ledger control accounts for the month of January 2004 after these errors had been corrected and hence ascertain the missing totals of the ledger balance as indicated above.
- Explain how the use of day books can contribute to the efficiency and control of the double- entry ledger system.

### Scenario 4

The partnership business plans to produce its own brand of tomato puree in the year end 31 January 2005 in order to expand its market share. A budget for the manufacture of 10 000 units per month has been drafted with the unit standard cost being \$60, made up as follows

	\$
Direct materials	35.00
Direct labour	5.00
Fixed overheads	20.00

The selling price of each unit is budgeted to be \$80.00.

Production and sales quantities for the 6 months ending.

	31 July 2005	31 January 2006
Production	10 000	10 000
Sales	8 000	12 000

### Question 4



- a) Prepare operating statements for each six month period:
  - i) Assuming the company uses marginal costing, and
  - ii) Assuming absorption costing is used.
- b) Comment on the differences of the two systems as regards.
  - (i) Stock valuation, and
  - (ii) Period profit

## CHAPTER 4

### MARGINAL COSTING AND SHORT-TERM DECISION MAKING

#### **Chapter objectives**

**After studying this chapter the student should be able to:**

1. Explain the way costs behave at different levels of activity, and how the analysis of costs in this manner can help management to make the best choice from a number of alternatives
2. Establish the break-even point, and explain how this calculation of break-even can assist the decision-making process
3. Establish the margin of safety
4. Explain what marginal costing is and contribution
5. Calculate and use the contribution/sales ratio
6. Calculate profits/losses using marginal costing
7. Construct and interpret break-even charts, contribution and profit charts

## Introduction

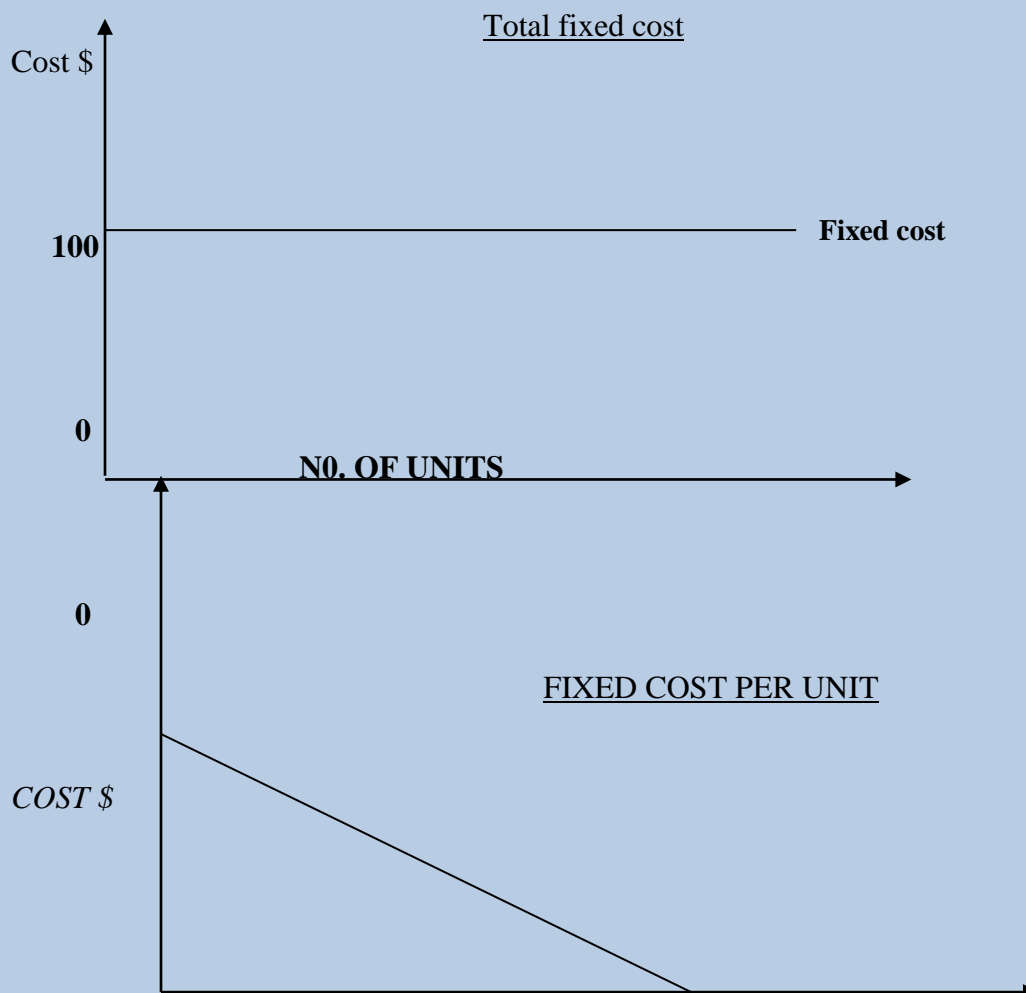
The elements of cost; materials, labour and overheads comprise two different types of costs: fixed costs and variable costs. As activity fluctuates i.e. rises or falls, some of the costs will rise and fall in line with the variations in activity. These costs are known as variable costs. They change in line with output. On the other hand other costs remain completely unchanged in the short-term and are unaffected by fluctuations in levels of activity. These are known as fixed costs. Fixed costs are time related and within limits; are unaffected by changes in the level of activity. I must hasten to point out that this does not mean that fixed costs do not change. In fact, they do change and the change may be quite frequent. The point is that the change in the fixed cost is not caused by changes in the volume of activity.

A further behavioural classification of the elements of cost is whereby costs have a combination of both fixed and variable elements. These are termed semi-variable or semi fixed costs.

It should be noted that all costs change over time, but in the short term, they are generally considered to behave according to the above descriptions.

For accounting purposes, costs are considered to move in on exact linear fashion, fixed costs staying at the same level also as shown below.

**It is important to note that it is total fixed costs which will remain constant but fixed costs per unit will decrease with increase in activity and increase with decrease in activity. This can be shown on the diagram.**



*NO OF UNITS*

Variable costs move directly in line with output as shown below.

TOTAL VARIABLE COST

*COST \$*

Total variable  
cost

*NO OF UNITS*

In practice, the characteristics of costs i.e. fixed variable and semi-variable have to be established. It is not always given that costs are either clearly fixed or clearly variable. One way of establishing this fact is by analyzing past cost and activity data. There are a number of techniques used for this purpose, namely the High/Low method, the scatter graph and the statistical technique known as the least squares method of linear regression. The scatter graph and the least square method are mathematical techniques, but for the purposes of this syllabus, it will suffice to study the High- Low method which is a non-mathematical technique.

The High-Low method consists of examining past costs and activity, selecting the highest and lowest levels of activity and comparing the changes in costs which result from the two levels of activity.

### **Illustration of the high-low method**

Assure that the following activity levels and costs are established

Volume of production	Total costs
Units	\$
500	3 500
1000	5 500
1 500	7 500
2 000	9 500

Note that the high/low cost points are:

	Units	Total Costs (\$)
High	2 000	9 500
Low	500	3 500
Difference	1 500	6 000

#### Step 1

Find the difference between the two ranges in terms of units and cost as shown above.

#### Step 2

Find the rate of cost change per unit i.e. the variable cost element

$$\frac{\text{Difference in cost}}{\text{Difference in units}} = \frac{6\,000}{1\,500} = \$4/\text{unit}$$

#### Step 3

Find the fixed cost element by deducing the total variable costs (Units x.v.c) from the total production cost. E.g. at 2000 units of output, variable costs are 2000 x \$4 variable cost per unit = \$8000. Fixed costs are therefore 9 500- 8000 = \$1 500.

### Activity

Test the validity of the high/low method by working out fixed costs and variable costs as illustrated above, at each level of activity.

### Marginal Costing defined

This is an alternative to absorption costing which only considers variable or direct costs. Only variable manufacturing costs are assigned to products and included in inventory valuation. Fixed manufacturing costs are not allocated to the product, but are considered as period costs and changed directly to the profit statement. The product cost is thus simplified with no over or under absorbed fixed overhead computations to be done.

In brief, marginal costing can be defined as the total of variable costs incurred in the production of goods and services.

Note that for the purpose of published accounts, the method of marginal costing for the valuation of inventories is not acceptable. This method also does not accord with the accruals concept outlined in IAS (disclosure of accounting policies).

An adjustment to marginal costing closing inventory will always be needed for financial reporting purposes, to include a proportion of the fixed cost production overheads.

### Marginal costing as aid to decision-making

Marginal costing techniques are especially useful in assisting managers to make short-term decisions such as:

1. Whether to continue to make or buy a product from an outside supplier.
2. Whether to accept once-off special orders from customers.
3. Whether to accept an order priced below the normal selling price.

4. How to select the best course of action from a number of alternatives to maximize profit
5. How best to use scarce resources.

### Guidelines in analysing decisions to be taken in marginal costing

- Fixed costs must remain unchanged
- Separate fixed and variable costs
- Calculate revenue and contribution of each of the alternative
- Check to see if there is any limiting factor (*this is a binding constraint which prevents indefinite expansion or unlimited profits*) and if so calculate the contribution per unit of the limiting factor and rank the products

These decisions are based on contribution which is the difference between the selling price and the variable/marginal costs. It is understood that as long as the level of activity remains within the range of maximum output, fixed costs are irrelevant as the decision to be made will not affect them. Contribution is relevant in the sense that it first contributes towards covering fixed costs and then when the fixed costs are covered, it then contributes towards the profit.

A proposal is acceptable as long as it makes a positive contribution. It must be noted that whether or not a decision is taken, fixed costs will remain unchanged.

### The four scenarios

#### 1. Limiting factor

A limiting factor is a binding constraint which limits the activities of an organization. In order to make a decision involving a limiting factor, the following steps should be taken.

Steps to follow:

1. Identify the limiting factor
2. Determine the contribution per unit of the finished product
3. Divide the contribution per unit by the number of units of the limiting factor required to make/ produce one unit. This will give you the contribution per limiting factor.
4. Rank the product according to the contribution per limiting factor having the product with the highest contribution per limiting factor ranking highest.
5. Produce to its maximum the product ranked as number **one**. This is done by multiplying sales demanded by the number of units of input resources. If the resource is still left we move to the next product. This can be illustrated as follows:

	<b>A</b>	<b>B</b>	<b>C</b>
	\$	\$	\$
Selling price per unit	80	90	100
Less variable costs	<u>70</u>	<u>82</u>	<u>86</u>
Contribution per unit	10	8	21
Units of input resource required to produce 1 unit (kg)	<u>2</u>	<u>4</u>	<u>7</u>
Contribution per limiting factor (\$)	<u>5</u>	<u>2</u>	<u>3</u>





∴ Units Produced	<u>20 000kg</u> 2kg / Unit	<u>19 000kg</u> 3 kg / Unit
	<u>= 10 000 Units</u>	<u>= 6 333 Units</u>

**Profit Statement**

	A	B	Total
Total Contribution: A = 10000 X 22) B = 6333 x 118)	220 000	113 999	333 999
Less Fixed Costs	(1)	(2)	<u>300 000</u>
Net Profit			<u>33 999</u>

	A	B
Rank Order	1	2
Kg Available 39 000kg		
Allow production of 7 500 units of each		
Product Kgs required	<u>7 500 x 2</u>	<u>7 500 x 3</u>
Total Raw Materials Utilized (37500)	15 000kg	22 500 kg
∴ Total Units to be produced	<u>16 500 kg</u> 2kg / Unit	<u>22 500 kg</u> 3 kg / Unit
	<b>= 8 250 Units</b>	<b>7 500 Units</b>

**Note**

Remaining Raw Materials (39000 – 37500) given to product with the highest ranking i.e. A  
The remaining can be allocated to its products 1500 kg

**Profit Statement**

	A	B	Total
Contribution (8250 x 22) - A	181 500	135 000	316 500
Less Fixed Costs (7 500 x 18) - B			<u>300 000</u>
Net Profit			<u>16 500</u>



## 2. Make-or-buy decision

Make or buy decisions should mainly focus on relevant costs in a particular given scenario. The relevant costs comparison is between marginal cost of manufacture and the buying in price.

If there is spare capacity the choice is simple, it is worth buying a component only if the marginal costs incurred in production are greater than the purchase (*buying price*)

If however there is no spare capacity then to the marginal cost we must add the contribution lost from the product displaced that is termed opportunity cost.

### Non-financial factors

The capacity of the selected suppliers to supply all your requirements

- Price stability of the supplier
- Financial stability of the suppliers
- Labour redundancy
- Quality of the components
- Delivery reliability
- Idle capacity when the decision to buy in has been made
- The quality and reliability of the selected outside supplier.

### Example 6

Madzingira Ltd manufactures an electric component ZESA 2000 and costs for the current production level of 10 000 units are

	Cost per unit \$	Total costs \$
Direct material	1	10 000
Direct labour	2	20 000
Variable overheads	1.5	15 000
Fixed overheads	<u>3</u>	<u>30 000</u>
Total cost	<u><u>7.5</u></u>	<u><u>75 000</u></u>

The buying in price for component ZESA 2000 is \$6 per unit. Should component ZESA 2000 be bought in or manufactured?

### Solution:

Marginal cost per unit of ZESA 2000

	Costs/unit \$
Direct material	1
Direct labour	2
Variable overheads contribution	<u>1.5</u>
	4.5

**Decision**

Make component ZESA 2000 since the marginal cost of manufacture (\$4,5) is less than the buying in price \$6 per unit.

**Example 7**

Vusumuzi Ltd manufactures Vusani moving boxes.

The budget for November 2005 is as follows:

	\$
Direct materials	90 000
Direct labour	135 000
Factory overheads: Variable	45 000
Fixed	63 000
Selling and distribution expenses: Variable	36 000
Fixed	81 000
Administration expenses – fixed	288 000
Selling price per Vusani moving box	405

Planned production output for the month - 2 000 units

Vusumuzi Ltd can buy vusani moving boxes form Vusilizwe Mega Boxes Ltd at a cost of \$126 per box.

**Required**

- (a) A financial statement for November 2005 to show whether Vusumuzi Ltd should continue to manufacture vusani moving boxes or should cease production of the boxes and retail those manufactured by Vusilizwe Mega Boxes Ltd.
- (b) A calculation of the profit for November 2005 if:
  - (i) Vusumuzi Ltd continues to make and sell vusani moving boxes.
  - (ii) Production of the boxes is ceased and Vusumuzi Ltd retails those made by Vusilizwe Mega Boxes Ltd.

**Solution**

- a) Marginal cost of own boxes:/ per unit

	\$
Direct materials	45.00
Direct labour	67.50
Factory overheads – variable	22.50
Marginal cost of production	135.00

Manufacturing cost of each box are more than the cost of buying in the boxes from outside.

Vusumuzi should discontinue production and simply retail boxes from Vusilizwe Mega Boxes Ltd as they can be acquired at \$126 per box, which is \$9 cheaper. Variable selling and distribution expenses are ignored as these will presumably be incurred anyway.

b) Contribution if own boxes are made and sold:

(i) S.P per unit – marginal cost per unit X units sold.

$$= \$405 - 153 \times 2\,000 = \$504\,000$$

Net profit = total contribution less fixed overheads

	\$
Total contribution	504 000
<u>Less fixed overheads (63 000 + 81 000 + 288 000)</u>	<u>432 000</u>
Net Profit	<u>72 000</u>

(ii) Increase in total contribution if boxes are bought in  $(135 - \$126) \times 2\,000 = \$18\,000$

Net profit = \$72 000 + \$18 000 = \$90 000.00

### 3. Acceptance of a special order

A firm may be producing below capacity. Due to the spare capacity well-wishers may make special requests at prices less than the normal offer. Management is faced with a scenario to decide whether to accept or reject the special offer. The grounds of decision are based on the added contribution obtained on condition that the fixed costs remain unchanged. However, there are other factors to consider such as:

- The reaction of other customers to this lower price: will they bid for this price?
- Other alternatives to this special order as the price will be lower than normal.

#### Example 6

Same data as in (b) except that the firm is operating at 80% capacity, the current selling price is \$8 per component. In addition Sound Electrical has made a special order for Madzingira Limited to manufacture at full capacity and have offered to buy each component at \$5. Should Madzingira Ltd accept the offer?

#### Solution:

	\$
Sales(10 000 x \$8)	80 000
Less marginal costs(10 000x4,5)	<u>45 000</u>
	35 000
	<hr/>
Less fixed costs	30 000
Net profit	5000
	<hr/>
Contribution for special order	
Sales (12 500-10 000) x5	12 500
Less marginal cost 2500 x 4.5	<u>11 250</u>
	<hr/>
Contribution	<u>1 250</u>

**Note: full capacity is 12500 units obtained by 10 000/80%**

**Decision:**

Accept the offer as it brings in added contribution

**4. Dropping a product**

From mere speculation of a company producing a range of products it might appear from the net operating loss/income that one department is most profitable. It is not appropriate to make a guess but a proper managerial decision has to be undertaken to make precise conclusions. It is appropriate to consider whether the sales revenue does cover the variable and the avoidable fixed costs incurred or not. If the costs are covered then the department continues in operation and the opposite holds water.

Madzingira Ltd has 3 departments. Data for the recent year is presented below

	A	B	C
Sales	10 000	7 500	5 600
Variable expenses	5 700	4 100	1 300
<u>Fixed expenses</u>			
Unavoidable	1 200	1 000	1 000
Avoidable	4 600	2 900	900

Should any department(s) be eliminated? Which one (s) and why?

**Solution**

	A	B	C	Total
Sales	10 000	7 500	5 600	23 100
Less variable expenses	<u>5 700</u>	<u>4 100</u>	<u>1 300</u>	<u>11 100</u>
Contribution	4 300	3 400	4 300	12 000
Less fixed expenses	<u>5 800</u>	<u>3 900</u>	<u>2 000</u>	<u>11 700</u>
Operating income	<u>(1 500)</u>	<u>(500)</u>	<u>2 300</u>	<u>300</u>

Departments A and B seem to be making losses but further analysis reveals this:

	A	B
	\$	\$
Sales	10 000	7 500
Variable expenses	(5 700)	4 100
Avoidable expenses	<u>(4 600)</u>	<u>2 900</u>
	<u>(300)</u>	<u>500</u>

The sales revenue in A of \$10 000 cannot cover the variable and avoidable costs of \$10 300 whereas the sales in B of \$7500 can cover the expenses \$7 000.

**Decision:**

Department A should be eliminated.

The elimination of department A produces the following net income:

	B	C	Total
Sales	7 500	5 600	13 100
Less variable expenses	<u>4100</u>	<u>1300</u>	<u>5400</u>
Contribution	3 400	4 300	12 000
Less property, plant and equipment	<u>3 900</u>	<u>2 000</u>	<u>5 900</u>
Operating profit/loss	<u>(500)</u>	<u>2 300</u>	<u>1800</u>

The operating income of the firm increased by \$1 500

#### Cost-Volume Profit Analysis (CVP)

CVP analysis is the study of effects on future profit of changes in fixed cost, variable cost, sales price and quantity mix.

CVP analysis is an important tool in short-term planning as it explores the relationship existing among the variables mentioned above. CVP analysis is most relevant where the proposed changes in the levels of activity are relatively small as this will generally not alter existing cost patterns.

#### Assumptions behind CVP Analysis

1. All costs can be separated and classified either as fixed or variable
2. Fixed costs will remain unchanged and variable costs will change in direct proportion to activity levels.
3. Costs and revenues behave in a linear fashion over the activity range under consideration
4. Volume is the only factor affecting changes in costs and revenues, all other factors remain constant.
5. When graphically presented, the analysis will relate to a single product or a constant product mix.
6. Inventory levels do not change and inventories are valued at marginal cost only.

The formulae listed below are used in CVP analysis:

1. Sales = Fixed costs + variable costs + Profit  
Or  
Contribution + Variable costs
2. Fixed Costs = Sales - Variable costs - profits  
Or  
Contribution - profit
3. Total costs = Fixed costs + variable costs
4. Variable costs = Sales - Fixed costs - profit

$$5. \text{ Profit} = \text{Sales} - \text{Fixed costs} - \text{variable costs}$$

$$6. \text{ Contribution} = \text{Sales} - \text{Variable costs}$$

$$7. \text{ Contribution/Sales ratio} = \frac{\text{Sales} - \text{Variable costs}}{\text{Sales}}$$

$$8. \text{ Break Even quantity} = \frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

$$9. \text{ Break Even Value} = \frac{\text{Fixed costs}}{\text{Contribution/Sales ratio}}$$

Or

$$\text{Break even quantity} \times \text{selling price per unit}$$

$$10. \text{ Margin of safety} = \text{Budgeted Sales} - \text{Break even sales value}$$

Or

$$= \text{Sales quantity} - \text{Break even sales quantity}$$

$$11. \text{ Margin of safety ratio} = \frac{\text{Budgeted Sales} - \text{Break even sales value}}{\text{Sales value}}$$

### Example 10

The following information is obtained from the budget of Dlodlo Ltd for 31 Dec 2002:

Selling price per unit =	\$16
Variable cost per unit =	\$4
Total fixed costs	\$4 800
Expected sales	600 units

**Required:** Calculate the following for 31 December 2002.

- Break even volume
- Contribution sales ratio
- Break even value
- Margin of safety ratio

### **Solution:**

Dlodlo Ltd

$$(a) \text{ Break even volume} = \frac{\text{Total fixed costs}}{\text{Contribution per unit}}$$

$$= \frac{\$4\,800}{(\$16 - \$4)}$$

$$= 400 \text{ units}$$

(b) Contribution/Sales ratio =  $\frac{\text{Contribution per unit}}{\text{Selling price per unit}}$

$$= \frac{\$16 - \$4}{\$16}$$

$$= \frac{3}{4} \text{ or } 75\%$$

(c) Break Even Value =  $\frac{\text{Fixed Costs}}{\text{Contribution/Sales ratio}}$

$$= \frac{\$4\,800}{0,75}$$

$$=\$6\,400$$

(d) Margin of safety ratio =  $\frac{\text{Expected sales volume} - \text{Break even sales volume}}{\text{Expected sales volume}}$

$$= \frac{600 - 400}{600}$$

$$= \frac{1}{3} \text{ or } 33 \frac{1}{3}\%$$

### Example 11

The following information regarding Dlodlo Ltd is available

Fixed cost per year	\$ 8000
Variable costs per unit	\$ 1.25
Selling price per unit	\$ 2.50

- Calculate the break even volume
- Calculate the profit if the sales volume is 10% more than the break even volume
- Calculate the additional number of units to be sold to realize the profit as calculated in (b) if the variable costs should increase by 12%.

### Solution:

Dlodlo Ltd

(a) Break even volume =  $\frac{\text{Total fixed costs}}{\text{Contribution per unit}}$

$$\frac{= \$ 8000}{(\$2,50 - \$1,25) = \$ 1.25}$$

$$= 6400 \text{ units}$$

	\$	
(b) Sales (6400 + 640) x \$2.50	17600	
Less: variable costs (7040 x \$1.25)	8800	
Less: fixed costs	<u>8000</u>	
Profit	<u><u>800</u></u>	
(c) Selling price per unit	\$2.50	
Less: variable cost per unit (1.25 + 12%)	<u>\$ 1.40</u>	
Marginal income per unit	\$ 1.10	

Marginal income of sales remains constant:	7920
Less fixed costs	<u>8000</u>
Loss	80

$$\begin{aligned} \text{Additional units to be sold} &= \frac{\$ (800 + 80)}{\$1,1} \\ &= 800 \text{ units.} \end{aligned}$$

### Example 12

The following is an illustration of a marginal cost statement for Machipisa Ltd for the month of January 2002.

Sales		X
<b><u>Less variable cost</u></b>		
Direct material	X	
Direct Labour	X	
Direct Expenses	X	
Variable production costs	X	
Variable selling and distribution costs	<u>X</u>	
Marginal cost	<u>X</u>	
Contribution		<u>X</u>

### NOTES

1. Marginal cost has already been defined as the total of all variable costs.



2. Contribution is the difference between the selling price value and the marginal cost. It represents the contribution each unit of production makes forwards covering the fixed costs and whatever that remains will form part of the profit.
3. Fixed cost are not considered here.

### **Break – even analysis**

Breakeven is the point where the company is neither making a profit nor a loss. It is this point where total costs (fixed & variable) equals sales revenue.

### **The Break Even Chart**

The break-even chart shows in both sales value and volume. This part is when the company has made neither a profit nor a loss. It also shows the level of production at which a certain amount of profit can be achieved.

There are two methods of calculating break-even point; sales value terms and sales unit terms. When calculating break even in terms of Sales value, the formula used is.

#### Fixed Costs

Contribution/Sales percentage (C/S %)

The contribution/sales percentage represents the ratio of contribution to sale. With variable costs deemed to move precisely in line with sales, this ratio is constant.

Breakeven in terms of sales units is calculated using the formula

$$\frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

The contribution per unit represents the contribution each makes to the fixed costs and profit.

### **Example 13**

Triangle Ltd has just furnished you with the following budgeted figures relating to the production of one of its leading product, molasses.

		\$/Litre
Selling price		140
Direct materials	40	
Direct labour		<u>38</u>
Other variable costs		20

Total fixed costs for the 6 months ending 30 June 2001 should amount to \$60 000 and the company estimates to produce 7 000 litres of molasses.

### **Required:**

- a) Prepare a marginal cost statement
- b) Prepare the break-even chart for the Triangle Ltd
- c) Calculate the margin of safety percentage
- d) Calculate the breakeven in terms of sales value.
- e) Calculate the breakeven in terms of sales units.

### **Solution**

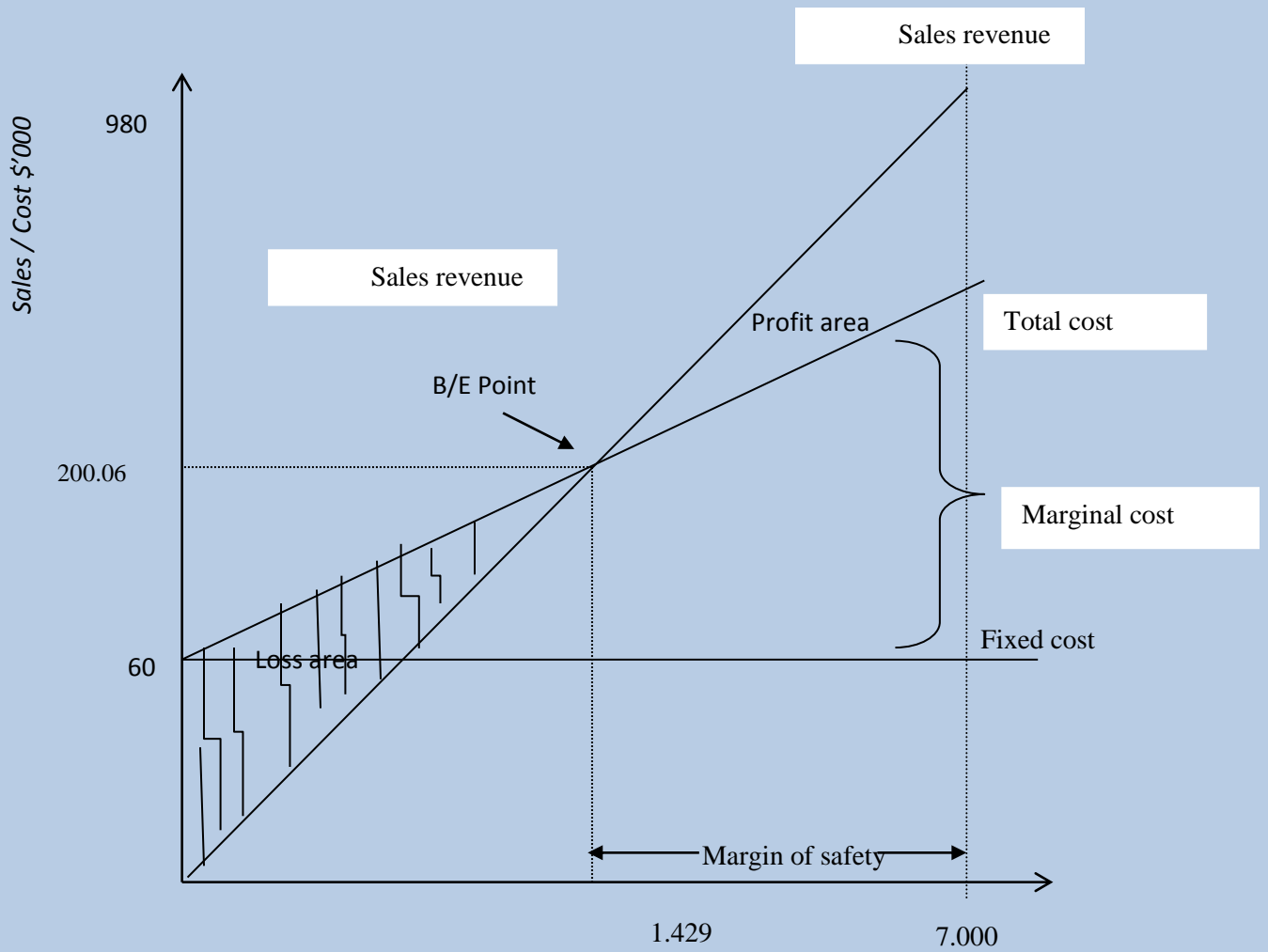
#### Triangle Ltd.

Marginal cost statement for the year period ending 30 June 2001

\$                      \$

Sales		980 000
Less direct materials	280 000	
Direct labour	266 000	
Other variable costs	<u>140 000</u>	
<b>TOTAL CONTRIBUTION</b>		<b>294 000</b>
Less fixed costs	<u>60 000</u>	
Profit		<u>234 000</u>

**The break-even chart**



Margin of safety percentage

No. Of units in '000

$$\frac{(7\ 000 - 1\ 429) \times 100}{7\ 000}$$

7 000

= 80%

$$\begin{aligned}
 \text{d) Break-even in sales value} &= \frac{\text{Fixed Costs}}{C/S\%} \\
 &= \frac{60\,000}{294\,000 / 980\,000} \\
 &= \frac{60\,000}{\%} \\
 &= \$ \\
 \\
 \text{e) Break-even in terms of sales units} &= \frac{\text{Fixed costs}}{\text{Contribution/unit}} \\
 &= \frac{60\,000}{294\,000 \div 7\,000 \text{ litres}} \\
 &= \frac{60\,000}{42} \\
 &= 1428,57 \text{ units} \\
 &= \underline{1429 \text{ units}}
 \end{aligned}$$

When calculating breakeven in terms of units, note that you cannot sell a fraction of a unit. When the number of units have decimal as shown above, always round off to the next whole number. If you had found 1428,14, you cannot round off downwards to 1428 because at that point, you do not exactly meet your fixed costs, therefore you always need to round off upwards to the next whole number.

#### How to draw a break-even chart

1. Establish the value of fixed and variable costs.
2. Draw the axes.
  - i) The horizontal axis shows the level of activity in units or percentage of total output. (y axis)
  - ii) The vertical axis shows the values in monetary terms for costs and revenues (x axis)
3. Draw the cost lines.
  - i) The fixed cost line is a straight line parallel to the horizontal axis at the level of fixed costs
  - ii) The total cost line will start where the fixed cost line intersects the vertical axis. It is a straight line sloping upwards at an angle depending on the proportion of variable costs to total costs.
4. Draw the revenue/sale line.
 

This is a straight line from the point of origin, i.e. where the x and y axis meet, sloping upwards at an angle determined by selling price.

#### The Contribution chart

The only difference between the contribution and breakeven chart is that variable costs (VC) are drawn on the chart before fixed Costs (FC). In this case, the contribution made to fixed costs is more clearly revealed.

#### Example

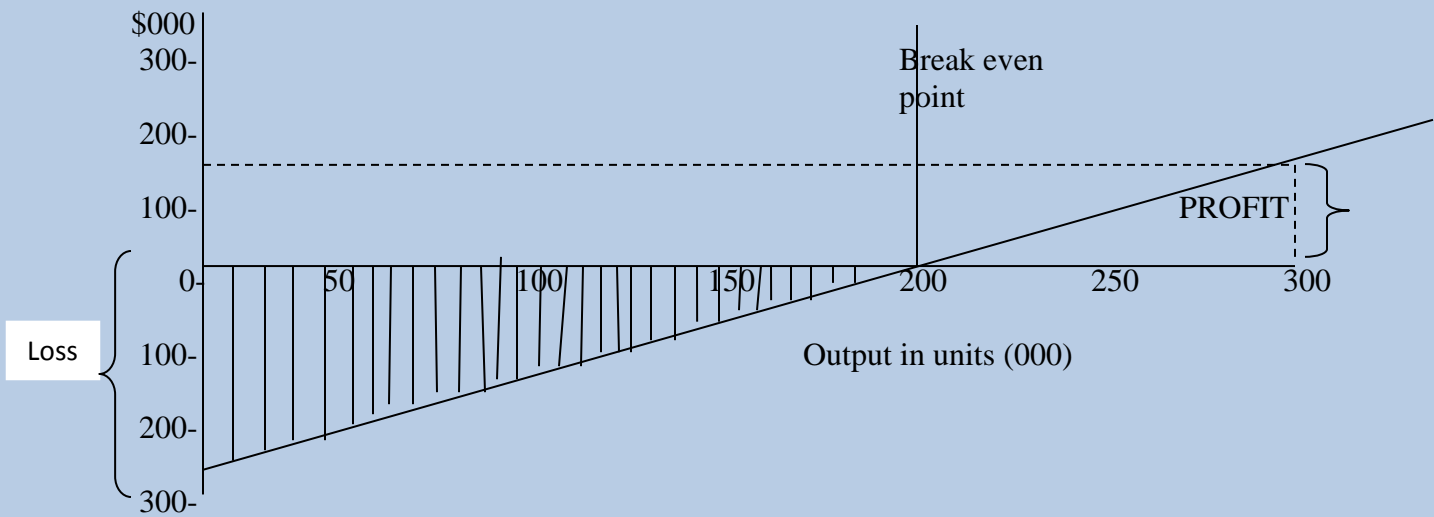
A company makes a single product, Tit-Bit, with a total capacity of 400 00 units per annum. Cost and sales data are as follows

Selling price	\$3 per unit
Marginal cost	\$1,50 per unit
Fixed Costs	\$300 000

- a) Draw a break-even chart showing the likely profit at the expected production levels of 300 000 units



### Profit chart for Tit-Bits



Sales of 300 000 units = profit of \$150 000  
 Sales of 50 000 units = Loss of \$252 000

<u>Proof</u>	<u>Units</u>	<u>50 000</u>	<u>300 000</u>
Sales	\$3/unit	\$150 000	\$900 000
V.C	\$1.50/unit	\$ 75 000	\$450 000
Contribution		\$75 000	\$450 000
<u>Less Fixed Cost</u>		<u>\$300 000</u>	<u>\$300 000</u>
(Loss)/Profit		<u>\$225 000</u>	<u>\$150 000</u>

Apart from the usefulness of the breakeven point, it also has some drawbacks which are explained below.

#### Advantages of break-even charts

1. They show at a glance the relationship between the units sold (volume / value) and the costs and hence the profit or loss.
2. If drawn to scale, the graph can show the volumes needed before you break even and start to make a profit.
3. You can tell at any volume of sale whether you can make a profit or loss.
4. The method is easy to follow.

#### The limitations of the Break Even Point

1. It assumes that all costs can be separated between fixed and variable, of which it is not always possible in practice. We may have semi-fixed costs.
2. It is also based on the assumption that the selling price is constant and does not change with time or other circumstances. It ignores items like discounts and bad debts.

3. The break-even chart is only valid up to a certain level of production. Beyond that point, additional information required regarding to sales revenue and expenses.
4. Assumes a constant sales mix (where more than one product is sold). This mix is likely to change continually owing to changes in demand.
5. Assumes that costs and sales levels can be predicted with certainty. In practice, these variables are uncertain as they are also determined by macro-economic activities. E.g. changes in exchange rates.
6. Assumes that costs and revenues increase linearly. In reality, total cost and total revenue are curvilinear due to price elasticity of demand (revenue) and economies of scale (cost).
7. Variable costs do not always change in proportion to the volume of sales but can do so disproportionately.

### Examination type questions

#### Multiple choice questions

1. The following information relates to a unit of production.

	\$
Selling price	24
Direct materials	2
Direct labour	6
Direct labour	6
Fixed overhead allocation	10
Variable overheads are set to increase by 10%	

What is the new contribution per unit?

- \$4.20
- \$5.20
- \$15.20
- 15.40

2. A company's single product sells for \$5 per unit. The variable costs are \$3.00 per unit and the planned fixed costs are \$1.00 per unit at the budgeted production level. What is the break – even level?
  - A. 40 00 units
  - B. 66 667 units
  - C. 100 000 units
  - D. 160 00 units

3. The following information applies to Belta Ltd

<b>Output</b>	<b>Sales</b>	<b>Profit</b>
(units)	\$000	\$000
750	1 500	200
1 000	2 000	500

4. What is the contribution to sales ratio?

25%  
40%  
60%  
87%

5. The following information relates to a product.

	\$
Fixed costs	144 000
Desired profit	60 000
Selling price per unit	20
Variable cost per unit	8

6. How many units must be produced and sold to cover fixed costs and make the desired profit?

- A. 12 000 units
- B. 17 000 units
- C. 18 000 units
- D. 25 500 units.

7. P Limited manufactures and sells two products J and K. Annual sales are expected to be in the ratio of J:1 and K: 3. Total annual sales are planned to be \$1 260 000. Product J has a contribution to sales ratio of 40%, whereas that of product K is 50%. Annual fixed costs are estimated to be \$360 000.

The budgeted break- even sales value (to the nearest \$1 000) is:

- E. \$588 000
- F. \$600 000
- G. \$759 000
- H. Cannot be determined.

The following details relate to product C

Level of activity (units)	1 000 \$/ unit	2 000 \$/ unit
Direct materials	12.00	12.00
Direct Labour	9.00	9.00
Production overhead	10.50	7.50
Selling overhead	3.00	1.50

The total fixed cost and variable cost per unit are:

	Total fixed Cost	Variable cost per unit
\$	\$	
A	6 000	21.00
B	6 000	25.50
C	9 000	21.00
D	9 000	25.50

8. A limited has fixed costs of \$60 000 per annum. It manufactures a single product which it sells for \$20 per unit. Its contribution to sales ratio is 40%.

A limited's break even point in units is:

- A 1 800
- B 3 000
- C 5 000
- D 7 500

9. W plc makes a single product which it sells for \$32 per unit. Fixed costs are \$153 600 per month and the product has a contribution to sales ratio of 40%. In a period when actual sales were \$448 000, W plc margin of safety, in units was

- A 2 000
- B 6 000
- C 8 000
- D 12 000

10. AB Ltd makes three components: S, T and U. The following costs pertain to each of the three components.

Components	Component	Component	
S	T	U	
Unit cost	Unit cost	Unit cost	
\$	\$	\$	
Variable cost	7.50	24.00	15.00
Fixed Cost	6.00	24.90	11.25
Total Cost	13.50	48.90	26.25

Another company CD Ltd, has offered to supply the components to AB Ltd at the following prices.

Components	Components	Components	
S	T	U	
Price each (\$)			
	12.00	21.00	16.50

Which component (s), if any, should AB Ltd consider buying in?

- A. Buy in all three components
- B. Do not buy any
- C. Buy in S and U
- D. Buy in T only

11. A company is operating below its full capacity and is considering accepting a special order which will require four skilled employees. The four skilled employees could be recruited on a one- year contract at a cost of \$160 000 per employee. The employees would be supervised by an existing manager who earns \$240 000 per annum. It is expected that supervision of the contract would take 10% of the manager's time. Instead of recruiting new employees, the company could retain some existing employees who currently earn \$120 000 per year. The training would cost \$60 000 in total. If these employees were used they would need to be replaced at a total costs of \$400 000.

The relevant labour cost for the special order is:



- E. \$400 000
- F. \$460 000
- G. \$540 000
- H. \$564 000

## Structured questions

### Question 1

Tissue Makers Ltd manufactures toilet paper. The normal output of this product is 200 000 units. The following is a cost statement relating to the production of a roll of toilet paper.

	\$	\$
Materials		35.00
Wages		49.00
Factory overheads:		
Fixed	31.5	
Variable	<u>7.00</u>	38.50
Administration overheads: Fixed		14.00
Selling overheads:		
Fixed	24.50	
Variable	<u>21.00</u>	<u>45.50</u>
		<u>182.00</u>

The selling price of a roll of toilet paper is \$252.00.

During the year the company received inquiries from a leading retailer, who wanted to brand in his own name, about two special orders, each involving the production of 2 000 units. One enquiry related to the production of super toilet paper grade A and the other to Grade B, economy toilet paper. It was only possible to handle just one of these orders because of normal production commitments.

The conditions for the production of Grade A super toilet paper are that variable costs will increase by 25%, but the selling price cannot exceed \$175.00 per unit. The conditions relating to the production of Grade B, economy toilet paper are that variable costs will decrease by 25% but the selling price will be \$133 per unit.

- (a) Computer the break-even point of normal trading in terms of:
  - (i) Sales revenue
  - (ii) Units produced
  - (iii) Percentage of normal capacity being
- (b) What profit would be earned in normal capacity being utilized
  - (iii) The selling price was increased to \$280 per unit and output restricted to 160 000 units.
  - (iv) The selling price was reduced to \$196 per unit and output increased to 260 000 units.
- (c) Advise the Board as to which of the two special orders should be accepted. Calculations must be shown and a reason given for the choice made.

## Question 2

The production manager of Pinto Ltd wants advice on Project X, a one – off order that he intends to tender for. The costs associated with the project are as follows:

	\$
Material A	48 000
Material B	96 000
Direct labour	72 000
Supervision wages	24 000
Overheads	144 000
	384 000

### Additional information

- i) There is now no other use for material A other than for the above project. It would cost \$21 000 to dispose of. Material B would have to be ordered at the cost shown above.
- ii) Direct labour cost of \$72 000 relates to workers that will be transferred to this project from another project. Extra labour would be recruited for the other project at a cost of \$84 000.
- (iii) Supervision costs have been charged to the project on the basis of 33 $\frac{1}{3}$ % of labour costs and would be carried out by existing staff within their normal duties.
- (iv) Overheads have been charged to the project at the rate of 200% on direct labour.
- (v) The company is currently operating at a point above break- even.
- (vi) The project would need the utilization of machinery that would have no other use to the company after the project has been completed. The machinery would have to be purchased at a cost of \$120 000 and then disposed of for \$63 000 at the end of the project.

The production manager says he has been advised that the customer is prepared to pay a maximum of \$360 000 for the project and a competitor is prepared to accept the order at the price. He also informs you that the minimum he can charge is \$480 000 as the above costs show \$384 000, and this does not take into account the cost of the machine and the project's profit.

### Required:

- (a) Cost the project for the production manager, clearly stating how you have arrived at your figures and give your reasons for the exclusion of other figures. [2]
- (b) Write a report to the production manager stating whether the organization should go ahead with the tender for the project. Justify your advice with reasons, bearing in mind that the competitor is prepared to undertake the project for \$360 000. [8]
- (c) State four non- financial factors that should be taken into account before tendering for the project. [2]
- (d) What would be your Advise if you were told that the organization was operating below break- even – point? Give reasons for your answer. [3]

**Question 3**

PQR Ltd makes three products and is reviewing the profitability of its product line. You are given the following budgeted data about the firm for the coming year:

PRODUCT	A	B	C
Sales (in units)	100 000	120 000	80 000
	\$	\$	\$
Revenue	7 500 000	7 200 000	4 400 000
Costs:			
Material	2 500 000	2 400 000	1 200 000
Labour	2 000 000	1 600 000	800 000
Overhead	3 250 000	3 000 000	1 800 000
	7 750 000	7 000 000	3 800 000
Profit/ Loss	(250 000)	200 000	600 000

The company is concerned about the loss on product A. It is considering ceasing production of it and switching the spare capacity of 100 000 units to Product C.

**Additional Information**

- (i) All production is sold
- (ii) 25% of the labour for each product is fixed in nature.
- (iii) Fixed administration overheads of \$4 500 000 in total have been apportioned to each product on the basis of units sold and are included in the overhead costs above. All other overhead costs are variable in nature.
- (iv) Ceasing production of Product A would eliminate the fixed labour charge associated with it and one – sixth of the fixed administration overhead apportioned to Product A.
- (v) Increasing the production of Product C by 100 000 units would mean that the fixed labour cost associated with Product C would double, the variable labour cost would rise by 20% and its selling price would have to be decreased by \$7.50 in order to achieve the increased sales.

**REQUIRED:**

- (a) Prepare a marginal cost statement for a unit of each product on the basis of:
  - (i) the original budget
  - (ii) product A is dropped [12]
- b) Prepare a statement showing the total contribution and profit for each product group on the basis of:
  - (i) The original budget
  - (ii) Product A is dropped. [8]

- c) Using your results from (a) and (b) advise whether product A should be dropped from the product range, giving reasons for your decision. [5]

Case studies

### Case study 1 INSTRUCTIONS

The case study on pages 2 to – describes a series of events in the life of a business. The questions that follow each scenario should be answered in the order in which they are set.

#### Scenario 1

John has been in the manufacturing business for several years. He operates in a rural area of high unemployment, producing a specialized type of milling machine. The following balances have been extracted from his books at 30 April 2001.

	\$
Sales	4 000 000
Purchase of raw materials	660 000
Direct wages	731 250
Indirect wages	97 500
Rent	225 000
Heating and lighting	211 500
Insurance	15 750
Office salaries	257 250
Carriage inwards	57 525
Carriage outwards	12 600
Advertising	35 000
Motor van expenses	30 000
Stocks at 1 May 2000:	
Raw materials	56 250
Work in progress	90 000
Finished goods	135 000

#### Additional Information

Stocks at 30 April 2001:

	\$
Raw materials	65 625
Work In Progress	78 750
Finished goods	120 000

The following expenses must be accrued at 30 April 2001

	\$
Rent	18 750
Heating and Lighting	13 500

The following expenses have been prepaid at 30 April 2001

	\$
Insurance	4 500
Advertising	17 500

4. Expenses are to be apportioned as follows

Rent: factory 75%, Office 25%

Heating And lighting: Factory 2/3, Office 1/3

Insurance: Factory 9/10; Office 1/10

Motor costs: Factory 50%; Office 50%

5. Provision for depreciation is to be made as follows

	\$
Factory building	15 000
Factory machinery	50 000
Office machinery and equipment	20 000
Motor vans	40 000

6. Finished goods are transferred to the trading account at factory cost plus a mark up of 20%

### Question 1

- Prepare John's manufacturing account for the year ended 30 April 2001.
- Prepare John's income statement for the year ended 30 April 2001.

### SCENARIO 2

John wishes to expand his business and so considers merging his business with that of another sole trader in the same line of business, Peter to form a company Picman Pvt Ltd on 1 May 2002. The balance Sheet at 30 April 2002, before the acquisition of Peter's business, was as follows:

	\$000	\$000
<u>Tangible fixed assets</u>		
Land and buildings		16 000
Plant and machinery		6 000
Motor Vehicles		<u>3 200</u>
		25 200
<u>Current Assets</u>		
Stock	1 680	
Debtors	1 280	
Bank	<u>2 560</u>	
5 520		
<u>Current liabilities</u>		
Creditors	<u>560</u>	<u>4 960</u>
		<u>30 160</u>

Peter's balance sheet on the same date was as follows:

	\$000	\$000
<u>Fixed assets</u>		
Land and buildings		4 800
Plant and machinery		2 800
Motor vehicles		<u>1 680</u>
		9 280
<u>Current Assets</u>		
Stock	560	
Debtors	320	
Bank	<u>400</u>	
	1 280	
<u>Less Current liabilities</u>		
Creditors	<u>160</u>	<u>1 120</u>
		<u>10 400</u>
Capital		<u>10 400</u>

Peter's assets and liabilities were taken over at the following values

	\$000
Land and buildings	6 400
Plant and machinery	2 240
Motor Vehicles	1 280
Stock	400
Debtors	240
Creditors	160

John did not take over Peter's bank account. The purchase consideration was agreed at \$12 000 000, made up as follows; cash \$1 600 000 and 100 000 ordinary shares of \$80 each.

### Question 2

- Prepare journal entries in Picman Pvt Ltd's books to record the purchase of Peter's business.
- Prepare Picman Pvt Ltd's Balance Sheet immediately after the purchase of Peter's business.

### Scenario 3

Picman, operating in a highly inflationary environment, has been having difficulty in trading over the last four years. In order to make the company more attractive, a scheme for restructuring the capital of the company has been agreed by all the necessary parties involved, with effect from 1 May 2007.

At 30 April 2007, the following were some of the items appearing in the balance sheet.

	\$
Issued share capital	
8% Preference shares of \$80 each	16 000
Ordinary shares of \$80 each	96 000

Capital Reserves	9 040
Revenue Reserves	1 600
Profit and loss a/c (Dr balance)	65 600
10% Loan stock	12 000
Fixed Assets (Book Value)	129 440
Stock	6 400
Trade debtors	1 600
Bank	400
Trade creditors	3 200
Loan stock interest owing	1 200

### Additional Information

1. The preference dividend has not been paid since 30 April 2004
2. The terms of the reconstruction have been agreed as follows:
  - i) The nominal value of the ordinary shares shall be reduced to \$32 each.
  - ii) The preference shares shall be cancelled and replaced by a 3 for 4 issue of new 10% preference shares redeemable in 2018. The nominal value of the shares is \$80.
  - iii) The preference dividend outstanding will be honoured by the issue of Ordinary shares to the preference shareholders.
  - iv) The creditors will be offered settlement by a payment of 50% of what is owed and new ordinary shares to the tune of the balance. Three quarters of the creditors accepted this offer; the remainder is paid in full.
  - v) Sufficient ordinary shares shall be issued at \$40, payable in full on application to bring the issued share capital to its original value. This issue was fully subscribed and the shares were allotted on 25 June 2007.
  - vi) The capital reserves are to be utilized before revenue reserve is used.
  - vii) The loan stock interest outstanding is settled by a cash payment.

During the year ended 30 April 2008, the company modernized their factory at a capital cost of \$32 000 000 half of which was paid by 30 April 08. Business was boosted by an original advertising campaign which was to be repeated in the year ending 30 April 2009. The total cost of the campaign was \$4 000 000 and half of it was paid in the year ending 30 April 2007.

Receipts from debtors during the year were \$99 200 000 and \$125 600 000 was paid to creditors and for operating expenses. The company made profits for the year of \$6 000 000 (after tax and appropriations). Depreciation of \$24 720 000 had been charged, the preference dividend had been paid as had Loan Stock interest \$300 000 had been transferred to reserves.

Apart from any balance which can be ascertained from above the following appear in the books at 30 April 2008.

	\$
Stock	5 360 000
Trade debtors	2 000 000
Trade creditors	1 440 000

**Question 3**

- a) Prepare journal entries for items (i) – (vii) above.
- b) Draft a summarized bank account for the year ending 30 April 2008.
- c) Prepare a summarized balance sheet as a 30 April 2008.

**Scenario 4**

Picman is reviewing the manufacture of the three components, S,T, and U, which form part of the milling machine manufactured. The following information has been extracted from the budget prepared for the next financial year ending 30 April 2009.

	S	T	U
	\$000	\$000	\$000
Direct materials	6 000	12 800	7 040
Direct labour	2 000	3 200	1 920
Variable overheads	2 000	8 000	3 200
Direct costs	10 000	24 000	12 160
Fixed overheads attributable to components	800	640	960
Annual production in units	5 000	10 000	8 000

The fixed overheads shown above are known to be incurred as a direct consequence of the production of the components. Enquiries have been made with a view of the possibility of buying in these components, and a potential supplier has quoted the following prices per unit.

S      \$1 520;      T      \$2 560;      U      \$1 280

If the parts were bought in, it would involve additional handling charges annually as follows:

S;      \$200 000      T \$240 000;      U\$256 000

The cessation of production of the components would mean that twelve skilled workmen would be made redundant; no redundancy payment would be incurred. In the face of this threat, the trade union officials have submitted suggestions which if implemented, would save the following amounts in direct costs:

S      \$1 600 000  
T      \$ 800 000  
U      \$1 280 000

They have also indicated that they would give serious consideration to co-operation in other cost- saving investigation.

**Question 4**

On the assumption that budget levels will be achieved.



- a) Prepare a detailed forecast statement (in columnar form) showing savings or extra costs which would arise should the management decide to purchase the components from the quoted supplier.
- b) Draft a report to the management of Picman Pvt Ltd indicating whether all or any of the components should continue to be manufactured within the factory. Your report should include factors which should be considered by the management other than profit savings or losses.

## Case study 2

### INSTRUCTIONS

The case study on pages – to describe a series of events in the life of a business. The questions that follow each scenario should be answered in the order in which they are set.

### SCENARIO 1

Patience has never kept full accounting records. She Has provided the following information to her accountant.

	31 August 2002	31 August 2003
	\$000	\$000
Land and buildings @ cost	600 000	700 000
Fixtures & fittings	75 000	90 000
Motor Vehicles	60 000	45 000
Creditors	87 750	84 500
Debtors	132 000	156 000
Rent owing	7 500	-
Wages & salaries owing	28 000	19 000
Stock	140 000	160 000

A summary of the business bank account for the year ended 31 August 2003 is given below.

	2002		2003
	\$000		\$000
<u>Receipts</u>		<u>Payments</u>	
Sept 1 Balance	270 000	Aug 31 Creditors	978 000
2003		Rent	30 000
Aug 31 Receipts from		Wages & Salaries	72 500
Debtors	604 000	General expenses	39 000
Cash sales	750 000	Purchase of	
Fixed assets sales	5 750	Fixed assets	145 000

### Notes:

1. Patience banked all her weekly takings after retaining \$1 500 000 per week for her own private expenses.
2. During the year, Patience took goods costing \$12 500 000 for her own use.

3. Closing stock on 31 August 2003 has been valued at selling price. The normal mark up on stock is 25%.
4. Patience had borrowed \$250 000 000 from her cousin on a long- term basis on 1 September 2002. This transaction had not been formerly recorded in the books. They had agreed at an interest rate of 10% per annum, but to date no interest had been provided for or paid.
5. During the year ended 31 August 2003, the following transactions relating to fixed took place.

		Cash paid	
Acquisitions		\$000	
Land		100 000	
Motor Vehicles		15 000	
Fixtures & fittings		30 000	
Received			
	Cash received		Net book values
			As at 31 August 2002
Disposals	\$000		\$000
Motor vehicles	5 000		12 500
Fixtures and fittings	750		5 000

### Question 1

- a) Calculate the Opening Capital for the year ended 31 August 2003.
- b) Prepare a Trading and Profit and Loss Account for the year ended 31 August 2003.
- c) Prepare a balance sheet as at 31 August 2003.

### Scenario 2

Patience has recently attended a seminar on record keeping for sole traders and so has tried to implement what she has learnt by preparing control accounts. However, she misplaced some purchase invoices and wants you to help her determine her purchases and sales for the last quarters of the year as well as debtors & creditors at the end of that period. She furnishes you with the following details pertaining to the last 5 months of her financial years ended 31 August 2004.

	April	May	June	July	August
	\$	\$	\$	\$	\$
<u>Receipts</u>					
Credits sales	435 000	1 005 000	810 000	585 000	645 000
Cash Sales	375 000	600 000	225 000	390 000	555 000
<u>Payments</u>					
Purchases	-975 000	1 757 000	750 000	945 000	

### Notes

1. One quarter of the turnover for the turnover for the three months ended 31 August arose from cash sales.
2. On 30 June, a debt due from Tracey, a customer, was written off as irrecoverable, total amount \$135 000.
3. A gross profit of 40% of sales has been obtained throughout the three months ended 31 August.
4. All purchases credit and sales occur on a monthly credit basis.
5. Purchases returns totalled \$90 000 at list prices. All purchases and purchases returns were subject to a trade discount of 10%.
6. Payments to suppliers made in June were in settlement of debts totaling \$1 800 000.
7. Sales returns from cash customers totalled \$150 000.
8. \$18 400 was received for a debt which had been written off as irrecoverable 2 years ago.
9. Balances at 31 August 20 included.
 

	\$
Sales ledger	1 008 credit
Purchases ledger	76 000 debit
Of \$270 000	
10. A debt due from j. White was transferred to the purchase ledger and set off against a debt of \$420 000 due to J. White.
11. Closing stock at 31 August 20 is \$1 200 000.

## QUESTION 2

- a) Calculate the total turnover for the three months ended 31 August 2004.
- b) Calculate total purchases for the three months ended 31 August 2004.
- c) Prepare control accounts to determine closing debtors and closing creditors for the period ending 31 August 2004.

## SCENARIO 3

As Patience finds the process of book- keeping tedious and confusing, she invites her sister Faith who has a sound knowledge of book- keeping and runs a similar business to join her in partnership on 1 September 2005.

Faith brought into the partnership as her capital, her existing business whose summarized balance sheet as at 31 August 2005 was as follows.

	\$000
Tangible fixed assets	4 000
Net current assets	<u>1 100</u>
	<u>5 100</u>
Capital – Faith	<u>5 100</u>

For the purposes of the partnership, the Faith's business was valued at \$6 000 000 on 1 September 2006. However, it has now been discovered that Faith's initial capital on 01 September 2006 has not been brought into the partnership accounts nor has effect been given to her goodwill at 1 September 2006.

The summarized trial balance below has been extracted from the partnership accounts at 31 August 2007.

	\$000	\$000
Tangible fixed assets	10 000	
Net current assets	12 300	
Capital account: Patience		17 000
Current accounts: Patience		1 800
Faith	300	
Net profit for the year ended 31 Aug 2007		3 800
	22 600	22 600

#### NOTES

1. The net profit for the year ended 31 August 2007 as stated above arose uniformly throughout the year.
2. The partnership agreement includes the following:
  - i) A goodwill account is not to be maintained.
  - ii) Faith is to be credited with a partner's salary of \$800 000 per annum.
  - iii) Partners are to be credited with interest on their capital account balances at the rate of 5% per annum.
  - iv) As from 1 March 2007 \$4 000 000 is to be transferred from Patience's capital account to the credit of a loan account in her name, interest is to be credited at the rate of 10% per annum.
  - v) The balance of profits and losses is to be shared between Patience and Faith as follows:
    - Up to 28 February 2007 – Patience 3/5, Faith 2/5
    - From 1 March 2007 equally

#### QUESTION 3

- a) Prepare the partnership's profit and loss appropriation account for the year ended 31 August 2007.
- b) Prepare the partner's capital accounts for year ended 31 August 2007.
- c) Prepare the partners' current accounts for the year ended 31 August 2007.

#### SCENARIO 4

Patience and Faith have diversified and gone into manufacturing leather handbags (classic business and style which are made from the same basic leather material which costs \$10 000 per square metre. The standard until cost the three products are as follows:

	Classic \$	Business \$	Style \$
Direct materials			
Leather	8 400	7 800	7 500
Zips	1 400	2 500	3 000
Direct labour			
Machinery	1 000	1 500	1 900
Sewing	400	700	600
Unit setting price	17 500	18 600	19 000

Sales expectations for the coming month are:

	<b>Units</b>
Classic	2 000
Business	2 400
Style	1 600

Owing to an industrial dispute, suppliers of leather have indicated that they will be able to supply only 2 500 square metres during the month.

#### **QUESTION 4**

- Prepare a statement which will enable you to advise management on the most profitable production pattern to pursue.
- Mention briefly the matters which should receive the attention of management when confronted with the type of situation described above.

# CHAPTER 5

## BUDGETING

### Chapter objectives

After studying this chapter the student should be able to:

1. Explain what a budgeting is
2. Identify and explain the six different functions of budgeting
3. Prepare functional and master budgets
4. Describe and explain the difference between activity based and zero-based budgeting
5. Explain how budgets facilitate management by exception and responsibility accounting

### Introduction

Budgeting is a technique used in industry, commerce and government for short-term planning and control. Short-term planning involves making decisions concerning the utilization of resources, such as financial and material to achieve defined specific objectives in the most effective and efficient manner so as to maximize profits. Budgeting therefore helps management to plan and control the resources of a business as it ensures that operations and performance conforms to overall corporate or organizational plans.

Budgets are somewhat similar to standard costs as they both establish predetermined targets of performance, and they both provide comparison for actual performance through variance analysis. The difference lies in the fact that budgets relate to the business as a whole while standard costs relate to production costs in manufacturing processes.

In short, a budget is an expression of a plan of action in financial or quantitative terms which should ideally be part of a long term plan.

### Benefits of Budgets

#### 1. **Panning**

As detailed above, budgeting works within long term plans which aim at fulfilling overall organizational objectives. Non-planning entities are often unprepared for the future and therefore suffer costs and lost opportunities. Management needs to look forward constantly to ensure organizational success. Budgets therefore force panning to take place.

#### 2. **Coordination**

Budgets serve as a vehicle of communicating and bringing together different departmental plans and reconciling them together into a common plan to meet overall organizational goals. When managers of different departments and functions work together to pursue organizational goals. Conflicts existing, between and among various departments are identified and resolved.

#### 3. **Communication**

The process of budgeting involves all levels of management. It is an important way of communicating organizational policies and objectives between & among levels of

management. So that all members of an organization may understand the overall expectations of the organization and the part they ought to play in order to attain organizational objectives.

#### 4. **Motivation**

Involvement of lower and middle management in the budgeting process can be a useful device for influencing managerial behavior and motivating management to work towards achieving organizational goals. People respond positively when their opinions are sought and are informed where plans are leading to. If top management sets budgets on its own and simply hands them down to lower level manager the budget could be resisted and such manager may not feel inclined to conform as they view the budget as a threat.

#### 5. **Control**

At the end of a budget period, actual results are compared with the budget and variances are reported. Adverse variances showing failure to conform to the budget or original plan are then analyzed and corrective action taken. In the process financial discipline is imposed.

#### 6. **Performance evaluation**

Budgets are a tool of examining how well managers have performed their mandate in the departments, thus their performance is often measured by the failure or success in meeting the targets that they were involved in setting.

### **Management by exception and responsibility accounting**

#### **Budgeting**

Budgeting enable the implementation of management by exception where by management devotes its time to investigate significant deviations from the budget with the aim of taking corrective action. In order to enable management by exception to be used, it is necessary to clarify the responsibilities of each manager in settling targets when budgeting so that when actual performance is compared with the budget, and variations noted the manager responsible for the budget can be called to answer for deviations from the budget. This is called responsibility accounting and is used in budgetary control. The involvement of departmental managers in setting budgets justifies responsibility accounting as each manager literary approves the budget challenge set and certifies it as achievable.

### **Preparing Budgets**

1. A budget committee is formed consisting of the managing Director and other manager of various departments. It is responsible for preparing and administering the budgeting system.
2. A budget officer, who is usually the Chief accountant or other accounts- related person, is appointed. The budget officer is responsible for compiling the budget in readiness for review and approval by both the committee and the Board of Directors.
3. A budget manual is issued by the budget officer which details procedure to be followed in the budgeting process the budgets to be established, timetable for submission of

budgets, defines responsibility of managers, highlights limiting factors and outlines inter-relationships between budgets, among other things.

All budgets must be coordinated with each other and contribute towards the master budget which is the overall budget, the budgeted Income statement and Statement of Financial position.

Because most business are sales led the sales budget is often prepared first as all other functions such as production and buying among others depend on what quantities are hoped to be sold. This is termed the limiting factor However, sales is not always a limiting factor other limiting factors could be the availability of raw materials, money to acquire resources etc. During the budgeting process the limiting factor has to be established and its effect on all other budgets considered. A limiting factor is also known as the key factor or principal budget factor.

### What is a budget?

A budget is a list of all planned expense and revenues. It is a plan for saving and spending

### Functional budgets

#### 1. Sales budget

-It is an estimate of future sales, often broken down into units and monetary value and is used to create the company's sales goals. Once the sales budget has been completed and the sales appear to be attainable a copy is passed on to the production department(s).

### Illustration 1

Franklin sells a single product Teetbits. In the month of June he sold 700 units at \$80 each. He expects the following changes to take places in the next 3 months.

Month	Sales Volume Increase	Sales value Increase
July	5%	2%
August	-	-
September	10%	5%

### Required

Prepare Franklin's sales budget for the three months ended 30 September

### Answer

Franklin's sales budget for the three months ended 30 September

Month	Quantity	Price	Amount
July	$(700 \times 5\%) + 700 = 735$	$80 + (80 \times 2\%)$	81-60 59 976
Aug	735	81-60	59 976
Sept	$735 + (735 \times 10\%) = 809$	$81,60 + (81.60 \times 5\%)$	85-68 <u>69315,12</u>
	<u>2279</u>		<u>189 267,12</u>

### Exercise

Using the information given below, prepare a sales budget for x Ltd for the six months ending 30 December 2012.



X Ltd sells three products Acolo, Bancolo and Dancolo. In June sales of Acolo were 1 200 units at \$12 each, Bancolo 800 units at \$15 each and Dancolo 700 units at \$20 each. It is projected that sales of Acolo will increase by 3% in August and a further 5% in November and the price will increase by 6% in August and a further 8% in December. Bancolo sales volume will increase by 5% in September and the price will also increase 10% in September. Dancolo sales volume will increase by 2% in October and the selling price will increase by 4% in December.

### **Production budget**

This budget has to link with the sales budget to ensure that sales demand is met and to adhere to management's policies on acceptable minimum and maximum levels of stock. On the other hand the capacity of the factory to produce volumes required by the sales budget should be confirmed so that if the factory doesn't have the capacity to produce the required quantities, alternative arrangements, such as outsourcing the finished product, must be made. Close co-operation and co-ordination is therefore essential when preparing the sales and production budgets.

Where monthly or periodic production is even a production budget can be used to determine closing stock by using the formula  $\text{Opening stock} + \text{production} - \text{sales}$ .

Where the production quantity is uneven and has to be determined the formula below must be used:

$\text{Production} = \text{sales} + \text{closing stock} - \text{opening stock}$

### **Illustration 2**

Linda's budgeted sales in kgs for the next four months ending May is 2100kg in February, 3500kg in March; 4200kg in April and 5 500kg in May. Closing stock in January is 900kg and required closing stocks are February 1100kg, March 1 300kg, April 1 700kg and May 2 400kg.

### **Required**

Prepare Linda's production budget for the four months ended 31 May

#### Step 1

Draft a table showing the months horizontally list vertically the opening stock, sales, closing stock and production.

#### Step 2

Enter the quantities for each month for the sales and closing stocks,

#### Step 3

Enter opening stocks using closing stock figures for the previous month

#### Step 4

Balance the table by working out production figures using the formula  $\text{Production} = \text{sales} + \text{closing} - \text{opening stock}$ .

**Answer to the illustration**

Linda's production budget for the four months ending 31 May

	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>
	Kgs	kgs	kgs	kgs
Opening stock	(900)	(1100)	(1 300)	(1 700)
Sales	2 100	3 500	4 200	5 500
Closing stock	1 100	1 300	1 700	2 400
Production	2 300	3 700	4 600	6 200

**Exercise**

Model A Ltd produces dinner sets for the export market and the following figures are budgeted in (sets)

	Forecast Sales	Closing Stock
March	4 500	1 000
April	5 300	900
May	5 500	1 500
June	5 500	1 300
July	5 500	1 400
August	5 800	1 000

**Required**

Prepare Model A's production budget for the six months ending 31 August.

**Materials and stock Purchasing budget**

This budget is a variation of the production budget where we state purchases in place of production. The purchase price is then noted and cost of material purchases determined as illustrated below.

**Illustration 3**

Using data supplied in illustration 2, prepare a raw material purchases budget

	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>
	Kgs	Kgs	Kgs	Kgs
Opening Inventory	(900)	(1 100)	(1 300)	(1 700)
Sales	2 100	3 500	4 200	5 500
Closing inventory	1 100	1 300	1 700	2 400
Purchases	2 300	3 700	4 600	6 200
Price	\$5	\$7	\$9	\$9
Cost of raw materials	\$11 500	\$25 900	\$41 400	\$55 800

**Illustration 4**

The company is in the process of preparing the budget for the coming four months ending 31 April 2000 and the sales forecasts are as follows:

	<b>Cash sales</b>	<b>Credit sales</b>	<b>Total sales</b>
	\$	\$	\$
January	30 000	300 000	330 000
February	35 000	325 000	360 000
March	40 000	360 000	400 000
April	54 000	386 000	440 000
May	60 000	400 000	460 000

Goods are sold at cost plus 33 1/3%. It is the company's policy to arrange purchases such that inventory at the end of each month will exactly cover sales for the following month. The balances as at 1 January 2000 are as follows:

Inventory	\$247 500
Debtors	\$265 000

### **Required**

Calculate the purchases for each of the 4 months ending 30 April 2000.

### **Solution**

Cost-plus % profit means mark up. Mark up is added to the cost of goods sold to give the sales value. Since we are not given the **Cost of goods sold**, we cannot use 33 1/3%. It is the same as 1/3 so margin is 25%.

We can now determine cost of sales as follows:

January	$(30\ 000 + 300\ 000) \times 75\%$	=	\$247 500
February	$(35\ 000 + 325\ 000) \times 75\%$	=	\$270 000
March	$(40\ 000 + 360\ 000) \times 75\%$	=	\$300 000
April	$(54\ 000 + 386\ 000) \times 75\%$	=	\$330 000
May	$(60\ 000 + 400\ 000) \times 75\%$	=	\$345 000

Purchases can then be calculated as follows:

	January	February	March	April
	\$	\$	\$	\$
Closing inventory	270 000	300 000	330 000	345 000
Add cost of sales	<u>247 500</u>	<u>270 000</u>	<u>300 000</u>	<u>330 000</u>
	517 500	570 000	630 000	675 000
Less opening inventory	<u>247 500</u>	<u>270 000</u>	<u>300 000</u>	<u>330 000</u>
Purchases figure	270 000	300 000	330 000	345 000

**Direct labour budget**

This budget is also developed from the production budget. Direct labour requirements need to be computed before hand so that the company will know whether available labour will meet production demand. Labour required is determined by the formula.

Production volume x direct hours/unit

In order to work out the labour hours required. Direct labor hours needed for production are then multiplied by direct labour cost per hour to derive budgeted direct labour cost.

**Illustration 5**

Using data in illustration 2, assume that direct labour is 3 hours at \$2 per hour calculate the direct labour required.

	February	March	April	May
Production (kgs)	2 300	3 700	4 600	6 200
Direct labour (hrs)	3 x 2300	3 x 3700	3 x 4600	3x 6200
Total hrs required	6 900	11 100	13 800	18 600
Direct labour cost/hr	\$2	\$2	\$2	\$2
Total direct labour cost	\$13 800	\$22 200	\$27 600	\$37 200

**Operating Budgets****Illustration 6**

A firm makes two products Major and Minor, and is developing its budgets for the next period.

The following information is available:

	Major	Minor
Sales forecast (units)	14 500	18 000
Selling price per unit	\$225	\$165
Forecast data per unit		
Material x (kilos)	6	4.5
Labour Hours (Dept 1)	3.6	1.8
(Dept 2)	2.28	1.1

Material X cost \$9.60 per kilo and Dept 1 labour is \$13.50 per hour and Dept 2 \$18 per hour. Production overheads are Dept 1 \$534 000, Dept 2 \$375 000 and are absorbed on labour hours.

Administration overheads are \$255 000 and are absorbed on labour cost.

Opening and closing inventory are budgeted as follows:

	Major	Minor	Material X
Opening inventory	900 units	1 500 units	6 500 kilos
Closing inventory	1 350 units	1 100 units	4 200 kilos

**REQUIRED:**

Prepare the following:

a) **SALES BUDGET IN (\$)**

Product	Budgeted Units	Budgeted selling Price/ unit (\$)	Budgeted Sales (\$)
Major	14 500	225	3 262 500
Minor	18 000	165	<u>2 970 000</u>
			<u>6 232 500</u>

b) **Production budget (units)**

Product	Major	Minor
Opening Inventory	900	1 500
	<u>1 350</u>	<u>1 100</u>
Increase (decrease)	450	(400)
Sales	<u>14 500</u>	<u>18 000</u>
Production	<u>14 950</u>	<u>17 600</u>

c) **Material X purchases budget (kgs and \$)**

	Kgs
Opening inventory	6 500
Closing inventory	<u>4 200</u>
(Decrease)	<u>(2 300)</u>
Production requirements	
Major 14 950 x 6	89 700
Minor 17 600 x 4.5	79 200
	168 900
Less inventory decrease	<u>2 300</u>
Purchases	<u>166 600</u>

∴ Purchases (\$) = 166 600 @ \$9.60/kg = \$1 599 360

d) Departmental labour budgets (hours and \$)

	Dept 1 Hrs		Dept 2 hrs	Total
Production:				
Major 14 950 x 3.6	53 820	x 2.8	= 41 860	
Minor 17 600 x 1.8	31 680	x 1.1	= 19 360	
	85 500 hrs		61 220hrs	
	x \$13.50/hr		x \$18/hr	
	= \$1 154 250		= \$1 101 960	
				<b>\$2 256 210</b>

e) Budgeted production overhead absorption rates for department 1 and 2

$$\begin{aligned} \text{Dept 1} &= \frac{\text{Budgeted overheads}}{\text{Budgeted hours}} \\ &= \frac{\$534\,000}{85\,500 \text{ hrs}} \\ &= \$6.246 \text{ per hour} \\ &= \mathbf{\$6.25/\text{hrs}} \end{aligned}$$

$$\begin{aligned} \text{Dept 1} &= \frac{\$375\,000}{61\,220 \text{ hrs}} \\ &= \$6.125 \\ &= \mathbf{\$6.3/\text{hr}} \end{aligned}$$

f) Budgeted administration overheads absorption rate

$$\begin{aligned} &\text{Administration overheads} \times \frac{100}{\text{Total Labour Cost}} \\ &= \$255\,000 \times \frac{100}{\$2\,256\,210} \\ &= 11.3\% \text{ on labour cost} \end{aligned}$$

g) Budgeted product cost and profit for each product

	<b>Major</b>		<b>Minor</b>	
	\$	\$	\$	\$
Selling price		225.00		165.00
<u>Less costs</u>				
Material	57.60		43.20	
Labour Dept 1	48.60		24.30	
Dept 2	50.40		19.80	
Production overheads				
Dept 1	22.50		11.25	
Dept 2	17.64		6.93	
Admin overheads	<u>11.10</u>	<u>207.84</u>	<u>5.10</u>	<u>110.58</u>
Profit		<u>17.16</u>		<u>54.42</u>

**The cash budget**

A cash budget is a detailed plan showing how cash resources will be acquired and used over some specified time period. In other words, it is an estimate of cash inflows and outflows projected in a specific period of time. Apart from showing cash flows, a cash budget's major objective is to ensure that cash resources will be adequate to meet all cash operations which require cash outflows as projected by all other budgets prepared. Working capital includes cash and the cash budget is therefore one of the most important of the budgeting functions.

If temporary cash deficiency is projected during the budget period, the company will need to borrow funds such as short term loans. The management can plan to do so well before hand so that there are no disruptions in operations. On the other hand, if a cash excess is projected in the budget period, funds borrowed in the previous period of cash deficit can be repaid, and the excess idle cash can be put into short term investments to earn maximum interest.

### **Preparation of cash budget**

The following should be noted when preparing the cash budget:

- (i) A cash budget is prepared on a cash basis; this will include items of both revenue and capital expenditure in nature.
- (ii) Non-cash items should be ignored, such as depreciation and provision for bad and doubtful debts.
- (iii) Cash will be taken to accurately determine the timing of cash flows in terms of receipts from trade receivables and payments for trade payables. Failure to accurately determine the dates of cash receipts and payments leads to failure in examination. You therefore need to pay close attention to dates and details.
- (iv) Adjust amounts payable to trade payables with discount received.
- (v) Adjust amounts expected from trade receivables for bad debts written off and discounts allowed as may be necessary.
- (vi) You may need to work out trade receivables schedule and the trade payables schedule to determine the timing of such cash flows.

## Format of a cash budget

### Cash Budget for four months ended 30 April 19-0

	<u>Jan</u>	<u>Feb</u>	Mar	Apr
	\$	\$	\$	\$
<b><u>Receipts</u></b>				
Cash sales	xxx	xxx	xxx	xxx
Trade receivables ( <i>sales less bad debts less discount allowed</i> )	xxx	xxx	xxx	xxx
Total receipts	xxx	xxx	xxx	xxx
<b><u>Payments</u></b>				
Cash purchases	xxx	xxx	xxx	xxx
Payments to trade payables	xxx	xxx	xxx	xxx
Wages	xxx	xxx	xxx	xxx
Any other cash payments	xxx	xxx	xxx	xxx
Total payments	xxx	xxx	xxx	xxx
Net receipts/(Payments)	xxx	xxx	xxx	xxx
Balance b/d	xxx	xxx	xxx	xxx
Closing bank balance ( <i>Bal. c/d</i> )	xxx	xxx	xxx	xxx

### Notes

1. The difference between total receipts and total payments gives us the closing bank balance. The closing bank balance for April becomes the opening balance for May, and so on. In an examination situation overheads normally includes depreciation therefore depreciation has to be removed, as it is a non-cash expense.
2. Discounts allowed and discounts received are deducted from receipts from sales and payments to creditors
3. Bad debts and discount allowed should be deducted from the sales.
4. Discount received should be deducted from purchases.

### **Determination of credit period**

The problem in the examination is to determine when sales are to be received as cash e.g. in a firm which gives two months credit. In order to find when cash is received, we count two months from the month of sale e.g. Sales for January will be received as cash in March. We start counting from the first month of sale.

### **Illustration 7**

A firm projected the following sales for the four months ending 30 April 2000. Actual sales for November 1999 were \$6 500 and December \$9 000.

Jan-\$ 8000, Feb-\$12000, Mar \$15000 April-\$20 000. A firm gives one-month credit.



**Required:**

Prepare a cash budget extract for the 4 months Jan-April.

**Solution**

	Jan	Feb	March	April
Receipts from debtors	\$9 000	\$8 000	\$12 000	\$15 000

Assuming the same facts as above the policy of the firm is to allow 2 months credit to its customers. Prepare a cash budget

**Cash budget (extract) for the 4 months**

	Jan	Feb	March	April
Receipts from debtors	\$6 500	\$9 000	\$8 000	\$12 000

**Trade in of a non-current asset**

Another problem in the examination is when a non-current asset is traded in. There are two issues to be dealt with. Where there is trade in of a non – current asset there are two issues to be dealt with

1. How much should be treated as a payment?
2. The determination of profit or loss on the sale of the asset disposed of.

**Illustration 8**

A Company is planning to replace its machinery with a net book value of \$6 000. The new machinery will cost \$19 000. The manufacturer agreed to allow \$5 500 as the trade in value of the old machinery.

**Required:**

Calculate how much should be shown as payment in the cash budget and determine the profits/loss to be included in the budgeted income statement.

**Solution**

Cash payment to be included in the cash budget.

	\$
Cost of machinery	19 000
Less trade –in value	5 500
Cash payment	<u>13 500</u>

Determination of profit/loss

	\$
Trade in Value	5 500
Less NBV (Cost less accumulated depreciation)	<u>6 000</u>
Loss on disposal	<u><u>500</u></u>

**Illustration 9**

The following information relates to Madzingira

Ltd for the budget period ending 31 March 2002. The opening bank balance on 1 January 2002 is \$40 000. Extracts from the purchases and sales budgets revealed the following:

2001 ( <i>Actual</i> )			2001 ( <i>Forecast</i> )		
	<b>November</b>	<b>December</b>	<b>January</b>	<b>February</b>	<b>March</b>
Purchases		\$50 000	\$45 000	\$30 000	\$60 000
Sales	\$90 000	\$80 000	\$80 000	\$65 000	\$70 000

**Additional information**

1. An analysis of records revealed that debtors settle according to the following pattern:
  - a. 60% within the month of sale.
  - b. 25% the following month.
  - c. 12.5% after two months.
2. All purchases are on credit and past experience shows that 90% are settled in the month of purchases and the balance in the month following.
3. 2% discount is allowed on debtors who settle within the month of sale.
4. If the firm settles its creditors within the month of purchase they receive 1.5% settlement discount.
5. Wages are \$14 000 per month and overheads, \$16 000 per month settled monthly. Overheads include depreciation of \$3 500.
6. Taxation of \$5000 has to be settled in February 2002 and the company will receive settlement of an insurance claim of \$20 000 in March of the same year.

You are required to prepare the cash budget for the first quarter of the year 2002.

**Solution****Workings****Working 1 - Debtors Schedule**

Month	Total sales	November	December	January	February	March
November	90 000	52 920	22 500	11 250	-	
December	80 000	-	47 040	20 000	10 000	
January	80 000	-	-	47 040	20 000	10 000
February	65 000	-	-	-	38 220	16 250
March	70 000	-	-	-	-	41 160
				78 290	68 220	67 410

**Working 2 - Creditors payment schedule**

Month	Total purchases	December 2001	January 2002	February 2002	March
December	50 000	44 325	5 000		
January	45 000		39 893	4 500	
February	30 000			26 595	3 000
March	60 000				53 190
			44 893	31 095	56 190

**The cash budget for the budget quarter ending 31 March 2002**

	Jan	Feb	March
	\$	\$	\$
<b><u>Receipts</u></b>			
Receipts from: debtors	78 290	68 220	67 410
: Insurance Claim			20 000
Total cash received	78 290	68 220	87 410
<b><u>Payments</u></b>			
Payments to trade payables	44 893	31 095	56 190
Wages	14 000	14 000	14 000
Overheads (16 000-3500)	12 500	12 500	12 500
Tax payable		5 000	
Total payments	71 393	62 595	82 690
Net receipts/ (Payments)	6 897	5 625	4 720
Balance b/d	40 000	46 897	52 522
Balance c/d	46 897	52 522	57 242

Some questions on cash budgets do not give students purchases but provides information on sales, opening inventory, the firm's inventory holding policy and mark-up / margin.

In order to determine the purchases figures, students need to calculate cost of sales by multiplying sales by margin (*if given*) if not given, the mark-up will be given you can convert mark-up to margin by simply multiply sales  $\times 100 / 100 + \text{mark-up}$ . The purchases are then determined in the following manner.

Closing inventory	x
Add cost of sales	<u>x</u>
Less opening inventory	<u>x</u>
Purchases	x

### Master Budget

It is a budget which summaries and integrates all the individual budgets within an organisation. It a compressive representation and expression of management's plan for the future which shows how the plans are to be accomplished. Unlike the cash budget, a master budget is prepared on an accruals basis. Simply, put, a master budget is a combination of a budgeted income statement and statement of financial position. Only the total amounts and not monthly figures for revenue and expenditure, assets and liabilities are reported in the master budget on a pro-rata basis, i.e. to match the budget period.

### Budgeted income statement

1. Sales: Simply add the sales for the relevant months
2. Purchases: Simply add the purchases for the relevant months
3. Expenses: Simple add expenses for the relevant months including depreciation and discount allowed and bad debts. However care need be taken when dealing with depreciation, the rate of depreciation given is per annum. In most cases the master budget to be prepared for a period less than a year as a result, depreciation should be time apportioned i.e. first calculate depreciation and then divide it by 12 and multiply the result by the number of months in question.
4. Interest on loan: Interest for less than a year should be apportioned accordingly.

### Budgeted Balance Sheet

The key areas are how to determine

1. bank balance
  2. closing balance of accounts payables
  3. closing balance of accounts receivables
- The bank balance is the closing balance on the cash budget.

Part of the sales not received as cash in the cash budget accounts for the closing balance of accounts receivables. This means that if a firm gives two months credit sales, the figure for accounts receivables will be for the previous two months.

Part of the purchases not paid as cash in the cash budget amounts for the closing balance of accounts payables.

### **Illustration 9**

#### **Preparation of financial budgets, cash & master budget**

The budgeted balance sheet data of Leila's fashions is as follows (as at March 2007)

<u>Property, plant and equipment</u>	<u>Cost</u>	<u>Depr</u>	<u>NBV</u>
Land and Buildings	1 500 000	-	1 500 000
Machinery and Equipment	372 000	253 500	118 500
Motor vehicles	<u>126 000</u>	<u>49 200</u>	<u>76 800</u>
	<u>1 998 000</u>	<u>302 700</u>	1 695 300
 <u>Current Assets</u>			
Inventory of raw materials (100 units)		12 960	
Inventory of finished goods (110 units)		31 350	
Debtors: January	23 040		
February	<u>31 200</u>	54 240	
Cash and Bank		<u>20 370</u>	
		118 920	
 <u>Less current liabilities</u>			
Creditors (raw materials)		<u>11 700</u>	<u>107 220</u>
			<u>1 802 520</u>
 <u>Financed By</u>			
Ordinary share capital (fully paid \$3 shares)			1 500 000
Share premium			180 000
Profit and loss account			<u>122 520</u>
			<u>1 802 520</u>

***NB: Inventory of finished goods was valued at marginal cost.***

The estimates for the next four- month period are as follows:

	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>
Sales (units)	80	84	96	94
Production (units)	70	75	90	90
Purchases of raw materials units	80	80	85	85
Wages and variable overheads At \$195 per unit (\$)	13 650	14 625	177 550	17 550
Fixed costs	3 600	3 600	3 600	3 600

The company intends to sell each unit for \$657 and has estimated that it will have to pay \$135 per unit for raw materials. One unit of raw materials is needed for each unit of finished product.

All sales and purchases of raw materials are on credit. Debtors are allowed two months credit and suppliers of raw materials are paid after one month's credit. The wages, variable overheads and fixed overheads are paid in the month in which they are incurred. Cash from a loan secured on the land and buildings of \$360 000 at an interest rate of 7.5% is due to be received on 1 May. Machinery costing \$336 000 will be received in May and paid for in June. The loan interest is payable half yearly from September onwards. An item dividend to 31 March of \$37 500 will be paid in June.

Depreciation for the four months, including that on the new machinery is:

Machinery and equipment	\$47 199
Motor vehicles	\$10 500

The company uses FIFO method of inventory valuation.

**REQUIRED:**

a) Calculated and present the raw materials budget and finished goods budget in terms of units, for each month from March to June inclusive.

(Units)	March	April	May	June
Opening inventory	100	110	115	110
Add purchases	<u>80</u>	<u>80</u>	<u>85</u>	<u>85</u>
	180	190	200	195
<u>Less used in production</u>	<u>70</u>	<u>75</u>	<u>90</u>	<u>90</u>
Closing inventory	<u>110</u>	<u>115</u>	<u>110</u>	<u>105</u>

Units (Finished production):

Opening inventory	110	100	91	85
<u>Add production</u>	<u>70</u>	<u>75</u>	<u>90</u>	<u>90</u>
	180	175	181	175
<u>Less sales</u>	<u>80</u>	<u>84</u>	<u>96</u>	<u>94</u>
Closing inventory	<u>100</u>	<u>91</u>	<u>85</u>	<u>81</u>

b) Calculate the corresponding sales budgets, the production cost budgets and the budgeted closing debtors, creditors and inventory in terms of value.

	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>Total</b>
	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
Sales (\$657/ unit) (W1)	<u>52 560</u>	<u>55 188</u>	<u>63 072</u>	<u>61 758</u>	<u>232 578</u>
<u>Production cost:</u>					
Raw materials (Using FIFO)	9 072 (W2)	9 963 (W3)	12 150	12 150	43 335
Wages & Variable costs	<u>13 650</u>	<u>14 625</u>	<u>17 550</u>	<u>17 550</u>	<u>63 375</u>
	<u>22 722</u>	<u>24 588</u>	<u>29 700</u>	<u>29 700</u>	<u>106 710</u>

**Debtors:**

Closing debtors = May + June Sales = \$124 830

Creditors = June purchases 85 units x \$135 = \$11 475

Closing inventory:

Raw materials 105 units x \$135 \$14 175  
 Finished goods 81 units x \$330 (W4) \$26 730

## Workings

W1 = \$657/ unit x units sold in each month (see (a))  
 W2 = 70 units x \$12 960/ 100 units = \$9 072  
 W3 = 30 units x \$12 960/ 100 units + (45 units x \$135) = \$9 963  
 W4 = Materials (\$135) + labour + variable overheads (\$195) = \$330

**NB: It is assumed that inventories are valued on a variable costing basis.**

c) **Prepare and present a cash budget for each of the four months**

	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>
<u>Receipts</u>				
Receipts from debtors (2 months credit)	23 040	31 200	52 560	55 188
Loan	<u>-</u>	<u>-</u>	<u>360 000</u>	<u>-</u>
	<u>23 040</u>	<u>31 200</u>	<u>412 560</u>	<u>55 188</u>
<u>Payments</u>				
Creditors (one months' credit)	11 700	10 800	10 800	11 475
Wages & variable of heads	13 650	14 625	17 550	17 550
Fixed overheads	3 600	3 600	3 600	3 600
Machinery	-	-	-	336 000
Interim dividend	-	-	-	37 500
Total payments	<u>28 950</u>	<u>29 025</u>	<u>31 950</u>	<u>406 125</u>
Net receipts (payments)	(5 910)	2 175	380 610	(350 937)
Balances b/d	<u>20 370</u>	<u>14 460</u>	<u>16 635</u>	<u>397 245</u>
Balances c/d	<u>14 460</u>	<u>16 635</u>	<u>397 245</u>	<u>46 308</u>

d) **Prepare a master budget for the four months to 30 June****Budgeted Trading and profit and loss account for the months to 30 June 2007**

	\$		\$
Sales			232 578
Less cost of sales			
Opening inventory of finished goods	31 350		
+ Production cost	<u>106 710</u>		
	138 060		
- closing inventory of finished goods	<u>26 730</u>		111 330
Gross Profit			121 248
<u>Less expenses</u>			
Fixed overheads (4 x 3 600)	14 400		
Depreciation:			
Machinery & equipment	47 199		
Motor vehicles	10 500		
Loan interest (2/12 x 7½% x \$360 000)	<u>4 500</u>		76 599
			44 649
<u>Less interim dividend</u>			<u>37 500</u>
			7 149
<u>Add retained profit b/d</u>			<u>122 520</u>
Retained profit c/f to next year			<u>129 669</u>
Budgeted Balance Sheet as at 30 June 2007			
<u>Property, plant and equipment</u>	<u>Cost</u>	<u>Depr.</u>	<u>NBV</u>
	\$	\$	\$
Land and Buildings	1 500 000	-	1 500 000
Machinery and equipment	708 000	300 699	407 301
Motor vehicles	<u>126 000</u>	<u>59 700</u>	<u>66 300</u>
	<u>2 334 000</u>	<u>360 399</u>	1 973 601
<u>Current assets</u>			
Inventory of raw materials	14 175		
Inventory of finished goods	26 730		
Debtor	124 830		
Cash and Bank	<u>46 308</u>		
	212 043		
<u>Less current liabilities</u>			
Creditors	11 475		
Loan interest owing	<u>4 500</u>	<u>15 975</u>	<u>196 068</u>
			<u><b>2 169 669</b></u>
<u>Financed By</u>			
Ordinary share capital \$3 shares fully paid			1 500 000
Share premium			180 000
Profit and loss account			<u>129 669</u>
			1 809 669
Secured loan (7½%)			<u>360 000</u>
			<u><b>2 169 669</b></u>



e) **Outline the uses of a cash budget**

- Objective of a cash budget is to ensure that sufficient cash is available at all times to meet the level of operations that are outlined in the various budgets.
- They can help a firm to avoid cash balances that are surplus to its requirements by enabling management to take steps in advance to invest the surplus cash in short-term investments.
- Cash deficiencies can be identified in advance and step can be taken to ensure that bank loans will be available to meet any temporary cash deficiencies.
- Overall aim is to manage the cash of the business attain maximum cash availability and maximum interest income on any idle funds.

**Zero-based budgeting**

It is a method of budgeting which seeks the justification for all expenses in each budget period. As the name states, zero-based budgeting starts from a nil base where each item of proposed expenditure must be justified before it is included in the budget. In this process of analysis every function in the organization is analyzed for its needs and costs so that ultimately a budget is then prepared based on the needs of the upcoming period, regardless of what the pattern of past expenditure has been.

**Activity –based budgeting**

In this method of budgeting, activities which incurred costs in every functional area of an organization are tabulated, defined and analyzed. A budget is then drafted based on the plans of the previous year and adjusted as may be necessary for increases and decreases in expenditure and income.

**Examination type questions**

**Multiple choice questions**

1. A unit of a product uses 3 kg of raw materials. The year's production budget is shown.

Budgeted sales	12 000 units
Increase in raw materials inventory	2 000 kgs
Decrease in finished goods inventory	1 000 units

What are the budgeted purchases of raw materials for the year?

- 35 000kg
- 36 000kg
- 38 000 kg
- 39 000kg

2. A company's inventory of finished goods is 10 000 units. It budgets to produce 110 000 units which, after sales, will increase its inventory to 20 000 units. This table shows the resources required for the budgeted production, and the available resources.

	<b>Resources required per unit</b>	<b>Resources available</b>
Material (kilos)	3.0	315 000
Direct labour hours	2.5	300 000
Machine hours	0.5	110 000

Market research has shown that the demand for the product will be 90 000 units. What is the principal limiting factor in this case?

Direct labour

Machine hours

Material

Sales

3. The table shows a company's estimated sales

	<b>Cash \$</b>	<b>Credit \$</b>
February	80 000	120 000
March	80 000	200 000
April	80 000	280 000

Debtors are expected to pay as follows:

60% in the month following sale

40% in second month following sale

How much cash from sales is received in April?

\$168 000

\$200 000

\$248 000

\$360 000

4. B Ltd plans to sell 12 000 units in January and 13 000 units in February. Sales will increase by 1 000 units each month thereafter. Production will be scheduled so that at any one time a inventory of finished goods equal to next month's sales will be held, and a inventory of raw materials equivalent to next month's required production. What will be the budgeted inventory, in units, at the end of March?

	<b>Raw Material (equivalent units)</b>	<b>Finished goods</b>
A	15 000	14 000
B	15 000	16 000
C	16 000	15 000
D	17 000	16 00

5. A company's debtors total \$126 000 when the debtors' days are 40. The company budgets in the coming year for a 30% increase in turnover and debtors' days reduced to 30. What will the budgeted debtors be at the year-end?

- A. \$129 231  
 B. \$122 850  
 C. \$94 500  
 D. \$72 693
6. A flexible budget is:  
 A. The only suitable budget for control purposes.  
 B. A budget analysed to fixed and variable elements.  
 C. Designed to show the appropriate expenditure for the actual production level.  
 D. A budget, which recognises different cost behaviour, patterns and is designed to change as the volume of output changes.
7. An extract from a company's sales budget for the year to 31 December 2007 is as follows

December 2006	60 000
January 2007	70 000
February 2007	55 000
March 2007	65 000

40% of its sales are expected to be for cash. Of its credit sales 70% are expected to pay in the month after sale and take a 2% discount, 27% are expected to pay in the second month after the sale, and the remaining 3% are expected to be bad debts.

The value of sales receipts to be shown in the cash budget for February 2007 is

- A. \$38 532  
 B. \$39 120  
 C. \$60 532  
 D. \$64 220

## Structured questions

### Question 1

Pado Manufacturers produces two products, Pado and Dopa from the raw material "Z" mixed with 6 glycerins "GL".

The following information relates to the 2008 budget:

Direct raw materials:	Z	\$6.00 per kg
	GL	\$3.00 per litre
Direct Labour		\$12.00 per hr

Direct labour hours are used for apportioning factory overheads.

Anticipated inventory levels for 2008 are:

	<b>Z</b> <b>Kg</b>	<b>GL</b> <b>litres</b>	<b>PADO</b> <b>units</b>	<b>DOPA</b> <b>units</b>
Opening inventory	10 000	5 000	200	500
Closing inventory	12 000	8 000	500	1 000

There is no opening or closing inventory of work in progress.

	<b>Pado</b>	<b>Dopa</b>
Expected sales (units)	10 000	20 000
Selling price/unit (\$)	450	630
Composition of the finished Products is as follows:		
Z	15 kg	25 kg
GL	10 litres	20 litres
Direct labour	12 hours	18 hrs

Based on the anticipated level of activity the following factory overheads will have to be incurred and are allocated on the basis of direct labour hours.

	\$
Variable	1 921 140
Fixed	738 900

Opening inventory of finished goods budgets for Papado Manufacturers for the year ended 31 December 2008.

- SALES BUDGET (UNITS AND VALUE)
- Production budget (units)
- Direct raw materials usage budget (units & value)
- Direct raw materials purchases budget
- Direct raw materials purchases budgets (\$)
- Direct labour budget (hours & value)
- Manufacturing overheads budget (value)

## Question 2

Union Ltd. has been requested to submit a cash budget for the next three months by the bank in order for them to access their overdraft facility. You have been approached by Mr. David Mazura, the Managing Director of the company to assist in the preparation of the cash budget. He provides you with the following:

	<u>Cash Sales</u>	<u>Credit Sales</u>	<u>Total</u>
	\$	\$	\$
Aug	300 000	10 000	310 000
Sept	340 000	30 000	370 000
Oct	420 000	50 000	470 000

He advised you that his mark-up is 25% on cost and inventory on hand is \$40 000 on 1 August and would increase his inventory holding by 10% each month; his debtors and creditors were \$8 000 and 200 000 respectively and the bank balance on 1 August is \$30 000.

His monthly payments are as follows:

	\$	
wages		50 000
telephone		5 000
rent		4 000

You also establish that debtors pay in the following month of sale and creditors are paid in the month of purchases in order to take advantage of a 2½% cash discount.

He advises that he plans to purchase a new motor vehicle in August for \$140 000, \$5 000 would be allowed on the old vehicle. Depreciation is to be provided at the rate of 20% per annum on cost. The old vehicle cost \$10 000 and its accumulated depreciation is \$5 600.

### Required

1. Prepare a cash budget for each of the months of August, September and October 2000.
2. Prepare a projected income statement for the three months ended 31 October 2000

### **Question 3**

Sheeting C Ltd produces asbestos sheets from cement. 80% of the asbestos sheets are made in the month before sale. Each asbestos sheet requires 6 kgs of cement. The cement is purchased one month before it is required for production and suppliers allow the company one month's credit. 50% of sales are for cash and the remainder on one month's credit. Sales for eight months ending 31 July 2006 are forecast as follows:

	Number of asbestos sheets	Price (\$)
2005 December	2 300	48
2006 January	2 000	48
February	2 500	48
March	3 500	60
April	5 000	72
May	7 000	72
June	9 000	72
July	8 000	72

The raw material presently costs \$15.60 per kilo, but a 10% price increase is expected in February. Prepare the following budgets:

- (i) a sales budget
  - (ii) a production
  - (iii) a materials purchase budget
- (b) What is a budget?
- (c) Explain the term 'principal budget factor'.

**Case studies**  
**Case study 1**

**PAPER 3 : CASE STUDY**

**TIME : 2 Hours 30 Minutes**

**INSTRUCTIONS TO CANDIDATES**

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question. All accounting statements are to be presented in good style. Workings should be shown. Questions 26 and 3 must be answered in sentence form, not in note form, with supporting figures.

You should read the instructions at the top of page 291 before answering the questions. You may use a calculator.

The businesses in this question paper are intended to be fictitious.

Each scenario in this case study describes an event in the life of a business and is followed by a question. Answer **ALL** questions. The questions should be answered in the order in which they are set

**Scenario 1:** A partnership business is dissolved.

Maxwell, Keith and David are brothers who have been in a partnership business for some years, sharing their profits and losses in the ratio of 3:2:1 respectively. On 31 December 2000, they dissolve the partnership in order to run their businesses individually. The balance sheet on the dissolution stands as:

	<u>COST</u>	<u>ACC. DEP</u>	<u>NBV</u>
<u>PROPERTY, PLANT AND EQUIPMENT</u>	\$	\$	\$
Plant & Equipment	75 000.00	39 000.00	36 000.00
Motor Vehicles	54 000.00	45 000.00	9 000.00
Office Fittings	9 000.00	7 200.00	1 800.00
	138 000.00	91 200.00	46 800.00
Current Assets			
Inventory		63 000.00	
Debtors		19 200.00	
Bank		11 400.00	
		93 600.00	
<i>Less</i> Current Liabilities – Creditors		8 100.00	<u>85 500.00</u>
			132 300.00
<i>Less</i> Loan from Maxwell			<u>15 000.00</u>

			<u>117 300.00</u>
Financed by			
Capitals	:		
		Maxwell	60 000.00
		Keith	30 000.00
		David	6 000.00
			96 000.00
Current Accounts:			
		Maxwell	12 000.00
		Keith	15 000.00
		David	(5 700.00)
			<u>21 300.00</u>
			<u>117 300.00</u>

- David took over his car, which he was using at an agreed valuation of \$12 000.00. The remaining assets realized the following amounts on 01 January 2001.

\$

Plant and Equipment	30 000.00
Motor vehicles	15 000.00
Office Fittings	1 200.00
Inventory	72 000.00
Debtors	18 600.00

Creditors received \$7 878.00 in full and final settlement. Dissolution expenses amounted to \$2 400.00.

### Question 1

- Prepare the following accounts to record the dissolution:
  - a) The realisation account [8]
  - b) The partners' capital accounts in columnar form [8]
  - c) The firm's bank account. Partners should either pay in or receive from the bank relevant amounts to close their capital accounts. [9]

**Scenario 2:** A company is formed.

After running their private enterprises for two years Maxwell, Keith and David decided to come together once more but this time to form a private company in order to combat the problems of a partnership business and those of sole proprietorship. They register a private company, Brothers Unlimited (Pvt) Ltd to acquire each of their individual businesses. The company has an authorised share capital of \$1 750 000.00 divided into shares of \$1 each. 1 250 000 shares have been issued and fully paid.

The assets and liabilities taken over by the company and the amounts paid are listed below:

	<u>MAXWELL</u>	<u>KEITH</u>	<u>DAVID</u>
	\$	\$	\$
Premises	187 500.00	200 000.00	225 000.00
Delivery Vehicles	17 500.00	25 000.00	150 000.00
Furniture and Fittings	67 500.00	32 500.00	32 500.00
Inventory	20 000.00	17 500.00	30 000.00
Creditors	15 000.00	20 000.00	17 500.00
Purchase Price	337 500.00	250 000.00	525 000.00

Brothers Unlimited [Pvt] Ltd secured an overdraft and purchased a warehouse for \$1500 000.00. Preliminary expenses of \$25 000.00 were paid. After the formation of the company, trading activities commenced on 01 January 2003.

### Question 2

- a) Prepare the opening balance sheet of Brothers Unlimited [Pvt] Ltd as at 01 January 2003.  
[15]
- b) As a financial advisor, would you have recommended that the company get an overdraft to purchase the warehouse? Give reasons for your answer. [5]

**SCENARIO 3:** One of the directors questions the advantages of a company.

At a board meeting, one of the directors questions the life span of their company business, highlighting that the three directors wound up the partnership business and also failed to sustain their individual sole traders businesses, but hope to sustain the company business.

### Question 3

- a) As the business consultant, write a report to the directors of the company outlining the characteristics, advantages and disadvantages of each type of business enterprise in question. [25]
- b) Define the term 'over-trading' and outline its dangers. [ 5 ]

**SCENARIO 4:** Brothers Unlimited [Pvt] Ltd want to increase their overdraft.

The company, Brothers Unlimited [Pvt] Ltd finds that trading over the last two years has been very successful and feels that having achieved good results, it is now time to request an increase in the overdraft facility.

In the past, the bank has been willing to offer business overdraft facilities and at present, there is an agreed limit of \$75 000.00. On 01 May 2005, the overdraft stands at \$25 000.00. In order to support the company's request for the increased over-draft, a forecast income statement for the four months ended 31 August 2005 has been produced.



	MAY	JUNE	JULY	AUG
	\$	\$	\$	\$
	'000'	'000'	'000'	'000'
Sales	370	140	580	840
Cost of sales	255	60	390	505
Gross Profit	115	80	190	335
Less Rent	[20]	[20]	[20]	[20]
Other expenses	[40]	[15]	[50]	[70]
Depreciation	[25]	[25]	[25]	[25]
Net Profit	30	20	95	220

The Bank Manager has asked for a cash budget to be submitted in addition to the above Income Statement.

The following additional information concerning the business is available.

- Rent is paid quarterly in advance on the first day of May, August, November and February.
- All other expenses are paid in the month in which they are incurred.
- Purchases for the period are expected to be:-

May	\$300 000.00
June	\$600 000.00
July	\$200 000.00
August	\$215 000.00

These will be paid for in the month of purchase. Purchases will be unusually high in May and June because they will be subjected to a special reduction of 3% of the amounts quoted.

- 80% of the sales are on a credit, payable two months later. Sales in March were \$440 000.00 and in April were \$420 000.
- A workers' compensation payment of \$50 000.00 to a former employee for an industrial injury, not covered by insurance, is due to be paid in May.

#### Question 4

Prepare a forecast budget on a month-by-month basis for the period May to August 2005. [25]

#### Case study 2

The case study on pages 2 to describes a series of events in the life of a business. The question that follows each scenario should be answered in the order in which they are set.

#### SCENARIO 1

Interior deco Ltd has been in business for several years. They are considering expanding their market by manufacturing for export. You are provided with the following information:

	\$
Inventory at 31 March 1994:	
Raw materials	14 000
Finished goods (as transferred from factory)	58 080
Work in progress	55 760
Raw materials purchased	202
	200
Direct factory wages	158
	000
Indirect factory wages	58 800
Indirect factory materials	15 600
Factory maintenance and repairs	38 960
Factory heat, light and power	56 520
Sales	903
	680
Head office administrative expenditure	93 160
Selling and distribution expenditure	71 564
Freehold buildings: At cost	180
	000
Provision for depreciation:	27 000
Plant and machinery: At cost	656
	000
Provision for depreciation	360
	800
Debtors	80 036
Creditors	38 400
Balance at bank	17 680
Ordinary shares of \$1 each, fully paid	240
	000
Share premium account	120
	000
Retained earnings	61 200
Provision for unrealised profit	5 280

#### Additional information

- i. Raw materials at cost at 31 March 2005 are \$11 640
- ii. Inventory of finished goods at 31 March 2005, as transferred from the factory amounted to \$74 008.
- iii. Work in progress, at cost, at 31 March 2005 has been valued at \$66 000.
- iv. All goods produced are transferred from the manufacturing account to the trading account at cost plus 10%.
- v. Depreciation is provided for annually on the cost of property, plant and equipment as follows:
 

Freehold property	2½%
Plant and machinery	10%

 Freehold property depreciation is apportioned to the factory and to the administration.

- vi. The board of Interior Deco Ltd is recommending that a dividend of \$0.80 per share be paid for the year ended 31 March 1995.
- vii. Owing to a temporary lack of orders, the company's factory has been facing a period of 50% working during the last four months of the year. At a board meeting, the directors are considering if they should accept an export order at a price which would only cover factory costs. The order, if accepted, would provide two months' work for the factory.

### Question 1

- a) Prepare a Manufacturing, Trading and Profit and Loss Account for the year ended 31 March 1995. [12]
- b) A balance sheet as at 31 March 1995. [7]
- c) A report to the board of Interior Deco Ltd outlining the relevant factors when making a decision whether to accept the export order or not. [6]

### SCENARIO 2

Over the past two years, the country has been facing a challenging economic environment and this has had an adverse impact on the company's performance. Trading losses have been realised and no dividends have been paid. The following is the balance sheet of Interior Deco Ltd as at 30 June 1997.

	\$' 000	\$' 000
Goodwill		350
Property, plant and equipment		<u>4 550</u>
		4 900
<u>Current Assets</u>		
Inventory	224	
Debtors	560	
Bank	<u>42</u>	
	826	
Creditors	<u>294</u>	<u>532</u>
		<u>5 432</u>
<u>Financed by</u>		
Share Capital and Reserves		
Ordinary shares of \$7 each		7 000
Profit and loss a/c		<u>(1 568)</u>
		<u>5 432</u>

The following capital reduction scheme is on July 1997:

- i. Goodwill is considered to be valueless.
- ii. The value of tangible property, plant and equipment is to be reduced by \$1 050 000.
- iii. Inventory which had cost \$70 000 is now valueless.

- iv. Included in the debtors figure is an amount of \$112 000 from a customer who has now become insolvent.
- v. To eliminate the debit balance on the Profit and Loss Account, it has been proposed that each shareholder will receive one ordinary share with a nominal value of \$3.85 for every \$7 share currently held.
- vi. As a result of improved efficiency and the introduction of new products, the company can look forward to annual net profits of \$350 000. The future dividend policy is that dividends will be covered twice by earnings.

### Question 2

- a) Prepare the balance sheet of Interior Deco Ltd., as it will appear immediately after the capital reduction on 1 July 1997. [10]
- b) Explain the reasons why the shareholders are likely to agree to the reduction in the nominal value of their shares. [5]

### SCENARIO 3

The directors of Interior Deco Ltd are hopeful that after the capital reconstruction, cash will be available to expand the business operations through the purchase of capital equipment. The following data relates to the forecast period 1 July 1997 to 31 December 1997. The budgeted sales of their stock for the period is shown below:

Months	July	Aug	Sept	Oct	Nov	Dec
Units	700	800	800	900	1 000	1 200

Budgeted unit costs are:	\$
Direct material	27
Direct labour	36
Variable overheads (other than selling expenses)	18
Fixed overheads	27
Selling expenses	27

The selling price per unit is \$225.

- i. 80% of sales are on credit. Of that figure, it is expected that 70% will be paid for during the month following sale and will attract a 2½% discount. The remainder of credit sales will be paid for 2 months after sale. Bad debts are anticipated to be 2% of total monthly sales. Cash customers are allowed a discount of 3%.
- ii. Production each month is planned to meet the following month's sales, whilst purchases of direct materials meet the following month's production. All suppliers are to be paid the month after purchase, to qualify for a 2% discount.
- iii. Wages are paid in each month of production. A bonus of \$9 per unit is paid on production of over 800 units.
- iv. Variable overheads and selling expenses are paid in the month after production.
- v. Annual fixed overhead is \$302 400. Equal amounts are paid each month with the exception of rent, which is paid quarterly, commencing in August each year. Included in

the fixed overhead is \$108 000 per annum for depreciation and \$44 280 per annum for rent.

- vi. New machinery costing \$135 000 will be purchased in September. A deposit of 20% is to be paid in September and the remainder over 12 months in equal interest-free monthly installments beginning in November.
- vii. At the end of August, there is a bank overdraft of \$72 000.

### Question 3

- a) Draw up a cash budget for the months of September, October and November. [20]
- b) Explain why a business would prepare a Cash Budget. List the steps to be taken if the Cash Budget highlights future cash shortages. [5]

### SCENARIO 4

On 1 January 1998, an audit of the company's property, plant and equipment was carried out, particularly the machinery used in the factory. The machinery register contained the following information:

Serial Number	Cost Price	Net Book Value
11	\$60 000	\$27 600
12	\$67 500	\$31 050
13	\$75 000	\$48 000
14	\$70 000	\$57 400
15	\$60 000	\$49 200

All machines are depreciated over 5 years using the straight-line method of providing for depreciated. A full year's depreciation is charged on all machines at the end of the financial year, and none is charged at the end of the year in which they are sold. Residual value is assumed to be 10% of cost price, after 5 years. On 1 March 1998, machine number 16 was purchased from Singer Ltd. at a cost price of \$59 000, less \$20 000 for machine number 2 which was traded in.

### Question 4

- a) Draw up the Machinery Account, Machinery Disposal Account and the Provision for Depreciation Account for the year ended 31 December 1995 showing the opening balances on 1 January 1996 where applicable. [16]
- b) Calculate the difference in the profit or loss shown in the machinery disposal account in (a) if machine number 11 had been depreciated at 40% per annum on the reducing balance method. A full year's depreciated was charged in the year of purchase, but none was charged in the year of sale. [5]
- c) Explain why property, plant and equipment are depreciated. [4]

# CHAPTER 6

## STANDARD COSTING & VARIANCE ANALYSIS

### Chapter objectives

After studying this chapter *the student should be able to:*

1. Define standard costing and a standard cost
2. Outline the different types of standards
3. Explain how standard costs are set
4. Explain the meaning of standard hour and standard cost
5. Define basic attainable current and attainable standard
6. Identify and explain the purpose of a standard costing system
7. Calculate labour rate + usage variances materials usage and price variances, total cost variances, sales volume and price variances and labour rate and efficiency variances
8. Identify the causes of labour, material, overhead and sales variances
9. Reconcile budgeted profit and actual profit

### Introduction

Standard costing is “a financial control system that enables the deviation from budget to be analyzed in detail thus enabling costs to be controlled more effectively” Drury (2004, 725) In the use of a standard costing system estimate of costs and revenues are established beforehand in the budgeting process and there predetermined costs are compared with actual costs at the end of the period in question. The predetermined costs are known as the standard costs which are expected to be incurred under efficient operating conditions. Standard costs are based on a per unit of activity whilst budgeted costs are based on the entire activity or operation.

When standard costs are compared with actual costs and differences between the two will almost surface certainly those differences are known as a variances Management can then focus on those deviations or variances that impact negatively on operations i.e. adverse variances in a system of variance analysis, whereby differences in actual and standard costs is examined in its elements.

Standard hour: is the time taken for a given quantity of work to be completed, allowing for relaxation under efficient working conditions.

### Types of standards

#### 1. Ideal Standard

These are standards that assume there will be no wastage and inefficiency no work and disturbances. Ideal standards represent perfect performance and are superficial standards which are not realistic. If applied, such standards often lead to a demotivated workforce.

#### 2. Basic standard

These are standards which were set years ago and have remained unchanged for a long time. Since basic standards do not represent current costs, they are seldom used. However basic

standards are used to compare actual costs with the same standard over time, so as to establish efficiency trends.

### **3. Attainable standards**

These are standards that make allowance for normal expected losses but at the same time present a challenge to meet targets. They are achievable under generally efficient working conditions and can act as a strong motivational force to beat the target, thus improving productivity.

### **4. Current Standard**

This standard is based on present levels of activity

### **Variance Analysis**

Standard costing enables management as explained earlier to identify more quickly problem areas which need investigation, thus facilitating management by exception, which is the practice of focusing attention on those activities that negatively affect the budget and ignoring those that conform to the budget. For each element of cost, there is quantity and price to be considered, for labour we consider hours and rate. An adverse variance (A) occurs when actual costs are greater than budget costs and a favourable variance (F) occurs when budgeted costs are more than actual costs. An adverse variance (a) can also be referred to as unfavorable variance (u).

### **Purposes of standard costing**

- a) Assist managers in budgetary planning – compilation of budgets.
- b) Simplifies inventory valuation – inventory can be valued at standard cost.
- c) Provides a yardstick against which actual performance can be measured, variance analysed, and corrective action taken or plans reviewed.
- d) Sets target that managers and employees may be motivated to achieve.
- e) Forces managers to evaluate their methods of operation.
- f) Provides a prediction of future costs that can be used for decision-making purposes.

### **Advantages of standard costing**

- a) Predetermined standards are comparable with the actual performance, showing separately adverse or favourable variances, thus useful control information is provided.
- b) The business entity is able to identify the effects of changes in selling prices, sales volumes, wage rates and other factors.
- c) Enables the distinction of gains or losses caused by market fluctuations and those related to the firm, thus cost consciousness is stimulated.
- d) Enables the application of the principles of 'management by exception'. This will mean less time spent by management sifting through unnecessary information, but focus attention on essential issues.
- e) Enables the identification of variances and the investigation of the causes.
- f) Motivation can be improved because of the existence of clear targets.

**Direct material cost variance**

It is the difference between budgeted direct material cost and actual direct material cost for a given level of output. The variance is made up of two components: the price at which we purchase our direct materials and how efficient we use the direct materials.

**Direct material price variance**

It is that difference in standard direct material cost and the actual direct material cost due to several factors impacting on fluctuating prices.

Formula:  $(SP - AP) \times AQ$

Where: AQ is actual quantity purchased

AP is actual purchase price

SP is standard price &

SQ is budgeted quantity of materials

The following can cause material price variance:

1. Wrong standards (*errors made when costs were estimated*)
2. Inflation and deflation
3. Suppliers changing prices.
4. Different quality and type of materials used or compared to budget.
5. Effects of foreign currency exchange rates on imported materials.

Please note:

- If we do not buy anything during the period under review there is no material price variance
- When  $SP = AP$  this has no impact on the budgeted profit

**Direct material usage variance**

It is that part of the direct material cost variance which is caused by using different quantities of direct materials for a given level of output from the budgeted usage. The starting point is to identify actual production.

Formula:  $(SQ - AQ) \times SP$

Direct material quantity variance may be caused by:

1. Errors made when standards are determined
2. Poor/good control in the use of materials
3. Better/poor quality materials resulting in higher/lower output
4. Poor machinery
5. Theft of materials
6. Deterioration of materials
7. Careless handling of materials by production personnel.
8. Changes in quality control requirements.
9. Changes in methods of production.

**Example 1**



The standard quantity of material A is 2 000 kilograms at a standard price of \$4 per kg is allowed for the production of 1 unit of product X. The cost information for a given period shows that 1 920 kilograms of material A had been purchased at \$3 per unit were used for the production of X.

Required:

Calculate the direct material price variance.

Solution

$$\begin{aligned}\text{Direct material price variance} &= (\text{AQ X AP}) - (\text{AQ X SP}) \\ &= (1920 \text{ X } \$3) - (1920 \text{ X } \$4) \\ &= 1920 \text{ F ( Actual price is lower than standard price)}\end{aligned}$$

Adverse-actual cost is greater than standard cost.

Favourable - actual cost is less than standard cost.

$$\begin{aligned}\text{Material quantity variance} &= (\text{AQ X SP}) - (\text{SQ X SP}) \\ &= (1920 \text{ x } \$4) - (2000 \text{ x } \$4) \\ &= \$7680 - \$8000 \\ &= \$320\text{F (Actual quantity purchased and used was less than the quantity allowed)}\end{aligned}$$

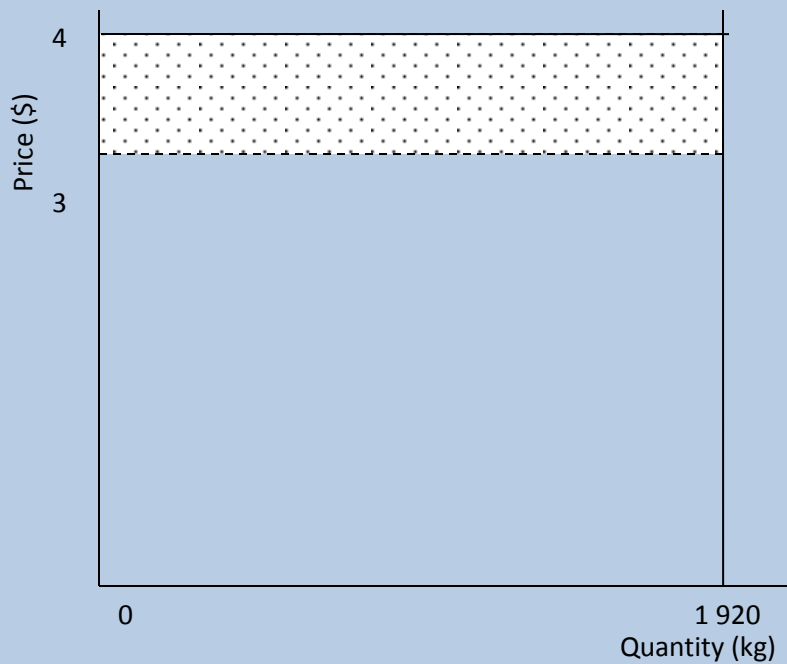
\*SQ=1000 units x 2kg per unit =2000 kg

$$\begin{aligned}\text{Total material variance} &= \text{Material purchase price variance} + \text{Material quantity variance} \\ &= \$1920\text{F} + \$320\text{F} \\ &= \underline{\underline{\$2240\text{F}}}\end{aligned}$$

$$\begin{aligned}\text{Alternatively: Total material cost variance} &= (\text{SQ X SP}) - (\text{AQ X AP}) \\ &= \$2000 \text{ x } 4 - (\$1920 \text{ x } 3) \\ &= \underline{\underline{\$2240\text{F}}}\end{aligned}$$

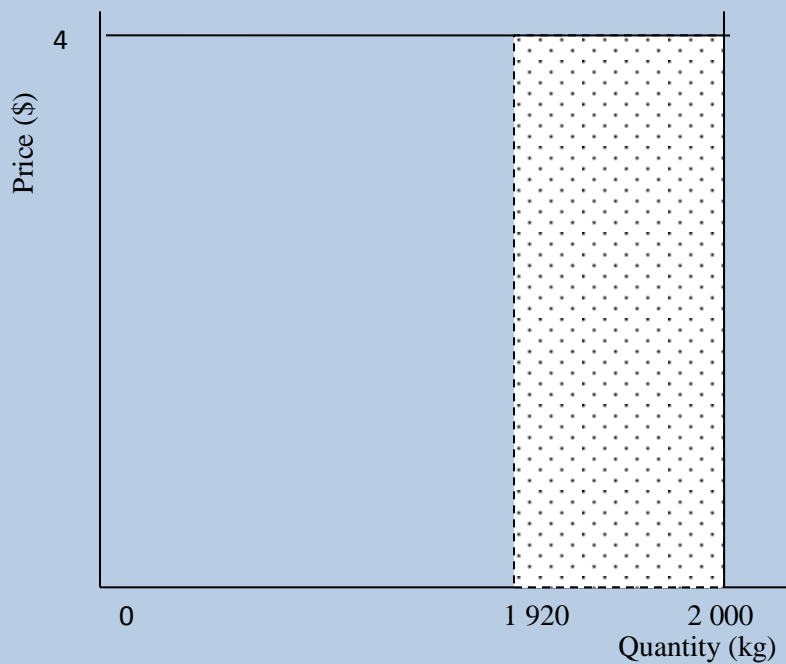
This information can be shown diagrammatically as follows:

Material price variance



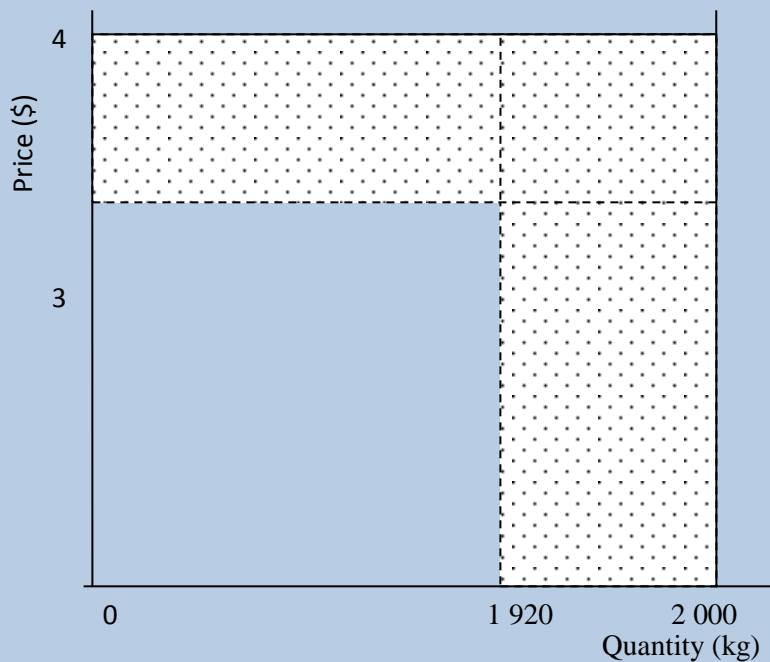
- The shaded area represents the material price variance. It extends to the price line and not the quantity line. The solid line is the standard cost line and the broken line is the actual cost line.
- If the shaded area is inside the standard cost line it is a favourable cost variance otherwise it is an adverse cost variance

#### Material usage variance



- The shaded area shows material usage variance as it extends along the quantity line.
- It is a favourable material usage variance as the shaded area is inside the standard cost line.

The total material variance is a combination of the material usage variance and the material price variance as shown below.



Note: when both variances are favourable or adverse, a common shaded area is formed. The total variance can be calculated as:

Direct material usage variance	80 x 4	=	320F
Direct material price variance	1 x 2 000	=	<u>2 000F</u>
			2 320F
Less common area (A)	1 x 80	=	<u>80</u>
Total material variance			<u>2 240F</u>

Both the material price variance and the material usage variance are favourable since they are inside the standard cost line and the standard quantity line (the solid line).

## Direct labour cost variance

It is the difference between budgeted direct labour cost and actual labour cost for a given level of activity. It is made up of two main variances: the direct labour rate variance and the direct labour efficiency variance

## Direct labour rate variance

It is mainly caused by paying the labour force a rate that is different from the standard one.

### Procedure:

1. Identify the standard rate from the standard cost information
2. Identify the actual labour hours worked
3. Multiply 1 and 2 above to give you how much was supposed to pay the employees .
4. Calculate the actual bill (*actual rate x actual labour hours*)
5. Find the difference between 3 and 4 to give you the direct labour variance.

The following formula can also be used:  $(SR - AR) AH$

Where: SR	=	standard or budgeted rate
AR	=	actual rate
AH	=	actual hours
SH	=	budgeted or standard hours

## Example 2

The following is a standard cost card for part JB and actual results for the month of December.

Direct raw materials (20 kg @ \$2.50 per kg)	\$50.00
Direct labour (7 hrs @ \$2.75 per hr)	<u>\$19.25</u>
	\$69.25

Actual results were as follows:

### Production

Direct material purchased - 3 500 kilograms at cost	\$9 100
Opening inventory of direct materials	650 kilograms
Closing inventory of direct material	425 kilograms
Wages paid (1010 hours)	\$2 929

Required: Calculate the direct labour rate variance

### Solution

1. The standard rate is \$2.75
2. Actual labour hours worked 1 010

$$3. \$2.75 \times 1010 = \$2\,777.50$$

$$4. \text{ Actual wage bill} = \frac{\$9100 \times 1010}{3500}$$

$$= \$2626$$

$$\text{AR} = \frac{2\,999}{1\,010} = 2.9$$

$$5. \text{ Direct labour rate variance} = \frac{\$(2.75 - 2.9)1\,010}{\$151.5A}$$

This is an adverse variance as the AR is greater than SR.

$$\text{Alternatively: } (2.75 \times 1\,010) - 2\,929 \\ 2\,777.5 - 2\,929 \\ \underline{\$151.5A}$$

### Causes of direct labour rate variance

1. The use of higher or lower skilled workers.
2. Changes in wage rates – the intervention of trade unions, not yet reflected in standard wage rate.
3. Overtime or premium rates paid which were unexpected at budget time.

### Direct labour efficiency variance

It measures the efficiency of the labour force in producing a given quantity. If it took the work force more hours than necessary it means they are less efficient and vice-versa.

#### Procedure:

1. Identify the actual output.
2. Identify the direct labour hours per unit from the standard cost information.
3. Multiply 1 by 2 above to give you the standard labour hours.
4. Identify the actual labour hours.
5. Find the difference between 3 and 4 above
6. Multiply value in 5 above by the standard rate to get the direct labour efficiency variance.

The following formula can also be used:  $(SH - AH) AR$

### Example 3

Using the above information in *Example 2*, calculate the direct labour efficiency variance.

**Solution**

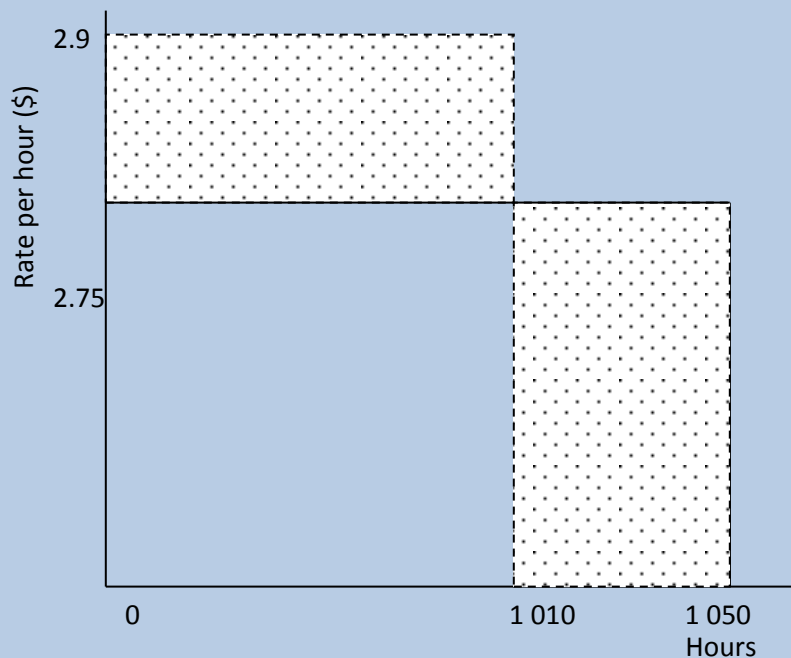
1. the actual output is 150 units
2. the direct labour hours is 7
3. 150 units x 7 hours =1050 hours
4. Actual labour hours =1010 hours
5. Difference between 3 and 4 = (1050 – 1010 )hrs  
= 40 hrs
6. Direct labour efficiency variance = 40 hours x \$2.75  
=\$110F

Therefore Direct labour Cost Variance =Direct labour rate variance +direct labour efficiency variance

$$= \$151.5A + 110F$$

$$= \$41.5A$$

The total labour variance of the above examples is shown below diagrammatically:



Total direct labour variance is calculated as follows:

Direct labour rate variance	=	1 010 x 0.15	=	151.5A
Direct labour efficiency variance	=	40 x 2.75	=	<u>110F</u>
Total direct labour variance	=		=	<u>41.5A</u>

The direct labour rate variance is adverse since the shaded area is outside the standard rate line and the direct labour efficiency variance is favourable since the shaded line is inside the standard hour line.

NB: when the variances are such that one is favourable and the other is adverse, there is no common area as is shown in the above diagram.

### Causes of direct labour efficiency variance

1. The use of higher or lower grade of skilled worker.
2. Type of machinery; poor or good.
3. Working method.
4. Quality control procedures.
5. Working conditions.
6. Use of inferior quality materials.

### Sales Variances

Apart from cost variances, are sales variances. Sales variances consist of three variances namely total sales margin variance, sales price variance and sales volume variance.

#### Total sales margin variance

It is the summation of price and volume variances. Alternatively it can be determined by the formula

$$\text{Total sales variance} = \text{AQ} (\text{AP}-\text{SC}) - \text{BQ} (\text{SP}-\text{SC})$$

$$\text{Price variance} = (\text{AP}-\text{SP}) \times \text{AQ}$$

$$\text{Volume variance} = (\text{AQ} - \text{SO}) \times \text{standard contribution per unit}$$

AQ = Actual quantity

AP = Actual price

SC = Standard cost

SP = Standard price

BQ = Budget quantity

### Example 4

From the following budgeted and actual sales data of Langa (PVT.) Ltd. you are required to calculate the following variances.

- (a) Total sales variance
- (b) Sales price variance
- (c) Sales volume variance

#### Budget data:

Budget sales quantity 30 000

Budget selling price \$19 per unit

Budgeted variable production cost \$13 per unit

**Actual results:**

Actual sales quantity	33 000
Actual selling price	\$18 per unit
Actual variable production cost	\$11 per unit.

(a) Total sales margin variance =  $AQ (AP - SC) - BQ(SP - SC)$   
=  $33\,000 (\$18 - \$13) - 30\,000 (\$19 - \$13)$   
=  $165\,000 - 180\,000$   
=  $\$15\,000A$

(b) Price variance =  $(AP - SP) \times AQ$   
=  $33\,000(\$18 - \$19) = \$33\,000A$

(c) Sales Volume =  $(AQ - SQ) \times \text{Standard contribution per unit}$   
=  $\$19 - \$13 (33\,000 - 30\,000)$   
=  $\$18\,000F$

**Causes of sales variance****Price**

1. Quantity discounts.
2. Price reduction due to competition or as a penetrating strategy.
3. Price increases.
4. Price controlled by the state.

**Sales volume variance**

1. Competition within the market.
2. Changes in consumer tastes
3. Change in marketing strategies.
4. Defect products.
5. Seasonal variations.

**Inter-Relationship of Variances**

Often there is a relationship in the various types of variances reported. For instance a favourable labour rate variance could consequently result in an unfavourable materials usage variance due to the employment of unskilled labour which does not have the expertise of producing the required standard product, thus leading to material wastage. In the examination you may be required to establish a link between various variances reported. When required to suggest causes of variances, your suggestions must be reasonable. You are discouraged from making assumptions which cannot be substantiated by information provided in the question, and when you do make assumptions, state clearly that it is important to note that often variances arise due to fundamental errors made in the budgeting process.

**Fixed and Flexible budgets****Fixed budgets**

It is a budget which is made without regard for potential variations in business activity. It has no allowances for changes in budgeting needs and is prepared for a specific level of performance. Invariably, a fixed budgets is “the master budge which is based on forecast and



predictions of sales at a certain level of activity with the resulting costs incurred applicable to that level of sale' Storey (; 283)

As budgets are not always achieved, it becomes difficult to compare the fixed budget set at one level of activity, with actual results achieved at a different level because of the nature of costs other than fixed costs which tend to behave in relation to sales/output. A budget for the actual level of activity has therefore to be drafted to enable this comparison thus, a flexed budget or flexible budget.

A flexed budget is a budget that changes in response to changes in activity in terms of sales turnover and output. In other words, it is a budget that adjusts for flexes or changes in the volume of activity and is therefore more useful as a control tool in variance analysis.

### **Flexing the budget**

A budget can be flexed by multiplying the budgeted price by the actual level of activity. Where costs are semi-variable the high-low method can be used to establish the fixed cost element so that budgeted variable costs can be multiplied by the actual output quantity. Fixed costs will remain the same.

The reconciliation statement will assume this format

Budgeted profit	\$	\$
Budgeted profit		xxx
<u>Add favourable variances</u>		<u>xxx</u>
		xxx
<u>Less adverse variances</u>		xxx
Actual profit		—
		<u>xxx</u>

Example 6 (follows)

### **Disadvantage of standard costing**

1. In situations where the market is not stable, production methods and costs may change rapidly such that standards quickly come out of date and lead to a demotivated workforce.
2. Standard costing concentrates on financial factors and ignores important non-financial factors such as quality, customer satisfaction management style etc.
3. It may be expensive and time consuming to install and keep a system of standard costing up to date.

### **Example 5**

ABM Electronics makes and sells a range of electric motors. The following is a budget for one of its latest models for the month of March 2004.

Standard production

Budgeted production/ sales 300 units

\$

Direct materials	120 000
Direct labour	420 000
Variable overheads	<u>360 000</u>
	900 000

During March 2004, 280 units were produced and the following actual costs were incurred.

\$

Direct materials	115 000
Direct labour	450 000
Variable overheads	<u>290 000</u>
	855 000

You are required to :

- Prepare a flexed budget.
- Calculate the variance.

**Solution**

	Standard cost	Actual cost	Variance
	\$	\$	\$
Direct materials	112 000	115 000	3 000A
Direct labour	392 000	450 000	58 000A
Variable overhead	336 000	290 000	46 000F
	840 000	855 000	15 000A

Flexing the budget leads to a realistic computation of variances to enable management to take corrective measures to deal with variances which do not conform to the budget.

**Reconciliation of actual and budgeted profit****Example 6**

BJC Ltd. produces a product called a Canon. The standard selling price and the manufacturing costs of this product are as follows:

	\$
Standard selling price per unit	286

Standard production costs:

Direct materials (1.5 kilos @ \$50 per kilo)	75
Direct labour (50 minutes @ \$120 per hour)	100
Variable overheads (1.5 kilos @ \$40 per kilo)	60
	235
	235

The projected production and sales for December 2000 were 485 units. On 1 January 2001 the following actual figures were determined:

Sales	510 units @ \$283 each
Production	510 units
Direct materials	760 kilos @ \$51.60 per kilo
Direct labour	410 hours @ \$119 per hour
Variable overheads	\$34 800

There was no opening or closing inventory of the product Canon

Required

- a) Prepare an actual profit and loss statement for BJC Ltd. for December 2000.
- b) Calculate the following variances.
  - (i) Direct material price variance
  - (ii) Direct material usage variance
  - (iii) Direct labour rate variance
  - (iv) Direct labour efficiency variance.
  - (v) Sales price variance.
  - (vi) Sales volume variance.
- c) Prepare a statement showing budgeted profit for December 2000.
- d) Prepare a statement reconciling the actual profits calculated in (a) above with budgeted profits calculated in (c) using variances calculated in (b).

- e) Write a report to the management outlining the factors to be considered when standards are being established.

Solution

Actual profit and loss statement for December

	\$	\$
Sales (510 x \$283)	144	330
<u>Less cost of sales</u>		
Raw materials (760 x \$51.60)	39	216
Direct labour (410 x \$119)	48	790
Variable overheads	<u>34</u>	<u>800</u>
Actual profit		21 524

- a) Calculation of variances

i. Material price variance = (SP – AP)AQ  
 $\Rightarrow$  (\$50 - \$51.60)760 = \$1 216A

ii. Material usage variance = (SQ\* – AQ)SP  
 $\Rightarrow$  (765 – 760)\$50 = \$250F

\*SQ should be flexed (510 units x 1.5 kgs)

iii. Labour rate variance = (SR – AR)AH  
 $\Rightarrow$  (\$120 - \$119)410 = \$410F

iv. Labour efficiency variance = (SH\* – AH)SR  
 $\Rightarrow$  (425 – 410)\$120 = \$1 800F

\*SH should be flexed (510 units x 50 mins)

v. Sales price variance = (AP – SP)AQ  
 $\Rightarrow$  (\$283 - \$286)510 = \$1 530A

vi. Sales volume variance = (AQ – SQ)SP  
 $\Rightarrow$  (510 – 485)\$286 = \$7 150F

c) Flexible budgeted profit and loss statement for December

	\$	\$
Sales (485 x \$286)		138 710
<u>Less cost of sales</u>		
Raw materials (510 x \$75)	38 250	
Direct labour (510 x \$100)	51 000	
Variable overheads	30 600	119 850
Budgeted profit		<u>18 860</u>

b) Reconciliation of actual and budgeted profit

		\$	\$
Budgeted profit			18 860
Add favourable	Material usage		250
variances:			
	Labour rate		410
	Labour efficiency		1 800
	Sales volume		<u>7 150</u>
			28 470
Less adverse	Material price	1 216	
variances:			
	Sales price	1 530	
	Variable overhead	4 200	(6 946)
Actual profit			<u><u>21 524</u></u>

**Work back from variances to standard cost**

The following data relates to actual output costs and variances for an accounting period of a company that makes a single product. There were no opening and closing inventory of work in progress.

Actual production	18 000 units
Actual costs incurred	\$000
Direct materials purchased and used (150 000kg)	420
Direct wages for 32 000 hrs	272
Variable production overhead	76

**Variances**

Direct materials price	30 (F)
Direct materials usage	18 (A)
Direct labour rate	16 (A)
Direct labour efficiency	32 (F)
Variable production overhead expenditure	12 (A)
Variable production overhead efficiency	8 (F)

A standard marginal costing system is operated.

- (a) Present a standard cost sheet for one unit of the product.

	\$
Direct materials 8 kg (W2) at \$3.00/kg (W1)	24 000
Direct wages 2 hrs (W4) at 8/hr (W3)	16.000
Variable overhead 2 hrs (W4) at \$2/hr (W5)	4.00
	44.000

**Workings:**

- Actual quantity of materials purchased at standard price = \$450 000 (actual cost + favourable materials price variance)  
 $\therefore$  Standard price = \$3.00 ( $\$450\,000 \div 150\,000\text{kg}$ )
- Material usage variance = 6 000kg ( $18\,000 \div \$3.00$  standard price).  
 $\therefore$  Standard quantity for actual production = 144 000 kg ( $150\,000 - 6\,000\text{kg}$ ).  
 $\therefore$  Standard quantity/ unit = 8 kg ( $144\,000\text{kg} / 18\,000$  units)
- Actual hours worked at standard rate = \$256 000 ( $\$272\,000 - \$16\,000$ )  
 $\therefore$  Standard arte/hr = \$8 ( $\$256\,000 \div 32\,000$  hrs).
- Labour efficiency variance = 4 000 hrs ( $\$32\,000 \div \$8$ )  
 $\therefore$  Standard hours of actual production = 36 000 hrs ( $32\,000 + 4\,000$  hrs).  
 $\therefore$  Standard hrs/ unit = 2 hrs ( $\$36\,000 \div 18\,000$  units)
- Actual hours worked at the standard overhead rate is \$64 000 ( $\$76\,000$  actual variable overhead less \$12 000 favourable expenditure variance)  
 $\therefore$  Standard variable overhead arte = \$2 ( $\$64\,000 \div 32\,000$  hrs).

**Examination type questions**

**Multiple choice questions**

- In a period 5220 hours were worked at a total cost of \$110 925. The labour rate variance was \$7 830 adverse and the labour efficiency variance was \$3 555 favourable. How many standard hours were produced:
  - 5 220
  - 5 400
  - 5 588
  - 5 421
- A manufacturing concern manufactures a motor vehicle component, Part No. 0082X and the following data is obtained for the month of August.

<b>Standard cost/ unit</b>	<b>\$</b>
Raw materials 50 kg @ \$5.00/kg	250.00
Direct labour 14 hrs @ \$9.50/ hour	133.00
Actual results for August	
Production	150 units
Direct materials purchases – 7 000 kgs	\$36 400
Opening stock of direct material	1 300 kg
Closing inventory of direct material	850 kg
Wages paid (2020 hrs)	\$19 796

Calculate the material usage and material price variances.

**Material usage variance**

**Material price variance**

- |                      |                   |
|----------------------|-------------------|
| 1. \$1400 adverse    | \$ 250 favourable |
| 2. \$ 250 adverse    | \$1400 favourable |
| 3. \$ 250 favourable | \$1400 adverse    |
| 4. \$1400 favourable | \$ 250 adverse    |

3. Based on data in question 3 above

Calculate the labour rate and labour efficiency variances

**Labour rate variance**

**Labour efficiency variance**

- |                     |                  |
|---------------------|------------------|
| 1. \$760 favourable | \$606 adverse    |
| 2. \$760 adverse    | \$606 favourable |
| 3. \$606 favourable | \$760 favourable |
| 4. \$606 adverse    | \$760 Adverse    |

The table shows variances taken from the profit statement of a company (F = favourable; A = Adverse)

		<b>\$</b>
1	Sales total variance	1 600F
2	Sales volume variance	2 400 F
3	Sales price variance	?
4	Materials total variance	1000 F
5	Materials usage variance	600 A
6	Materials price variance	?
7	Labour total variance	480A
8	Labour efficiency variance	2120 A
9	Labour rate variance	?

What is the effect **in total** of variances 3, 6 and 9 on the company's profit?

1. \$760A
2. \$840F
3. \$2 440A
4. \$2 440F

5. A sales budget for one product was based on 500 units at 450 per unit. The actual sales were 600 units for total sales revenue of \$29 250.

What are the sales volume and sales price variances?

	<b>Volume / \$</b>	<b>Price/ \$</b>
A	750 F	4 250F
B	4 250F	750F
C	5 000F	750F
D	5 000 A	750 F

6. A favourable material usage variance may result from
1. The labour being of a higher skill than the standard.
  2. The use of substandard material
  3. The employment of lower skilled labour
  4. Use of material of a better quality than the standard.
- A. 1 & 2  
 B. 1 & 3  
 C. 1 & 4  
 D. 4 Only
7. An adverse sales volume variance may occur because
- A. The goods have become unfashionable
  - B. Improved products have allowed prices to be increased
  - C. Prices have been reduced generally to increase sales volume.
  - D. Local competition from other firms may have increased.

- A A only  
 B C only  
 C B & C  
 D A & D

8. A company manufactures a product which requires 2 hours of direct labour per unit. Normal output is 1400 units. In one month, the company manufactured 1300 units of the product in 2 500 direct labour hours, costing \$35 100. The direct labour efficiency variance is \$1 300 favourable.



What is the standard labour rate?

- A \$13.00
- B \$14.20
- C \$12.54
- D \$13.50

9. The material price variance for a given product is \$158 400. What is the actual quantity material used if the budgeted material is 41 500 kg at \$36/kg and the actual cost of the material is \$39.60/kg.

- A 41 500 kg
- B 52 800 kg
- C 44 000 kg
- D 49 500 kg.

10. During trading period x 17 500 hours were worked at a standard cost of \$13.00 per hour. The labour efficiency variance was \$15 600 favourable. How many standard hours were produced?

- A 1 200
- B 16 300
- C 17 500
- D 18 700

11. NM uses a standard absorption costing system. The following details have been extracted from its March budget.

Fixed production overhead cost	\$96 000
Production (units)	4 800

In March, the fixed production overhead cost was under- absorbed by \$16 000 and the fixed production overhead expenditure was \$4 000 adverse.

Actual number of units produced was:

- A 3 800
- B 4 000
- C 4 200
- D 5 400

12. A company which operates a system of standard costing extracted the following details from the standard cost card in respect of direct materials:

8 kg at \$2.40/ kg = \$19.20 per unit

Budgeted production in January was 850 units

Actual materials purchased in January when production was 870 units:

8 200 kg at a cost of \$20 664

Materials use in production = 7 150 kg

Which of the following correctly states the materials price and usage variance to be reported?

Price	Usage
A \$858 Adverse	\$456 Adverse
B \$858 Adverse	\$840 Adverse
C \$858 Adverse	\$882 Adverse
D \$984 Adverse	\$456 Adverse

### Structured questions

#### Question 1

Oriental Ltd produces a single product BB3. The standard selling price and the manufacturing cost of this product are as follows:

Standard selling price	\$36
<u>Standard production costs</u>	
Direct material (1,2 Kilos at \$9 per kilo)	\$18.80
Direct labour (3 hours at \$4.50 per hour)	\$13.50
Fixed overheads	\$60 000

The budget production and sales for the month of July 2002 were 8 000 units. On 3 August the following actual figures were determined:

Production 9 000 units

Sales (9 000 units) \$351 000

<u>Less cost of sales</u>	
Direct material (12 000 kilos)	\$98 400
Direct labour (26 500 hours)	\$145 750
Fixed overheads	<u>\$60 000</u>
Net profit	<u>304 150</u>
	<u>\$46 850</u>

There was no opening inventory of the product.

#### **Required:**

(a) Calculate the following variances and their sub variances

- (i) Sales
- (ii) Direct material
- (iii) Direct labour.

(b) Prepare a statement reconciling the actual profit with the budgeted (*expected*) profit

**Question 2**

Leila Limited uses a system of standard costing. The following information relates to Period 1 when standard output was achieved.

	<b>Standard</b>	<b>Actual</b>
Price of material/litre	\$10.50	\$11.20
Usage of material/litre	220	200
Labour hours	45	48
Wage rate/ hour	\$37.10	\$35

(a) From the figures above, calculate the following variances stating clearly if it's an adverse or favourable variance.

- (i) Wage rate variance
- (ii) Labour efficiency variance
- (iii) Total direct labour variance
- (iv) Materials price variance
- (v) Materials usage variance
- (vi) Total materials variance

(b) When is a favourable labour variance and favourable materials variance not always desirable?

**Case Study****Case study 1**

The case study on page 2 describes a series of events in the life of a business. The questions that follow each scenario should be answered in the order in which they are set.

**SCENARIO 1**

Rail and Road have been in partnership for several years. They wish to inject more capital into the business by admitting Pathway. Before the admission of Pathway, Rail and Road shared profits and losses equally. Partnership salaries were Rail \$80 000 and Road \$120 000. Interest on capital was pegged at 10%.

On 31 March, they agreed to admit Pathway into the partnership, subject to the property being revalued to \$750 000 and goodwill valued at \$150 000 being incorporated into the books, both prior to the admission of Pathway. Pathway is to bring in \$200 000 cash.

The new partnership agreement is as follows:

- a) Profits and losses to be shared Rail  $\frac{3}{8}$  ; Road  $\frac{1}{2}$  and Pathway  $\frac{1}{8}$ .
- b) Salaries Rail - \$50 000 per annum  
                     Road - \$100 000 per annum  
                     Pathway - \$50 000 per annum
- c) Interest on capital – 10% per annum.

On 31 December 1995 the trial balance of the firm is as follows:

	\$	\$
Sales		2 500 000
Property	500 000	
Equipment	100 000	
Inventory-1 January 1995	150 000	
Purchases	2 000 000	
Wages	150 000	
Debtors	400 000	
Payment from Pathway		200 000
Capital - Rail		300 000
Capital - Road		300 000
Depreciation -equipment	20 000	
Provision for depreciation - equipment		40 000
Creditors		160 000
Drawings -Rail	100 000	
Drawings - Road	100 000	
Drawings - Pathway	75 000	
Rates	5 000	
Heat and light	10 000	
Administration	6 000	
Cash	75 000	
	<u>3 500</u> 000	<u>3 500</u> 000

Other information available:

- i. Depreciation of equipment is to be 20% per annum straight-line method.
- ii. Prepaid wages amount to \$10 000
- iii. Rates of \$30 000 were owing
- iv. Administration expenses of \$5 000 remain unpaid
- v. Sales for the period 1 January to 31 March 1995 amounted to \$500 000. Gross profit is 25% of sales. All expenses other than costs of goods sold and rates accrue evenly over the year. The rates for the first quarter amounted to \$2 500.
- vi. The partners now realise that the entries necessary to record the revaluation of the property, and the goodwill, have not yet been made.
- vii. The partners decide to write off goodwill at the end of the year.

### Question 1

- a) Prepare the partnership Trading and Profit and Loss Account for the year, in columnar form; clearly distinguishing the results of the first three months from the last nine months. [15]
- b) Prepare the partners' capital and current accounts, including the adjustment for the admission of Pathway. [10]

## SCENARIO 2

The partnership business has hired a trainee accountant who has drafted a trial balance on 31 December 1996 which has failed to balance. Investigations revealed the following:

- i. Rail has taken a motor vehicle from the partnership for his own use at an agreed value of \$3 000. The car had originally cost \$25 000 and had been depreciated down to a net book value of \$5 000. The book-keeper had made no entries relating to this transfer.
- ii. Purchase ledger control a/c balance had been understated by \$10 000.
- iii. Sales day book had been understated by \$1 500.
- iv. Purchase returns day book had been understated by \$250.
- v. The balance on Theresa, a customer had been understated by \$500 in the sales ledger.
- vi. An invoice for motor repairs of \$615 had been paid twice by mistake. The first time it was accidentally credited to the motor vans account as an amount of \$1 155. It was also correctly entered in the cash book a second time.
- vii. Carriage inwards of \$1 000 and carriage outwards of \$1 125 have both been put on the wrong side of the trial balance.

### Question 2

Prepare journal entries to correct the above.

Narratives are not required. [12]

Assume that control accounts form part of the double entry system of the partnership.

## SCENARIO 3

After having traded for several years, and Rail having retired from the partnership, the remaining partners decided to wind up their business on 31 December 2003. Road and Pathway who at that time-shared profits and losses Road  $\frac{3}{4}$ , Pathway  $\frac{1}{4}$  dissolved their partnership, each to pursue other interests.

No interests were charged on drawings or credited on capital accounts. The following is a summary of balances as at 31 December 2003:

	\$		\$
Debtors	4 200	Bank	32 130
		overdraft	
Fittings and Fixtures	12 600	Loan – road	21 000
		@ 6%	
Inventory at 1 January 2003	2 940	Capital	
		accounts:	
Purchases	18 200	Road	21 000
Freehold premises	42 000	Pathway	3 500
General expenses	5 670	Creditors	1 470
Drawings- Road	3 640	Sales	35 700
- Pathway	5 250		
Motor vehicle	4 900		
Wages	15 400		

For the purpose of accounts as on 30 December 2003, closing inventory was value at \$2 100. \$1 400 was to be written off the book value of the motor vehicle and \$700 off fittings and fixtures. A provision of \$420 was required for accrued general expenses and Road was to be credited with a year's interest on loan. Upon dissolution, it was agreed that:

1. Road should take over the inventory for \$1 750 and part of the fittings and fixtures for \$4 200.
2. Pathway should take over the motor vehicle for \$2 800.
3. Interest on Roads loan should cease as at 31 December 2003.

During January 2004:

- i. The freehold premises were sold, realising a net amount of \$47 600.
- ii. \$3 360 was collected from debtors (the balance was considered as irrecoverable)
- iii. The net proceeds from an auction of the balance of fittings and fixtures was received amounting to \$9 800. It was agreed that the few unsold items should be taken over partly by Road and the rest by Pathway for \$140.
- iv. Creditors were paid in full together with incidental realisation and dissolution expenses of \$840.
- v. All amounts receivable or payable by Road and Pathway were settled.

### Question 3

- a) Prepare the profit and loss account for the year ended 31 December 2003. [12]
- b) Prepare the realisation account. [5]
- c) Prepare the cash account for January 2004, and [5]
- d) Prepare the partners' capital accounts in columnar form showing the final settlement on dissolution. [5]

### SCENARIO 4

The partners have held a meeting to discuss a proposal to manufacture in December 1998. They estimate to produce and sell 10 000 units of the product. The costs of manufacturing those 10 000 units are estimated as:

	\$
Revenue	1 500 000
<u>Costs</u>	
Direct material (10 000 kg)	300 000
Direct labour (55/ hour)	660 000
Fixed overheads	350 000

18 000 are actually produced and sold but Rail, Road and Pathway are disappointed with the profit earned by the product. They ask you to explain the difference between the profit they had expected and the actual profit earned Data relating to the actual production of 18 000 units is:

	\$
Revenue	2 520 000
<u>Costs</u>	
Direct materials (17 560 kg)	597 040
Direct labour (2 300 hrs)	1 167 250
Fixed overheads	350 000

#### Question 4

Prepare a report to Road, Rail and Pathway to explain the difference between the profit expected on 10 000 units and the profit actually made on 18 000 units.

Your report should include a financial statement reconciling the expected profit to the actual profit. The statement should show clearly the following variances:

- i. Quantity variance (the difference between the profit expected 10 000 units and the profit made on 18 000 units)
- ii. Price variance
- iii. Direct material usage and price
- iv. Direct labour efficiency and rate.

The report should cover relationship between the variances and must have supporting figures:

Write your report in sentence form with supporting figures. (Up to 4 marks may be awarded for clear presentation and quality of English.) [36]

# CHAPTER 7

## JOB COSTING AND SPECIFIC ORDER COSTING

### Chapter objectives

After studying this chapter *the student should be able to:*

1. Define a job costing system and know where it can be used.
2. Calculate the cost of a job and prepare a job costing statement.
3. Compute predetermined overhead absorption rates and apply them to each job completed.
4. Explain why estimated overheads costs rather than actual overhead costs are used in the job costing process.
5. Calculate the profit attributable to a job.

### Introduction

Job costing is the process of tracking the expenses on a job against the revenue produced by a job. Lurey (:118) defined a job as “a form of specific order costing: the attribution of costs to jobs.” In job costing costs are captured by entering a job number on accounting transactions. Each job has its own job cost sheet on which are recorded the costs that have been charged to the job. This job cost sheet should have an identification code or number, and will show the costs collected for materials, labour and overheads.

As stated above, a job is established for specific work to be performed. Each job is different and is performed to the customer’s specifications. Job order costing is used when different types of pre-cut jobs are produced, typically over a rather short period of time. Direct materials and labour costs are usually traced directly to jobs and overheads are applied to jobs using predetermined rates. Actual overhead costs are not traced to jobs.

### Allocation of overheads

In order to allocate overhead costs some type of allocation base common to all products being produced must be identified. The most widely used allocation bases are direct labour hours, direct labour costs and machine hours. OARs are determined by the formula:

### Budgeted overheads

#### Budgets base

Note: This OAR is computed by dividing estimated total overheads for the upcoming period by the estimated total amount of the allocation base.

Job costing methods are similar to contract and batch costing methods. Industries which typically use job costing methods are construction, fabrication, ship building, maintenance works and professional services such as law firms, movie studios, auditing etc.



However, implement a suitable way of inventory control and valuation. Students should appreciate the usefulness of various methods of inventory control. The methods of inventory control being LIFO, FIFO and AVCO. In accordance with the International Accounting Standard (IAS 2), inventories should be valued at the lower of cost and net realisable value.

The following are examples of a job:

Job number 329 Engine overhaul to Mr. Rand's car  
Job number AB2 the installation of a computer programme

For a contract to be classified as a job, the duration should be reasonably shorter. If it is longer, it will be classified as contract costing which exceeds one year for example the construction of a bridge.

### **Example 1**

The following information has been supplied by Unique Construction Ltd for the construction of Mr. R Mazuka's residence-Job N0.627.

Direct Materials	\$84 000
Direct labour	\$200/hour.

Overheads are recovered on the basis of direct labour hours as at \$160 per hour. Three men will be required to complete the job at two weeks working for 30 hours a week.

### **Required:**

Cost this job if the profit margin is 20%.

### **Solution**

Job no 627-construction of Mr. Mazuka's Residence

### **Description**

	\$
Direct materials	84 000
Direct labour (180 hours x \$200/hr)	36 000
Overheads (180 hrs x 160/hr)	<u>28 800</u>
Total cost	148 800
Profit at 25 %	<u>37 200</u>
Price	186 000

The price of the job will be \$186 000. The profit margin of 20% has been converted to 25% to arrive at that figure using the relationship between mark-up and margin.

### **Budget overheads Versus Actual overheads**

It should be known that the figures in a job cost sheet are estimates. The actual cost may differ from budgeted cost thereby giving a variance which might be a favourable or unfavourable/

adverse. At the end of the job there is a variance, the firm should make a reconciliation of the budgeted figures and actual figures.

### Example 1

Let's take our example above of Mr. Mazuka's residence. Suppose the actual figures are as follows.

Direct materials	\$80 000
Direct labour	\$ 200 /hr

Due to the heavy rains, the job was completed in 3 weeks. One man left at the end of 2 weeks as he had other things to do. Overheads were absorbed at the rate of \$153.50/hour of labour.

### Required:

Prepare the actual job cost sheet for Job number 627.

### Solution

#### Calculation of labour hours

3 workers at \$200 x 2 weeks x 30 hours per week =	\$36 000
2 workers at \$200 x 1 week x 30 hours per week =	<u>\$12 000</u>
	<u>\$48 000</u>

#### **Actual cost of Job N0 627 Construction of Mr. R Mazuka's residence**

Description	Budget ( <i>As above</i> )	Actual	Variance
Direct Materials	84 000	80 000	4 000
Direct labour \$200/hr	36 000	48 000	(12 000)
Overheads	28 800	36 840	(8040)
Total cost	148 800	164 840	(16 040)
Profit at 25%	37 200	21 160	(16 040)
	186 000	186 000	-

The actual profit differs from budgeted profit figures as a result in changes in the unforeseen future. The difference, which is unfavourable in this case should be explained by a way of a reconciliation of the two figures.

#### **A reconciliation of budgeted and actual profit**

	\$	\$
Budgeted profit		37 200
<i>add</i> Decrease in materials		<u>4 000</u>
		41 200
<i>less</i> increase in direct labour	12 000	

increase in overheads	<u>8 040</u>	<u>20 040</u>
Actual Profit		<u>21 160</u>

NB

1. The firm cannot increase the price of job 627 because Mr. Mazuka has agreed on the price of \$186 000. It will be up to Unique Construction to reduce its own costs and make better profits.
2. A report reconciling budgeted profit to actual profit explains precisely each component of the variance. e.g. overheads were absorbed at a lower rate than expected which could have increased the profits but the profits were not increased because they were absorbed over increased men hours.

**Example 2**

An order for the construction of a sliding gate which was manufactured as Job n0. JF372, passed through three cost centres A, B and C whose overhead absorption bases and rates were:

Cost Centre	Bases of OASR	Rate (\$)
A	Machine hours	4/hr
B	Labour hours	3,50/hr
C	Labour hours	2,80/hr

The following production costs and date were recorded

Direct materials	\$130
Labour: 8 hrs in Dept A @	\$12,50 per hr
6 hrs in Dept B @	\$10,00 per hr
5 hrs in dept C @	\$ 8,00 per hr

General administration overheads are absorbed at 10% of total product cost and a profit of 40% of total cost is charged.

**Required**

Calculate the cost of Job No. JF372

Suggested Solution

Total Cost of job JF 372

	\$	\$
Direct material		130
Direct labour: Dept A (8 x 12,50)	100	
B (6 x 10,00)	60	
C (5 x 8,00)	<u>40</u>	<u>200</u>
Prime Cost		300
Production overheads absorbed		
Dept A 8 x 400	32	
B 6 x 3850	21	
C 5 x 2,80	14	<u>67</u>
Production cost		<u>397</u>
<u>Add</u> General administration overheads		
(10% x 397)		<u>39,70</u>
Total cost		436,70

Add Profit (40% x 436.70)	<u>174,68</u>
Selling price of the job	<u>611,38</u>

### Examination type questions

#### Multiple choice questions

1. A firm makes special storage safes to customers' specifications and uses a system of job costing. The data below relates to Period 1.

Job No.	A001	A002	A003
Opening work in Progress	\$31 000	\$105 000	0
Material added in the period	\$76 250	0	\$45 000
Labour for the period	\$45 000	\$35 000	\$40 000

The overhead for the period were exactly as budgeted at \$300 000. What overheads should be added to job A001 for the period?

- A. \$100 000  
 B. \$45 000  
 C. \$112 500  
 D. \$120 000
2. An engineering firm operates a job costing system. Production overheads are absorbed at the rate of \$17.00 per machine hour. In order to allow for non- production overhead costs and profit, a mark-up of 60% of prime cost is added to the production cost when preparing price estimates.

The estimated requirements of Job 674 are as follows:

Direct materials	\$21 300
Direct labour	\$6 520
Machine hours	140

The estimated price notified to the customer for job number 674 will be

- A \$44 512  
 B \$45 702  
 C \$46 892  
 D \$48 320

### Structured questions

#### Question 1

A factory with 3 departments uses a single production overhead absorption rate expressed as a percentage of direct wages cost. It has been suggested that departmental overhead absorption rates would result in more accurate job costs. Below is the actual

and budgeted data for the previous period, together with information relating to job No. 586.

	<u>Direct wages</u> <u>\$000</u>	<u>Hours '000</u>		<u>Production</u>
		Direct labour	Machine	Overheads \$000
<u>Budget:</u>				
Department A	225	90	360	1 080
B	900	450	90	270
C	225	225	-	675
	<u>1 350</u>	<u>765</u>	<u>450</u>	<u>2 025</u>
<u>Actual:</u>				
Department A	270	108	405	1 170
B	720	405	126	252
C	270	270	-	720
	<u>1 260</u>	<u>783</u>	<u>531</u>	<u>2 142</u>

During the period in question, Job No. 586 incurred the actual costs and actual times in the department as shown below.

	Direct material - \$	Direct wages - \$	Direct labour hours	Direct machine hours
Department A	1 080	900	180	360
B	540	540	360	90
C	90	90	90	-

To arrive at the selling price for the job, one third is added to production cost for gross profit in order to ensure a reasonable profit after deducting administration, selling and distribution costs.

- (a) Calculate the current overhead absorption rate.
- (b) Using the rate obtained in (a) above, calculate the production overhead charged to job 586 and state the production cost and expected gross profit on this job.
- (c)
  - (i) Comment on the suggestion that departmental overhead absorption rates would result in more accurate job costs.
  - (ii) Calculate appropriate overhead absorption rates for each department and briefly explain your reason for each rate.
- (d) Show the over/ under absorption, for each department and in total, for the period using:
  - (i) The current rate in your answer to (a).
  - (ii) Your suggested rates in your answer to c (ii) above.

- (d) Explain the accounting treatment of over absorbed and under absorbed overheads.

## Question 2

Brenda Williams is a commercial printer. Job No. 482 is for the production of a tourism magazine to promote a new resort site in Kariba. Brenda estimates that the magazine will require material costing \$4 000 and will require 18 hours of her time, which she charges at \$400 an hour, and 12 hours of her assistant's time, at \$100 an hour. She recovers the overheads

on the basis of \$150 per direct labour hour. Although Brenda normally expects a profit margin of 25% on cost, she knows that a bigger competitor is quoting for the same job. She therefore estimates that if she quotes \$18 750, she will secure the job by undercutting the competitor and getting the contract.

Brenda gets the contract and, on its completion, calculates actual costs as follows; materials \$3 200; direct labour hours: Brenda 20, assistant 15.

### Required

Prepare the job cost sheet for Job 482; showing the estimated and actual costs as well as profit.

## **Case Study**

### **Case study 1**

#### **SCENARIO 1**

Pioneers (Pvt.) Ltd. have been trading a couple of years and are currently considering a scheme of capital reconstruction. Their balance sheet at 30 September 2000 before the reconstruction was as shown below:

	\$'	\$'
	000	000
Property, plant and equipment		1 800
Current Assets	555	
<u>Less Current liabilities</u>	<u>288</u>	<u>267</u>
		<u>2 067</u>

#### Financed by

#### Issued and Paid up share capital

Ordinary shares of \$3 each	1 050
7% Redeemable preference shares of \$3 each	540

#### Reserves

Share Premium	225
Profit and Loss	<u>252</u>
	<u>2 067</u>

The following transactions took place:

- i. On 1 October 2 000 a bonus issue was made of one for five of fully paid-up ordinary shares, utilising the balance of capital reserves. These do not rank for dividend during the current financial year.
- ii. The redeemable preference shares, which had been issued at par, were redeemed on 15 January 2001 at a premium of \$1.50 per share. This was financed by the issue of 6% redeemable preference shares of \$3.00 each at \$3.60 per share. These rank for dividend on 1 October 2000.

- iii. On 13 March 2001 a rights issue was made of one for four ordinary shares of \$3 each in issue was fully taken up. These do not rank for dividend during the current financial year.
- iv. On 27 September 2001 property, plant and equipment costing \$45 000 were purchased on credit.
- v. On 25 October 2001 the company paid a dividend on ordinary share capital of \$0.24 per share for the year ended 30 September 2001.

### Question 1

- a) Draw up the balance sheet of Pioneers (Pvt.) Ltd. as at 30 September 2001. Assume no other transactions have taken place. [22]
- b) Explain
  - i. A rights issue [2]
  - ii. A bonus issue [2]
- c) (i) State and explain whether it is better to be an ordinary shareholder or a preference shareholder during times of failing profits. Assume that all available profits are distributed. [2]
- (ii) State two differences between ordinary shares and debentures. [2]

### SCENARIO 2

Pioneers (Pvt.) Ltd. has prepared their final accounts for publication in the year ended 30 September 2003. You have advised the accountant that certain information must be disclosed by companies in their annual accounts. This information includes a reconciliation of the movements of all property, plant and equipment between the beginning and the end of the year, and the change in the Provision for Depreciation of Property, plant and equipment during the year.

### Question 2

- a) Prepare a schedule of property, plant and equipment to show the movements of the property, plant and equipment and the changes in the provision for depreciation of property, plant and equipment for the year ended 30 September 2003. The schedule should be in a suitable form for inclusion as a note of the published account. [20]
- b) What other notes are reported based on the balance sheet. [5]

#### Use the information below:

- i. Balances on 1 October 2002.

Freehold premise at cost	\$400 000
Prov. For depreciation of freehold premises	\$100 000
Plant and machinery at cost	\$200 000
Provision for depreciation on plant & machinery	\$72 500
Motor vehicles at cost	\$56 500
Provision for depreciation on motor vehicles	\$27 000

- ii. For the year ended 30 September 2003:

Depreciation has been provided for as follows:

- a) Plant and machinery- \$30 000 charged to cost of sales and \$10 000 charged to selling and distribution expenses.

b) Motor vehicles - \$14 000

iii. Property, plant and equipment sold during the year:

	Cost	Net book value at date of sale
Warehouse machinery	\$48 000	\$15 500
Motor Vehicles	\$20 000	\$8 500

iv. Additions to property, plant and equipment during the year at cost: Warehouse machinery \$40 000 and Motor vehicles \$11 000.

v. Freehold premises are to be revalued to \$500 000 at 30 September 2003.



# CHAPTER 8

## PROCESS COSTING AND CONTINUOUS COSTING

### Chapter objectives

After studying this chapter *the student should be able to:*

1. Define a process costing and know when it can be used.
2. Explain when process costing systems are appropriate
3. Distinguish between normal and abnormal losses and gains as well as explain their accounting treatment
4. Prepare process, normal loss/gain, abnormal loss/gain, abnormal loss/gain accounts
5. Calculate the number of equivalent units in the valuation of closing inventory of work-in-progress
6. Define and distinguish between a by-product joint-product and waste product
7. Understand how joint products are costed
8. Distinguish between process costing and job costing and identify companies that would use each costing method.

### Introduction

Process costing is a form of continuous costing which seeks to find the average cost per unit during a production period, here a single homogenous product or service is produced using a continuous series of processes e.g. in the oil refining industry, food and beverage flour, brick, detergent production etc. CIMA defines process costing as “the costing method applicable where goods or services result from a sequence of continuous or repetitive operations or processes. Costs are averaged over the units produced during the period.”

### Allocation of costs

In process costing, costs are assigned to products, usually in a large batch, which may include an entire month's production, on an average cost basis. Eventually costs have to be allocated to individual units of product. Process costing assigns average costs to each unit and is the extreme opposite of job costing, which attempts to measure individual costs of production of each unit. In addition to this, process costing provides managers with feedback that can be used to compare similar product costs from one month to the next, keeping costs in line with projected manufacturing budgets.

### Features of products identifiable with process costing

1. Output consists of homogenous products
2. Output from each process is uniform- all units are identical during each process. It is not possible to identify any particular lot of output from any particular lot of input.
3. Production is carried on in different stages each of which is called a process, having a continuous flow.
4. The production process is continuous except where operations are stopped for repairs maintenance of plant and equipment

5. Input passes through two or more processes before it can be identified as output. Output for each process becomes input for the next process until the final product is obtained in the last process
6. Output from any other process apart from the last may also be saleable
7. Input of any process may also be acquired from an outside source.
8. Output of a process is generally transferred to the next process at cost to the process
9. Normal and abnormal losses may arise in the process

### **Characteristics which distinguish process costing from job costing.**

- The cost per unit of output with a process costing system is the average cost per unit whereas job costing traces the actual cost to each individual unit of output.
- With a process costing system, the allocation of costs to cost of goods sold and closing inventory is not as accurate, because each cost unit is not separately identifiable. As a result WIP is estimated using the equivalent production concept.
- Job costing requires that a separate order and job number be used to collect the cost of each individual job.
- With a process costing system, cost are not accumulated for cash order and it is necessary to use the equivalent production concept to value WIP with a job costing system, costs are accumulated for each order and WIP is calculated by ascertaining the costs that have been accumulated within the accounting period.
- With a process costing system, each unit of output is similar, whereas with a job costing system each unit of output is unique and requires different amounts of labour, material and overheads.

### **Normal losses**

These are unavoidable losses that are expected to occur under efficient operating conditions. They are an expected production cost and should be absorbed by the completed production. The cost of normal loss is indicated as part of the cost of standard production. A normal loss is usually expressed as a percentage of the total input material. If any value can be recouped from the sale of the imperfect articles/ materials this should be credited to the process account reducing the overall cost. The following are some of the causes of normal losses:

- a) Evaporation or weight loss.
- b) Testing to destruction.
- c) Samples for inspection.
- d) Spoilage or defectives.
- e) Material wastage.
- f) Off – cuts or trim loss.
- g) Unavoidable handling.
- h) Residuals and ashes.

### **Abnormal process losses and gains**

Losses greater than normal are known as abnormal losses and losses that are less than normal are known as abnormal gains. These are losses above the level meant to be the normal loss rate for the process. Abnormal losses/gains are not included in the process costs but are removed from the appropriate process account and reported separately as an abnormal loss. Abnormal losses should be excluded from routine reporting and only normal costs charged to production. Abnormal losses or gains will be cost on the same basis as goods produced and should be

written off to the income statement. Abnormal losses can be caused by an unexpected pilferage and abnormal gain can be due to unexpected security restricting pilferage.

### Calculation of cost per unit in process costing

This is determined simply by dividing the total costs (*direct material, direct labour and overheads*) for a given period by the total number of units of products expected to be completed in that period. If normal loss is sold as scrap the total cost is reduced before dividing. The formulae for unit cost is:

$$\text{Average cost per unit} = \frac{\text{Total Cost less value of Scrap from normal loss}}{\text{Expected output}}$$

The expected output is determined by the number of units introduced into the process less the % of normal loss.

#### Example 1

The total cost of a process is \$54 000. The number of units introduced into the process is 10 000. Normal loss of 10% expected and actual output is 9 000 units.

#### Required:

- (a) Calculate the average cost per unit.
- (b) Prepare the process account.

Solution

$$\text{Normal loss} = 10\% \times 10\,000 = 1\,000 \text{ units}$$

Cost per unit is therefore.

$$= \frac{\$54\,000}{10\,000 - 1\,000}$$

$$= \frac{\$54\,000}{9\,000}$$

$$= \$6 \text{ per unit.}$$

a)

## Process account

	Unit	\$		Unit	\$
Input cost	10 000	54 000	Normal loss Actual output c/fwd	1 000	-
				9 000	54 000
	10 000	54 000		10 000	54 000

**Example 2**

Assume the same fact as *Example 1 above* except that units scraped were sold for \$3 per unit.

**Required:**

- (a) Calculate the average cost per unit.  
 (b) Prepare the process account.

**Solution**

$$\text{Normal loss} = 10\% \times 10\,000 = 1\,000 \text{ units}$$

$$\text{Value of Scrap } 1\,000 \times \$3 = \$3\,000$$

$$\text{Therefore cost per unit} = \frac{54\,000 - 3\,000}{9\,000}$$

$$= \underline{\underline{\$ 5.67}}$$

## Process account

	Unit	\$		Unit	\$
Input cost	10 000	54 000	Normal loss Actual output c/fwd	1 000	3 000
				9 000	51 000
	10 000	54 000		10 000	54 000

**Example 3**

8 000 kgs were introduced into the process during a period. The cost of materials is \$6 000, labour and overheads \$9 600. Normal loss expected is 10 % of input and 6 900 kgs were produced. Scrap units are sold for \$6.00 each.

**Required:**

- (a) Calculate the average cost per unit.  
 (b) Prepare the process account.

**Solution**

$$\text{Normal loss } 10\% \times 8\,000 = 800 \text{ kgs}$$

$$\text{Actual loss } 8\,000 - 6\,900 = 1\,100 \text{ kgs}$$

$$\text{Abnormal loss } 1\,100 - 800 = 300 \text{ kgs}$$

$$\text{a) Average cost per unit} = \frac{6\,000 + 9\,600 - (800 \times \$6.00)}{8\,000 - 800}$$

$$= \frac{10\,800}{7\,200}$$

$$= \underline{\underline{\$1.50 \text{ per kg}}}$$

b)

## Process account

	kgs	\$		kgs	\$
Materials	8 000	6 000	Normal loss	800	4 800
Labour & overheads		9 600	Abnormal loss (300 x \$1.50)	300	450
			Actual output c/fwd	6 900	10 350
	8 000	15 600		8 000	15 600

**Example 4**

Assuming the same facts as in *Example 3* above, except that finished goods were 7 400

**Required:**

- (a) Calculate the average unit cost  
 (b) Prepare the process cost account.

**Solution**

$$\begin{aligned} \text{Normal loss} &= 10\% \times 8000 &= 800 \text{ kgs} \\ \text{Actual loss} &= 8000 - 7400 &= 600 \text{ kgs} \\ \text{Abnormal gain} &= 8000 - 600 &= 200 \text{ kgs} \end{aligned}$$

- a) Average cost per unit.

$$\text{Average cost per unit} = \frac{\$15\,600 - \$4\,800}{7\,200}$$

$$= \$1.50$$

b)

## Process account

	kgs	\$		kgs	\$
Materials	8 000	6 000	Normal loss	800	4 800
Labour & overheads		9 600	Actual output c/fwd	7 400	11 100
Abnormal gain (200 x \$1.50)	200	300			
	8 200	15 900		8 200	15 900

**Example 5**

A chemical manufacturing process has a normal loss of 5% of input materials which can be sold as cleaning agent at a price of \$5 per litre. For the month of January 2003, the following data was made available.

Input material, 200 litres at a cost of \$20 per litre

Labour and overheads \$5 170

Actual production 188 litres.

**Required**

Prepare the process account

**Solution**

$$\begin{aligned} \text{Cost per litre} &= \frac{\$9\,170 - (10 \times 5)}{200 - 10} \\ &= \$48 \end{aligned}$$

$$\begin{aligned} \text{Actual loss} &= \text{Input} - \text{Actual production} \\ &= (200 - 188) \text{ litres} \\ &= 12 \text{ litres} \end{aligned}$$

$$\begin{aligned} \text{Normal loss} &= 5\% \text{ of } 200 \text{ litres} \\ &= 10 \text{ litres} \end{aligned}$$

$$\begin{aligned} \text{Abnormal loss} &= \text{Actual loss} - \text{Normal loss} \\ &= (12 - 10) \text{ litres} \\ &= \underline{\underline{2 \text{ litres}}} \end{aligned}$$

Process account

	Litres	\$		Litres	\$
Materials	200	4 000	Normal loss	10	50
Labour & overheads		5 170	Abnormal loss (2 x \$48)	2	96
			Actual output c/fwd	188	9 024
	200	9 170		200	9 170

Normal gain – any value below normal loss. It is valued at the same rate as good production.

**Work in progress and the concept of equivalent units**

The equivalent units of WIP to finished is calculated such that periodic costs will be spread over the finished goods and WIP.

Formulae:

1. Total equivalent production goods in WIP = Completed units + Equivalent units of finished
2. Cost per unit =  $\frac{\text{Costs incurred during the period}}{\text{Total Equivalent production units}}$
3. Value of completed units = Fully completed units x Cost per unit
4. Value of WIP = Total costs – Value of completed production.

### Example 6

The following information relates to a process for the month of January 2001.

1. 4 380 meters were put in a process and the total costs for the period amounted to \$36 950
2. There was no loss or gain at the end except that 3 600 meters were fully completed whilst 780 meters were 75% complete.

You are required to:

- a) Calculate the total equivalent units.
- b) Calculate the cost per unit.
- c) Calculate the value of finished goods and work in progress.
- d) Prepare a process account.

#### Solution

Total equivalent production =  $3\,600 + (780 \times 75\%) = 4\,185$  meters  
 780 partly completed units are equivalent to 585 completed units.

The total costs for the period would be spread over the total equivalent production.

$$\begin{aligned} \text{Cost per unit} &= \frac{\text{Total costs for the period}}{\text{Total equivalent production}} \\ &= \frac{\$36\,950}{4\,185} = \$8.83 \text{ per meter} \end{aligned}$$

Value of completed units =  $3\,600 \times \$8.83 = \$31\,788$   
 Value of WIP =  $\$36\,950 - \$31\,788 = \$5\,162$

#### Process account

	Meters	\$		Meters	\$
Total input costs	4 380	36 950	Transfers to next process	3 600	31 788
			Work in progress c/d	780	5 162
	4 380	36 950		4 380	36 950

Please note that finished goods in a process are transferred to the next process where it will be input materials and closing WIP in a process is carried forward to the next period of the same process. No goods can be transferred to the next process unless if they are 100% complete.

### Valuation of WIP

The valuation of WIP depends with the flow of production. There are two widely used techniques in process costing FIFO and Average cost method.

#### First in First Out

The first work done is the completion of the of the opening work in progress. The closing WIP is valued at current period costs and part of the previous periods costs brought forward in the opening WIP valuation is attached to the cost of the completed units.

Calculation of effective units of production.

Completed units transferred out	xxx
Add Work contained in closing WIP ( <i>NO x% of completion</i> )	xxx
Less Work contained in opening WIP ( <i>NO x % of completion</i> )	<u>xxx</u>
Effective units for period	<u>xxx</u>

$$\text{Cost per unit} = \frac{\text{Cost of Transfers in plus process cost}}{\text{Equivalent effective units for the period}}$$

- the valuation of the number of complete units transferred to any process is found from the balance on the process account.

#### The Average Cost Method

The average unit cost is calculated using the total of the opening WIP plus the current period costs and transfer in. The effect of this is that both the closing WIP and completed units are valued using the same average unit cost. This is a useful device when costs fluctuate from period to period.

- The effective units are the transfers out to the next process plus the work contained in the closing WIP.
- Costs involved are the total of the opening WIP valuation plus the valuation of the units transferred in and the current process costs.

$$\text{Average cost per unit} = \frac{\text{total cost}}{\text{Equivalent number of units}}$$

The value obtained is used to value both closing inventory and transfers out. The balancing figure is used for transfers to the next process.



**Example 7**

Igwebu Breweries produces one product in a costing system involving several production departments. The 2<sup>nd</sup> department's costs and output for the month of December 2000 are as follows:

Beginning WIP (40% complete)	15 000 units valued at \$69 375
Transfers from previous process	140 000 units valued at \$786 000
Transfers to the next process	120 000 units
Ending WIP (30% complete)	35 000 units
Total periodic costs amount to	\$885 000

**Required:**

- Compute the equivalent units for the period using the FIFO method.
- Calculate the cost per unit.
- Calculate the value of closing WIP.
- Calculate the value of units transferred to the next process.
- Prepare a Process 2 account.

**Solution**

a)	Completed units transferred out	120 000
	Add Work contained in closing WIP (35 000 x 30%)	<u>10 500</u>
		130 500
	Less Work contained in opening WIP (15 000 x 40%)	<u>6 000</u>
	Effective units for period	<u>124 500</u>

b) Cost per unit =  $\frac{\$786\,000 + \$885\,000}{124\,500} = \$13.42$  per unit

c) Value of closing WIP = 35 000 x 30% x \$13.42 = \$140 910

d)

## Process 2 account

	Units	\$		Units	\$
Work in progress b/d	15 000	69 375	Transfers out to process 3 Work in progress c/d	120 000	1 599 465*
Transfers in from process 1	140 000	786 000		35 000	140 910
Process costs		885 000			
	155 000	1 740 375		155 000	1 740 375

\*\$1 599 465 is the balancing figure.

**Example 8**

Let's suppose that, in the above example, Ingwebu Breweries uses average cost, as a way of valuing WIP.

**Required:**

- Compute the equivalent units for the period using the Average cost method.
- Calculate the cost per unit.
- Calculate the value of closing WIP.
- Calculate the value of units transferred to the next process.
- Prepare a Process 2 account.

**Solution**

a)

Equivalent units	=	Completed units transferred out	120 000
		<i>Add Work contained in closing WIP (35 000 x 30%)</i>	<u>10 500</u>
		Equivalent units	130 500

b)

Cost per unit	=	$\frac{69\,375 + 786\,000 + 885\,000}{130\,500}$	= \$13.34
---------------	---	--	-----------

c)

Value of closing WIP	=	$35\,000 \times 30\% \times \$13.34$	= \$140 070
----------------------	---	--------------------------------------	-------------

d & e)

Process 2 account					
	Units	\$		Units	\$
Work in progress b/d	15 000	69 375	Transfers out to process 3	120 000	1 600 305
Transfers in from process 1	140 000	786 000	Work in progress c/d	35 000	140 070
Process costs		885 000			
	155 000	1 740 375		155 000	1 740 375

**Joint products by-products and waste products****Joint products**

These are two or more products generated simultaneously by a single manufacturing process using common input, and being substantially similar/equal in value e.g (butter & cheese + fresh cream from milk, diesel and petrol from crude oil. These products are separately identifiable and incur the same joint costs in the same manufacturing processes until they reach the split off point which is the point of separation. After separation each product will then be changed with its own costs to completion to bring it to a saleable condition.

**Illustration**

The following costs were incurred in a process to produce butter and cream, which are sold in units of a big

Milk	45 000
Additional material	8 000
Direct labour	32 000
Overheads	39 000
	<b><u>124 000</u></b>

At the point of separation 22 000kg of butter and 6 000kg of fresh cream were realized. Butter incurred further processing costs of \$4 700 and fresh cream incurred further processing costs of \$16 000. Calculate the value of each complete butter unit and fresh cream.

**Solution****Butter**

$$22\,000\text{kg to point of separation} = \frac{\$124\,000 \times 22\,000}{28\,000}$$

$$= \$97\,428,57$$

$$\text{Cost of complete unit of butter} = \frac{\$97\,428,57 + 4\,700}{22\,000}$$

$$= \frac{\$102\,128,57}{22\,000}$$

$$= \$4,64$$

**Cream**

$$6\,000\text{ kg to point of separation} = \frac{\$124\,000 \times 6\,000}{8\,000}$$

$$= \$26\,571,43$$

$$\text{Cost of complete unit of butter} = \frac{\$26\,571,43 + 16\,000}{6\,000}$$

$$= 42\,571,43 \div 6\,000$$

$$= \$7,10$$

**By products**

It is a secondary or incidental products which results from a manufacturing process whereby the product is not the primary or main product being produced e.. in the manufacture of clothes. If sales value is very low, proceeds from the sale of by-products may be credited to the process account to reduce the costs of the main or joint product. Alternatively, process from the sale of by-products may be treated as pure profit. If a by-product needs further processing to improve its marketability, such costs, including handling and selling expenses, may be deducting from the selling price to arrive at net revenue.

**Waste product**

This is valueless material which is of no use and results from processing it have no effect on the process accounts.

**Comparison of Joint and by Product**

<b>Joint Product</b>	<b>By Product</b>
1. Intentionally produced from the onset of production process	Incidentally produced
2. Is a high- sales value	Is of a low sales value
3. Cost per unit is derived by apportioning the joint costs to the product and adding on further costs to completion	-Process a/c may be credited with sales value or the proceeds may be treated as pure profit

**Exercise on Joint Products**

Baker produces two chemicals, Ansoff and Bandit. In a month x, 8200 litres of Ansoff and 3 600 litres of Bandit were produced. The inputs to the process were as follows:

	\$
Material	43 600
Labour	28 750
Overheads	16 340

After separation, Ansoff was processed further at a cost of \$3 18 and bandit at \$2 173.

**Required**

Calculate the cost of each complete unit of each product

Dalachi producers manufacture two products, Alpha and beta, in a process which involves three processes. These two products are distinguished in the first two processes, they only separate in process 3, where 70% of the product is Alpha and beta is 30%.

The following costs data is available.

	<b>Process</b>	<b>Process</b>	<b>Process</b>
	1	2	3
Materials per unit (kg)	14	9	7
Cost of materials per litre	\$3	\$4	\$6
Cost of materials used in process 1	\$168 000	-?	?
Direct labour laws/unit	4	3 ½	4
Hourly labour cost	\$16	\$12	\$14
Variable overhead/unit of labour hr	\$32	\$30	\$36
Fixed overhead absorption sale/labour	\$60	\$58	\$54

**Notes:**

- i) The by-product from process 1 is sold for \$2 000
- ii) There are no stocks of work-in progress in Process 1 and closing stock of work-in-progress in Process 2 is 000 units
- iii) Closing stock of work-in-progress in process 2 is 100% complete as to materials and 75% complete as to labour

**Required****Prepare ledger accounts for process 1, 2 and 3****Suggested Solution**

<b>Process 1 account</b>			
Direct materials	168 000	Sale of by-product	2 000
Direct labour (4000 x 4 x 16)	256 000	Finished production	
Variable costs (400 x 4 x 32)	512 000	transferred to process 2	1 894 000
Fixed overhead (16000 x 60)	<u>960 000</u>		
	<u>1 896 000</u>		<u>1 896 000</u>

Note: No. of units produced in process 1 =  $168\,000 \div (14 \times 3)$   
 = 4 000 units

<b>Process 2 account</b>			
Materials from Process 1	1 894 000	Transfer to Process 3 (w4)	
Added materials (4 000 x 9 x 4)	144 000	(3 000 x 85950)	2 578 500
Direct labour (W1)	157 500	W.I.P c/f (w5)	772 000
Variable costs (W2)	393 750		
Fixed overheads (W3)	<u>761 250</u>		
	<u>3 350 500</u>		<u>3 350 500</u>

**Process 3 account**

Materials from Process 2	2 578 500	Transfer to finished goods:	
Added materials (3 000 x 7 x 6)	126 000	Alpha (3 000 x 70%)	2 100 276 6750
Direct labour (3000 x 4 x 14)	168 000	Beta (3000 x 30%)	900 1 185 750
Variable costs (300 x 4 x 36)	432 000		
Fixed overheads (3000 x 4 x 54)	<u>648 000</u>		
	<u>3 952 500</u>		<u>3 952 500</u>

**Note:**

Only goods completed as to process 2 account are transferred to the next process, process, 3, which is 3000 units.

**Workings for process 2**

W1	Direct labour 4 000 units less 1000 wip	=	3 000 completed products
	= $3000 \times 3 \frac{1}{2} \times 12 = 126\,000$		= \$ 126 000
	Add W.I.P = 1000 x 75% complete for labour x $3 \frac{1}{2} \times 12$		<u>31 500</u>
			<u>157 500</u>

<b>W2</b> Variable costs= 3000 complete units @ 3 ½ x 30	=	315 000
Wip= 1000 x 751. X 3 ½ 30	=	<u>78 750</u>

<b>W3</b> fixed overheads= 3000 x 3 ½ x 58		609 000
Wip = 750 x 3 ½ x 58		152 250
		<u>761 250</u>

<b>W4</b> Finished production= 3 000 units		<u>Per unit cost</u>
Costs Materials form process 1= 194 000 ÷ 4 000=		\$473,50
Added materials = 144 000 ÷ 400=		\$ 36,00
Direct labour = 157 500 ÷ 3 750=		\$ 42,00
Variable Costs= 393 750 ÷ 3 750=		\$105,00
Fixed costs= 761 250 ÷ 3750=		<u>\$203,00</u>
Cost per complete unit		<u>\$859,50</u>

(w4) Work in progress from process 2		
Direct materials (1 000 x 473, 50 +36)	=	509 500
Direct labour (750 x 42)	=	31 500
Variables costs (750 x 105)	=	78 750
Fixed costs (750 x 203)	=	<u>152 250</u>
		<u>772 000</u>

## Examination type questions

### Multiple choice questions

- A process department began with no opening inventory. A total of 8 500 units were transferred in at a cost of \$187 000. The cost of raw materials added was \$7.00 per unit and labour costs were \$10 per unit. If 6 750 units were completed and transferred out, the total cost transferred out is:

A. \$331 500  
 B. \$187 000  
 C. \$263 250  
 D. \$148 500
- A chemical processing company puts a product through a single process. In a period it put 600 kg of material into a process at a cost of \$2.50 per kg, and conversion costs were \$348. The normal loss is 20% with no soap value. The output was 470 kg. There was no opening and no closing work – in – progress. What is the price per kg of the normal output?

E. \$3.08  
 F. \$3.23  
 G. \$3.85  
 H. \$3.93
- A product passes through two processes. Information for process 2 is given

\$	
Material transferred from process 1 (2 000 units)	40 000
Added material	2 400
Labour	16 000
Overheads (based on 50% of labour)	8 000

There was no opening inventory of work- in- progress but at the end of the period 400 units were complete as to 100% of materials and 50% labour. What was the value of the closing inventory of work – in progress?

- I. \$2 080
- J. \$28 880
- K. \$10 080
- L. \$10 880

4. A manufacturing company has identified that an abnormal gain of 160 litres occurred in its refining process last week Normal losses are expected and have a scrap value of \$2.00 per litre. All losses are 100% complete as to material cost and 75% complete as to conversion costs. The company uses the weighted average method of valuation and last week's output was valued using the following cost per equivalent unit:

\$	
Materials	9.40
Conversion costs	11.20

What is the effect on the profit and loss account of last week's abnormal gain?

- M. \$2 528 debit
- N. \$2828 debit
- O. \$2528 credit
- P. \$2848 credit.

5. Process B had no opening stock. 13 500 units of raw materials were transferred in at \$4.50 per unit. Additional material at \$1.25 per unit was added to the process. Labour and overheads were \$6.25 per completed unit and \$2.50 per incomplete unit. If 11 750 completed units were transferred out, what was the closing stock in process B?

- Q. \$77 625.00
- R. \$14 437.50
- S. \$141 000.00
- T. \$21 000.00

6. AB Ltd operates a process costing system. The process is expected to lose 25% of input and this can be sold for \$8 per kg. Input for the month was:

Direct materials	3 500 kg at a total cost of \$52 500
Direct labour	\$9 625 for the period

There is no opening or closing work in progress in the period. Actual output was 2 800 kg. What is the valuation of the output?

- U. \$44 100
- V. \$49 700

W. \$58 800

X. \$56 525

7. The following process account has been drawn up for the last month.

Process A/C

Units	\$		Units	\$	
Opening WIP	250	6 000	Normal loss	225	900
Input			Output	4 100	
Materials	4 500	45 000	Abnormal loss	275	
Labour		75 000	Closing W.I.P.	<u>150</u>	
	<u>4 750</u>			<u>4 750</u>	

Work in progress has the following level of completion.

	Material	Labour
Opening W.I.P.	100%	40%
Closing W.I.P.	100%	30%

The company uses the FIFO method for valuing the output from the process and all losses occurred at the end of the process.

What were the equivalent units for labour?

- A 4 380 units
- B 4 270 units
- C 4 320 units
- D 4 420 units

### Structured questions

1. The production data and costs for a process in period X is given as:

Production 12 600 units fully completed

Work in progress 4 200 units partially completed

The degree of completion of the partly complete units was:

Materials 80% complete

Labour 60% complete

Overheads 50% complete

The costs for the period were:

Material \$148 800

Labour \$100 500

Overheads \$217 200

Calculate the total equivalent production, the cost per complete unit and the value of the Work in progress.

Martin Koton Fabrics (Pvt) Ltd produces cotton fabrics. All direct materials are introduced at the start of the process. Conversion costs are incurred uniformly throughout the process. In



May there was no opening inventory. Units started, completed and transferred were 80 000. Each of the 6 000 units of WIP at the end of the month was 75% converted. Costs incurred during May: direct materials, \$3 840 000 , conversion cost \$920 000

### **Required**

- a) Compute the total work done in equivalent units and the unit cost for May
- b) Compute the cost of units completed and transferred
- c) Compute the cost of units in work in process at the end of May.
- d) Prepare a process account for the month ending May

### **Case Study**

#### **Case study 2**

#### **SCENARIO 1**

An assistant accountant has been asked to examine the financial situation of Pioneers Boozers Club. He has been provided with the information below and has turned to you for assistance.

Receipts and Payments a/c for the year ended 30 September 2001.

Bank balance	\$ 42 000	Purchase of drinks	\$ 94 500
(1.10:00)			
Sale of drink	210 000	Wages (bar attendant)	6 300
Donations received	52 500	Secretary's expenses	4 200
Members subscriptions		Donations to charity	47 250
2 000	8 400	Stationery	2 100
2 001	16 800	Motor-expenses	17 850
2 002	4 200	Electricity- club house	17 500
		Ground man's wages	8 400
		Balance c/d	135 800
	333 900		333 900

#### **Additional information**

1. Subscriptions in arrears at 31 September 2000 and 31 September 2001 were \$5 250 and \$7 350 respectively.
2. Inventory of drinks: 1 October 2000 \$11 550 and 30 September 2001 \$8 400.
3. On 30 September 2000, motor vehicles were valued at \$525 000 and are to be depreciated at 5% per annum.

### **Question 1**

- a) (i) Prepare a bar Income statement for the year ended 30 September 2001. [3]  
(ii) Draw up the subscription account. [5]  
(iii) Draft the club's income and expenditure account for the year ended 30 September 2001. [5]  
(iv) Prepare the club's balance sheet as at 30 September 2001.
- b) What is a statement of affairs? [1]
- c) What is the accounting treatment for each of the following in the year end financial statements:  
(i) Subscriptions in arrears [1]  
(ii) Subscriptions paid in advance. [1]

## SCENARIO 2

Pioneers (Pvt) Ltd are involved in the production of a single product Piodene by putting it through a single process. Information relating to the production of Piodene in the month of November is detailed below:

Input costs	
Material costs	25 00 kgs at \$4.96/kg
Labour costs	8 000 hrs at \$11.00/ hr
Overheads costs	\$126 000

You are also told the following:

- i. Normal loss is 4% of input.
- ii. Scrap value of normal loss is \$4 per kg.
- iii. Finished output amounted to 15 000 units.
- iv. Closing work in progress amounted to 6 000 units and was fully complete for material  $\frac{2}{3}$  complete for labour and  $\frac{1}{2}$  complete for overheads.
- v. There was no opening work- in -progress.

## Question 2

- a) Prepare the process account for the month of November, detailing the value of the finished units and the work in process. [12]
- b) Prepare an abnormal loss account. [2]
- c) Calculate the value of work - in - process using the equivalent production method. [15]

# CHAPTER 9

## CAPITAL EXPENDITURE APPRAISAL

### Chapter objectives

After studying this chapter *the student should be able to:*

1. Explain what investment appraisal is
2. Explain the opportunity cost of an investment and the time value of money
3. Calculate and compare the payback period, net present value (NPV), accounting rate of return (ARR) and internal rate of return (IRR).
4. Justify the superiority of NVP over the IRR
5. Explain the limitations of payback and ARR
6. Explain how the concept of risk incorporation and uncertainty is dealt with in capital investment appraisal.
7. Choose between alternative projects on the basis of NPV, IRR and payback.

### Introduction

As we have discussed in earlier chapters, all successful businesses plan for the future. Capital expenditure appraisal is another form of long-term planning for any business-related investment. Investment is the creation or purchase of assets with the objective of making gains in the future. Investments typically involve the use of financial resources to purchase non-current assets which will yield returns to an organization over a period of time.

There is always an imbalance between the need for capital expenditure and the resources available. Funds available to an organization for investment are often limited being narrow and finite and cannot satisfy all investment needs. Capital expenditure therefore shows how to be rationalized such that only those investments which will be projected to yield the best return on the invested monies are taken up.

Capital expenditure appraisal is a tool which is used to assess investment opportunities to see if spending money on an investment is financially beneficial to the business, which projects should be chosen, rejected or shelved. Key considerations will seek to address some for the following concerns:

- How much will the investment cost?
- Are there funds available?
- How long will it be before the investment starts to yield returns?
- How long will it take to pay back the investment?
- What are the expected profits from the investments?
- Could the money ploughed into the investment yield higher returns elsewhere i.e. the opportunity cost of sacrificed alternatives?

There are four commonly used investment appraisal techniques used to address the above concerns

2. Discounting Cash flow (DCF) methods
  - a) Net present value (NPV) method
  - b) Internal rate of return (IRR)

The traditional methods

- a) Payback method and
- b) Accounting rate of return (ARR) method.

### Traditional methods

#### 1. Payback Period

This method calculates the period of time a project will take for the projected future cash flows to equal the cost of the original investments. Essentially, it is the time the project will take to repay itself by a cash recoupment. A short payback period is attractive as it means that the project is less risky, because forecast cash flows become more unreliable over time. Because the primary focus of the payback method of investment appraisal is how quickly investment costs will be recovered by cash flows after the payback period are disregarded. As the payback period is based on cash flows, it ignores non-cash items such as depreciation. If Profits have been given in a question depreciation and other non-cash items need to be added back to arrive at cash flows.

### Advantages of Payback

1. It gives the exact period the project will take to recoup cash outlay on the investment.
2. It is a good indication of the measure of the riskiness of a project- the shorter the payback period, the less risky.
3. It is a useful measure of liquidity especially when there is a cash constraint
4. It serves as a simple primary screening device for project that deserves further considerations.

### Disadvantages of Payback

1. It ignores the time value of money, i.e. the NPV of cash flows, as so is not suitable for very long financing.
2. Cash flows after the payback are not considered.

### Example 1 - Calculation of the payback period

The following information relates to Extra Investments which is faced with a decision to acquire either plant A or B.

Year	Plant A cash flows	Plant B cash flows
0 – Initial Out flow	(\$900 000)	(\$700 000)
1	\$250 000	\$400 000
2	\$300 000	\$200 000
3	\$400 000	\$100 000
4	\$700 000	\$ 50 000
5	\$800 000	\$ 50 000
6	\$800 000	-

**Required:**

Calculate the payback period for the two plants and recommend the project undertake.

**Solution**

Plant	A	B
Payback Period	$2 + \frac{350}{400} = 2.875 \text{ years}$ $\approx 2.9 \text{ years}$	3 years

The initial outlay of \$900 000 for project A would be recovered in 2.9 years whilst for project B the initial outlay of \$700 000 would be recovered in exactly 3 years. The management of Extra Investments should consider project A which has a shorter Payback period.

Payback period is regarded as easy to calculate but does not take into consideration cash flows after the Payback period. Project B could be accepted but after Year 3 it would not be producing any attractive cash flows but project B would produce much more cash flows after Year 4.

NB: Accept the project with the shortest payback period.

**Example 2**

The following cash flows relate to the Titanic project

Year	Cash flow
0	(\$670 000)
1	\$293 000
2	\$300 050
3	\$196 720
4	\$400 230

**Required: -**

Calculate the payback period for Titanic project.

**Solution**

At the end of Year 2, the \$76 950 would be paid back sometimes during the year. We assume that the net cash inflow of \$196 720 accrues evenly thought the year, so the \$76 950 will be paid back somewhere through the year.

It should be paid after the 5<sup>th</sup> months =  $\frac{\$76\,950 \times 12}{\$196\,720}$  months = 4.7 months.

\$196 720

The Payback period for Titanic project is 2 years 5 months or 2.4 years

$$= 2 + \frac{4.7}{12}$$

$$= 2 + 0.392$$

$$= 2.4 \text{ years}$$

### **Accounting rate of return (ARR)**

This method of investment appraisal measures the rate of return on capital invested i.e. the profitability of an investment. It shows profit earned on the investment in relation to the investment made. The formula for its calculation is

$$\frac{\text{Average annual Profit}}{\text{Average investment}} \times \frac{100}{1}$$

Note: Average annual profits are used, and not cash flows. This means that non-cash adjustments for depreciation need to be deducted from cash flows to establish the annual profits. It is assumed that cash flows equal profits before depreciation adjustments are made.

### **Cost of the asset/project undertaken**

-The percentage rate of return can be compared with rates for other possible projects and with the relevant rate of interest.

The decision to accept or reject a project here is based on the relationship between the ARR and the cost of capital. If the ARR is greater than the cost of capital, the project is accepted and if it is less than the cost of capital, the project will be rejected.

### **Advantage of ARR**

1. ARR is easy to calculate
2. It considers project profitability, which can be used to compare current with projected profitability.
3. It is a useful technique for evaluating competing projects which are very similar in nature.

### **Disadvantages of ARR**

1. It ignores the time value of money
2. It ignores the timing of profits and cash flows
3. Average annual profit may not be representative of any profits earned in any particular year and may not be consistent from year to year.
4. Determination of profit is subject to a lot of accounting provisions
5. It does not take into account the life expectancy of a project

### **Changes in revenue and expenditure**

For one to evaluate capital expenditure using the following 3 methods, one should understand changes in cash flows as a result of the project (opportunity cost or gain). For these three methods, we only consider cash flows. Non-cash items are ignored.

Cash flows that took place before the implementation of the project are ignored (Sunk Cost). Before evaluating the capital expenditure, we need net cash flows for each year. The net cash flow is the difference between total cash inflows and cash outflows.

The following table illustrates some sources of cash flows:

DESCRIPTION	NATURE
1. Increase in sales revenue or cash takings	Cash inflow
2. Proceeds from disposal of old fixed assets to give room for new assets.	Cash inflow
3. Purchase of property, plant and equipment	Cash outflow
4. Proceeds from disposal of assets at the end of their life span.	Cash inflow
5. Decrease in revenue expenses e.g. wages, rent.	Cash inflow
6. Increase in revenue expenses e.g. cost of training staff, repairs & maintenance.	Cash outflow
7. Decrease in sale revenue	Cash outflow
8. Sunk costs already incurred	No effect.
9. Interest on loan used to finance the project	No effect
10. Depreciation of non – current assets	No effect

In general, a decrease in revenue is a cash outflow whilst an increase is a cash inflow and an increase in expenses is a cash outflow whilst a decrease is a cash inflow. All cash flows are assumed to take place at the end of each year unless otherwise directed by the question.

The cash flows should be taken into account in the years in which they took place. Consider the following:

### **The time value of money**

Money available today is worth more than the same amount in the future. This is an additional factor considered in long-term decision-making. Common factors considered in both short-term and long-term decision-making are among other things, the making of choices between alternatives, the need for the consideration of future costs and revenues, importance of changes in costs and revenues, irrelevance of sunk costs, etc. when a decision to invest is made, the money is locked in the investment and so is not available for alternative uses. The alternative opportunity to use the money is lost or sacrificed to the investment made. Risk and uncertainty cloud capital investments because the money is locked in for a long period of time. For an investment to be considered worthwhile, expected returns must be greater than the actual investment, and for meaningful and effective comparison of the projects' returns and the expenditure incurred by it, it is essential that the cash flows are discounted to present value term which reduces future cash flows to today's value. This is done using the discounted cash flow (DCF) technique.

### Discounted Cash Flow (DCF)

As stated earlier, cash flows arising at different times are not directly comparable. They must be converted to equivalent values at a common date, which is now, the present time. CIMA defines present value as “the cash equivalent now of a sum receivable or payable at a future date.” This entails the discounting of future cash flows at a given interest rate (discount factor) to reduce such cash flows to their equivalent today. The discount factor is often based on a company’s weighted average cost of capital, where the source of finance for the project cannot be identified specifically to the one source of capital, which is often the case. Where funds to finance an investment can be specifically identified the cost of capital, that is the discount factor, will be the cost of those funds, e.g. a loan specifically acquired for the project. Often, a Net Present Value Discount table will be provided, as in Appendix 1 on Pg.....

If the table is not given, you can calculate the discount factor for each year using the formula

$$\frac{1}{(1+x)^a}$$

Where x is the discount factor e.g. 14%  
a is the year of discounting

The two methods of investment appraisal which use discounted cash flows are

- a) The net Present Value (NPV) method
- b) Internal Rate of Return (IRR) method

### The net Present Value (NPV) method

The net present is the difference between the present value of expected future cash inflows and the present value of expected future cash out flows. The NPV of a project is the present value of its expected cash flows discounted at the cost of capital which is the cost of financing the project and is the interest rate at which the project is discounted. A positive NPV means that the project is a worthwhile investment and should be accepted. If the NPV is negative the project should be rejected because it does not add value to the firm. NPV analyses profitability of a project and is also sensitive to the reliability of future cash flows that a project will yield.

### Advantages of NPV

1. It is good for appraisal long-term projects because it considers potential future cash flows thus liquidity
2. It measures excess/shortfall of cash flows
3. It takes into account the risk of future cash flows
4. It indicates how much value is in a certain project
5. It considers the time value of money

### Disadvantages of NPV

1. It doesn’t take into account any intangible benefits that arise from a capital expenditure decision, such as community outreach
2. It does not account for flexibility and uncertainty



**Example 3**

The following cash flows relates two projects

<b>Year</b>	<b><u>Project 1</u></b>	<b><u>Project 2</u></b>
	\$	\$
0	(400 000)	(500 000)
1	90 000	140 000
2	(80 000)	200 000
3	200 000	230 000
4	50 000	230 000

**Additional information**

1. The cost of capital is 12%
2. Refer to a copy of the present value of \$1 for discounting factors at the end of the book (Appendix 1)

**Proposed solution**

Year	Discounting factors @ 12%	<b>Project 1</b>		<b>Project 2</b>	
		Cash flows	Present Value	Cash flows	Present Value
0	1	(400 000)	(400 000)	(500 000)	(500 000)
1	0.893	90 000	80 370	140 000	125 020
2	0.797	(80 000)	(63 760)	200 000	159 400
3	0.712	200 000	142 400	230 000	163 760
4	0.636	50 000	<u>31 800</u>	230 000	<u>146 280</u>
Net Present Value			(209 190)		94 460

**Comment**

- Project 2 should be accepted since it has a positive NPV.
- Project 1 should not be accepted because if the expected cash flows are discounted against their present value we get a negative present value.

**Internal Rate of Return (IRR)**

- This is the actual rate of return being earned by the project. IRR is a percentage rate of return which yields a nil NPV when the projects cash flows are discounted. In other words, it is the discount rate which gives a zero NPV, showing the rate at which neither profit nor

loss is made on the investment, i.e. the break-even point IRR is calculate by trial and error where two distant discount rates are used in order to find which gives a positive NPV and another which gives a negative NPV. Projects with an IRR greater than the cost of capital should be accepted since they are profitable. The cost of capital serves as a benchmark covering the risk premium of the investment. The higher the IRR, the more desirable the project.

The internal rate of return is calculated as follows:

$$IRR = A + d \left( \frac{NPV_A}{NPV_A - NPV_B} \right) \quad NPV_B$$

Where:  $A$  = the rate giving the a positive NPV

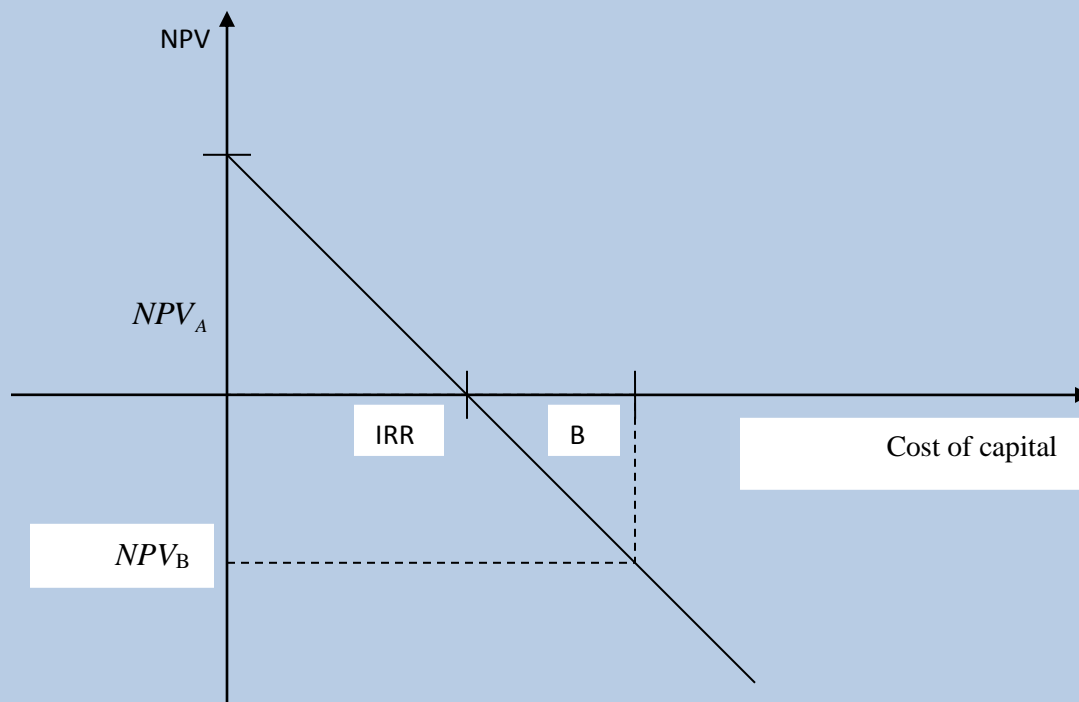
$d = B - A$  (The difference between the rate giving a positive and negative NPV)

$NPV_A$  = The positive net present value

$NPV_B$  = The negative net present value

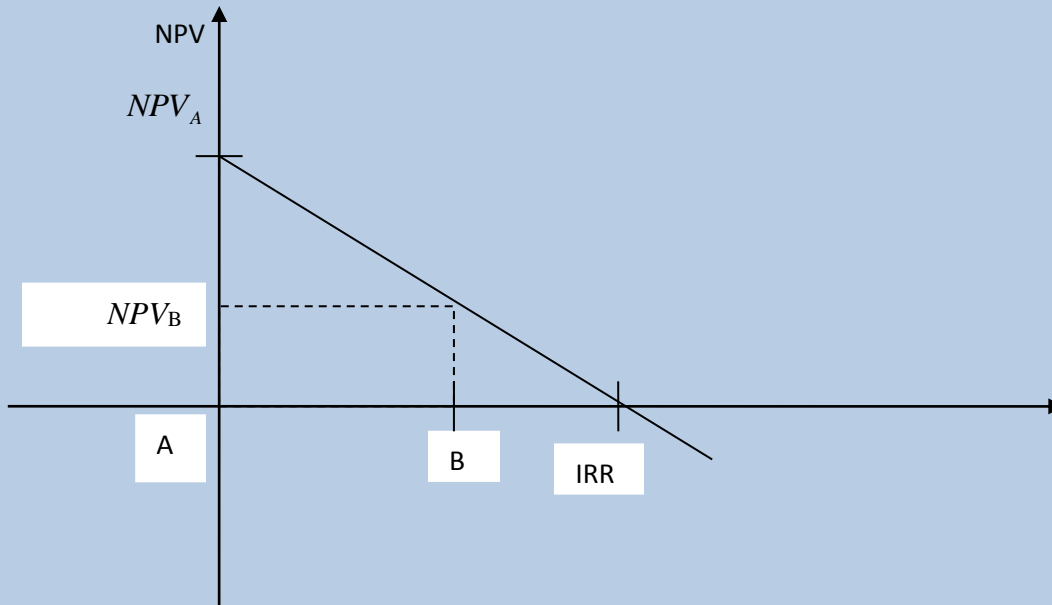
This means that  $NPV_B$  can be negative or positive, which has a bearing on the resultant sign in the denominator. If  $NPV_B$  is negative, then the denominator has a positive sign and if the  $NPV_B$  is positive then the sign in the denominator becomes negative.

The IRR can easily be shown on a graph.



The above diagram shows a situation the NPV at a discounting factor A is positive and negative at B. in this case the IRR is in the interval A to B.

The following diagram shows a situation where both  $NPV_A$  and  $NPV_B$  are positive



In the above diagram where both  $NPV_A$  and  $NPV_B$  are positive the IRR is greater than B.

### Advantages of IRR

1. It calculates the break-even
2. It calculates an alternative cost of capital including an appropriate risk premium

### Disadvantages of IRR

1. It cannot be used to rate mutually exclusive projects i.e. those projects where you have to choose one and not both
2. Intermediate cash flows are never reinvested thus cannot be used where cash flows are mixed through the life of a project.
3. If the calculated IRR is greater than the company's cost of capital project is acceptable as it is profitable able to cover the cost of capital (interest) and remain with excess profit

### Example 4

Taking the facts for Project 2 as in *Example 4* above, calculate the IRR for this project. The following (extract) discounting factor table is also available.

Year	<u>Discounting Factor at:</u>		
	20%	25%	30%
1	0.833	0.800	0.769
2	0.694	0.640	0.592
3	0.579	0.512	0.455
4	0.482	0.410	0.350

We have already calculated the positive NPV of Project 2 at 12% cost capital, which is \$94 690.

Calculation of NPV at 30% cost of capital

	140 000 x 0.769	107 660
	200 000 x 0.592	118 400
	230000 x 0.455	104 650
	230000 x 0.350	<u>80 500</u>
Net Present Value of cash inflows		<u><b>411 210</b></u>
NPV =	411210-500 000 =	(88 790)

$$\text{IRR} = 12 + 18 \left( \frac{94\,690}{94\,690 + 88\,790} \right) = 21.3\%$$

### Points to Note

1. Project 2 is presently earning a return of 21.3%. Since this return is above the company's cost of capital of 12% it should be undertaken. For independent projects, the one with the highest IRR should be considered.
2. If the net cash flows from this project are discounted at 21.3%, the resultant net present value would be Zero.
3. If the calculated IRR is greater than the company's cost of capital, the projected is acceptable as it is profitable, able to cover the cost of capital (interest) and remain with excess profit.

### Comparison of NPV and IRR

NPV is considered to be more superior than IRR because

- i) The IRR assumes that cash inflows arising during the course of the project will be reinvested at the IRR instead of the cost of capital and this is misleading.
- ii) When choosing between alternatives, percentage returns arising from IRR calculations can be misleading
- iii) The IRR cannot be used as a prudent measure to rank mutually exclusive projects.

### Non-financial factors to consider in investment appraisal.

A prudent capital expenditure decision is not just made on the basis of financial considerations i.e. the use of NPV, payback period, ARR and IRR. These methods of investment appraisal help us to determine which projects are worthy to be given further considerations, and such consideration are non-financial factors bordering on the effect of taking up a project on the environment and community as well as politics. These are known as social factors. Profitability alone cannot be the sole basis of decision-making.

### The Community

People in the community may be affected by the implementation of a project, e.g employees may be made redundant and therefore create a burden to the social welfare authority if they can no longer afford to send their children to school, etc. When employees have grievances and the

grievances are not dealt with effectively, trade unions may be engaged, thus causing problems for the business and this could affect profitability and goodwill of the business in the community. If employees are to be made redundant by the introduction of a new project it is worthwhile considering if the company is in a position to meet the redundancy costs.

On the other hand, factors such as noise and air pollution on the environment should be considered before a project is undertaken. It is important for a business to maintain a healthy and stable relationship with the community because that is where their support comes from. The business sells its products and services to the community and also recruits its manpower from that community. When a business develops a poor relationship with the community, the local authority such as the City council or rural council gets involved and will have to ensure that the business operations adhere to law pertaining to safety and health standards at work, environmental issues etc. Legal consequences such as paying fines and at worst facing closure may occur if operations of business do not conform to law.

### **Environmental Considerations**

Business operations should be carried out in such a way that the environment is not upset. If taking up a project would mean deforestation has to take place, the business would have to seek authority from environmentalists and out measures in place to replace the forests destroyed. If chemicals are used, care should be taken to protect the atmosphere and ozone layer from damage. Modifications to the proposed plant or project may have to be made so that the project is free from environmental pollution. It needs to take steps to abate or control the pollution or else risk its reputation, compulsory closure, negative publicity and heavy fines, Political and government considerations. This includes considerations about government policy on the use of scarce materials, compliance with trading standards, use of dangerous substances, selling of illegal commodities, trading with countries that are considered as state enemies etc. Government is also concerned about taxation and ensuring that business conforms to all trading and operative legislation. All business activities should always comply with statute i.e. law.

Students are encouraged to read widely and keep in touch with social issues that may affect businesses in their operations. It is important to note that when undertaking capital expenditure appraisals, apart from financial considerations, social considerations need to be made as such considerations affect business operations. In the examination, you need not express your own political or social views but you will need to base your arguments on facts given and if you have to make any assumptions, state clearly that they are assumptions. Do not present your views as facts.

### **Examination type questions**

#### **Multiple choice questions**

1. Which method of investment appraisal uses profits rather than cash flows to assess a project
  - A. Accounting rate of return
  - B. Internal rate of return
  - C. Net present value
  - D. Payback period

2. The table below shows the calculation of the net present value of a potential project.

Year	Details	Cash Flows	Discount Factor (10%)	Present Value
0	Initial cost	(80 000)	1.00	(80 000)
1	Receipt	48 000	0.91	43 680
2	Receipt	48 000	0.83	39 840

Which cash flow during year 1 would give a net present value of zero for the project?

- A. \$44 128
- B. \$44 480
- C. \$47 200
- D. \$51 520

3. Information regarding a proposed investment in a project given.

Estimated life of project	5 years
Cost of machine	\$270 000
Estimated proceeds of disposal of machine after 5 years	\$30 000
Additional working capital required throughout the project	\$90 000
Additional annual revenue (net)	\$45 000

What would be the accounting rate of return on the project?

- A. 13.6%
  - B. 21.4%
  - C. 25%
  - D. 27.3%
4. When the calculation of the net present value of a proposed capital expenditure is done, which rate is used to discount annual income and expenditure?
- A. Cost to the company of providing the initial outlay
  - B. Current rate of inflation
  - C. Rate of interest payable on a bank overdraft
  - D. Rate of interest which give the highest net present value
5. The net present value (NPV) method of investment appraisal requires.
- A. A distinction being made between capital and revenue expenditure and income.
  - B. The realistic depreciation of the capital expenditure involved.
  - C. A knowledge of the amounts and timings of the expected net proceeds of proposed investments.
  - D. The calculation of the payback periods of proposed investments.
6. The net present values of a capital project are as follows:
- |               |         |
|---------------|---------|
| Discount rate | NPV(\$) |
| 10%           | 12 000  |
| 16%           | (6 000) |

What is the internal rate of return for this project?

- A. 10%
- B. 12%
- C. 14%
- D. 16%

### Structured questions

#### Question 1

The directors of Modag Engineering are considering replacing its existing machinery (Sceudo) with the new computerized state of the art equipment Ureka. Sceudo was purchased 4 years ago at cost of \$200 000. Depreciation on all plant and machinery is calculated on a straight-line method assuming a disposal value of \$75 000 after 5 years of use. Sceudo was auctioned for \$89 000, after incurring some expenses amounting to \$13 500. The initial cost of Ureka is \$800 000 and this machinery should bring in additional sales revenue of \$200 000 in each year. Current sales were \$400 000 per year.

Technical staff shall receive training when Ureka is acquired. The total cost of training shall be \$18 000. Other costs (including depreciation) related to Ureka are \$170 000 per year.

The required rate of return is at 8%.

#### **Required: -**

- a) Using the two discounting techniques of capital budgeting, evaluate the cost associated with the acquisition of Ureka. Discounting factors are given on in Appendix 1, at the end of the book.
- b) Write a report to the directors of Modag Engineering advising them if should acquire this machinery or not.  
(up to 4 marks will be awarded for good presentation of the report).

#### Question 2

A company is considering an investment in a new production machine. The two machines under consideration are Machine A and Machine B. Data concerning each of these machines is detailed below. The cost of capital is 12%.

	Machine A	Machine B
Purchase price	\$180 000	\$250 000
Annual cost savings	\$50 000	\$65 000
Estimated useful life	5 years	5 years
Estimated disposal value	\$15 000	\$25 000

Discounting factors:

	12%	16%
Year 1	0.893	0.862
Year 2	0.797	0.743
Year 3	0.712	0.641
Year 4	0.636	0.552
Year 5	0.567	0.476

- (a) Calculate separately for each machine, its:
- The payback period
  - The net present value
  - Calculate the internal rate of return for Machine A.
- (b) Advise management which machine should be purchased, giving reasons for your answer

**Question 3**

In what ways might investment decisions be affected by non-financial factors? State and explain two disadvantages that discounted cash flow techniques have over the payback method of capital investment appraisal.

**Case studies****Case study 1**

The number of marks is given in brackets [ ] at the end of each question or part question. All accounting statements are to be presented in good style.

Workings should be shown.

You may use a calculator.

Names of persons or businesses in this question paper are intended to be fictitious.

Question 1[c], 2[c], 3[d] and 4[b] must be answered in sentence form, not in note form with supporting figures where appropriate.

Each scenario in this case study describes an event in the life of a business and is followed by a question. Answer all questions. The questions should be answered in the order to which they are set.

**Scenario 1:**

Maidei and Mary who are both cosmetic retailers form a partnership on 1 May 2002. Their agreement provides for the following:

- Mary to be credited with a partner's salary of \$45 000 per annum.
- A current account and a capital account is to be maintained for each partner.
- An interest on capital at the rate of 5% per annum is to be credited for partners' capital account balances.
- An interest on drawings of 10% per annum is to be charged for partners' cash drawings.



- v) Profits and losses are to be shared between Maidei and Mary in the ratio 3:1 respectively.
- vi) Other provisions for the partnership formation were as follows:

Maidei's net assets transferred to the partnership on 1 May 2002 are:

	\$
Fixtures & fittings	48 000
Motor Vehicle	30 000

Mary's assets and liabilities transferred on the same date are:

	\$
Inventory	48 000
Motor vehicle	39 000
Debtors	22 200
Creditors	9 300

- vii) The following values were agreed for the transfer of the net assets.

	\$
From Maidei	126 000
From Mary	102 000

- viii) No goodwill account is to be raised in the partnership books of accounts.

Additional information for the year ended 30 April 2003

1. The partnership's trial balance as at 30 April 2003 includes the following items:

	\$	\$
Net profit for the year		130 500
Drawings- Maidei	49 500	
-Mary	44 100	

2. Interest on partners' cash drawings has been determined as follows:

	\$
Maidei	2 400
Mary	1 950

3. Provision has not yet been made in the partnership books for the following goods at cost, withdrawn for use by the partners.

	\$
Maidei	900
Mary	330

**Question 1**

- a) Prepare the partnership's profit and loss appropriation account for the year ended 30 April 2003 [8].
- b) The partners' capital and current accounts for the year ended 30 April 2003. [11]

- c) Maidei is concerned that the partnership agreement does not permit a goodwill account to be maintained. As the accountant for the partnership justify the absence of a goodwill account in the partnerships' books.

## Scenario 2

Mary, who acts as the bookkeeper for the partnership fell ill and she asked her nephew Zororai, an 'A' level graduate to stand in for her in her absence. Zororai prepared the draft final accounts for the year ended 30 April 2004 and which revealed the following:

	\$
Gross profit	342 600
Net profit	97 500
Debtors	38 280
Creditors	22 413
Suspense	7 800[credit]

Investigations revealed the following

1. Payments to creditors in September 2003 of \$50 400 were debited in the purchase ledger control account as \$55 800.
2. Inventory costing \$90 000 was stolen from the partnership warehouse in March 2004. No adjustments have been made in the accounts for the loss of inventory. The insurance company has agreed to settle \$72 000 for the claim in May 2004.
3. On 1 November 2003 office stationery costing \$1 380 was purchased. This was debited to the Office Furniture Account. Depreciation is provided on office furniture at the rate of 10% per annum on cost.
4. Discounts allowed of \$930 and discounts received of \$2 130 were posted to the profit and loss account as discounts allowed \$2 130 and discounts received \$930.
5. A receipt of \$1 800 in March 2004 from Washaya, for a cash sale was credited in the sales ledger control account.

## Question 2

Prepare statements correcting the following items:

- a) Gross profit for the year ended 30 April 2004 [4]
- b) Net profit for the year ended 30 April 2004. [9]
- c) Debtors as at 30 April 2004. [3]
- d) Creditors as at 30 April 2004. [2]
- e) Prepare the Suspense Account to eliminate the credit balance. [4]
- f) Give three reasons why it is necessary for a trial balance to balance. [3]

## Scenario 3

Maidei and Mary decide to form a company, Bob Ltd, with effect from 1 May 2004. They compare their results with two other companies with a similar long-term finance structure, after a full year's trading on 30 April 2005.

	<b>Alex Ltd</b>	<b>Bob Ltd</b>	<b>Ladies Ltd</b>
6% Debentures	\$1 200 000	\$900 000	\$-
8% Preference shares of \$1 each	\$1 200 000	\$900 000	\$1 200 000
1% Ordinary shares of \$1 each	\$600 000	\$1 200 000	\$1 800 000
Market value per share	\$4.00	\$3.00	\$2.50

Net profit before calculation of debenture interest is \$300 000 in each case.

*Note: Ignore taxation in your answers.*

### Question 3

- a) Calculate the net profit for each company after debenture interest has been applied. [3]
- b) Assume that all of Bob Ltd's profits are to be distributed:
- How much is the total ordinary dividend payable by Bob Ltd? [1]
  - What percentage dividend is payable on ordinary shares. [1]
  - Calculate:  
Bob Ltd's ordinary dividend yield as a percentage [1]  
Bob Ltd's price earnings ratio. [1]
  - Explain the term earnings per ordinary share and give a formula for calculating it. [2]
- ci) Which of the companies is most highly geared? Explain your answer. [2]
- ii) In years of high profits, is it better to be an Ordinary Shareholder or a Debenture holder? Justify your answer. [3]
- iii) Apart from shareholders and investors, suggest organisations or groups of people who might be interested in a company's investment ratios. [2]
- d) Comment briefly on the changes that have occurred to the following ratios for Charles Ltd between 2004 and 2005:

	<b><u>2005</u></b>	<b><u>2004</u></b>
Gross profit ratio	33%	20%
Rate of inventory turn [times]	7	5
Net profit ratio	13%	12%
Current ratio	1.4:1	2.5:1
Quick [acid test] ratio	0.8:1	1.1:1
Average age of debtors [days]	30	20
Average age creditors [days]	30	40
Property, plant and equipment: sales	30%	40%
Return on total assets	16%	15%

[9]

### **Scenario 4**

Bob [Pvt.] Ltd wants to purchase a manufacturing plant on 30 June 2005 in order to expand its operations into the manufacturing sector. Two types of machines, namely

machine X and Y have been identified for further consideration. As funds are limited, investment can only be made in one project.

The two machines have the same purchase price of \$300 000 000. Depreciation on these assets will be provided at 20% per annum on the original cost over a period of five years. The projected net profits of the two machines over the five-year period are as follows:

<u>Year</u>	<u>X</u>	<u>Y</u>
1	\$30 000	\$48 000
2	\$45 000	\$75 000
3	\$60 000	\$105 000
4	\$90 000	\$30 000
5	\$15 000	\$15 000

The opportunity cost of capital is 15% and the following discount rates apply:

<b>Year</b>	<b>15%</b>	<b>30%</b>
1	0.870	0.769
2	0.756	0.592
3	0.658	0.455
4	0.572	0.350
5	0.497	0.269

#### Question 4

- a] For each of the two machines, calculate:
- The accounting rate of turn [ARR].
  - The payback period.
  - The net present value [NPV].
  - The internal rate of return [IRR]. To calculate the IRR, use the formula:

$$\text{IRR} = a + \frac{[d \times p]}{p + n}$$

Where a = the rate yielding a positive NPV.

d= the difference between the rate yielding a positive NPV and the rate yielding a negative NPV.

p= the positive NPV

n= the negative NPV [16]

- b] Which of the two plants do you think the firm should purchase? Explain fully the reasons for your decision. [9]

#### Case study 2

The case study on pages 2 to –describes a series of events in the life of a business. The questions should be answered in the order in which they are set.

### Scenario 1

Trust, Thubani and Trymore were in partnership manufacturing window frames for operation Hlalani Kuhle housing project. They shared profits and losses in the ratio of 6:3:1 respectively. Their partnership agreement provided for the following:

- Interest of 6% per annum to be allowed on the fixed capital accounts.
- No interest is to be allowed on current accounts but 8% per annum is to be charged on any debit balance at the beginning of the year.
- Goodwill is to be valued at 80% of the average annual profits of the previous three or four years, whichever is the lower.

The particulars of partner's accounts are as follows:

	Fixed Capital as at 31 December 1996	Current account Balances as at 31 December 1996
	\$	\$
Trust	36 000	10 000 Cr.
Thabani	18 000	2 000 Cr
Trymore	6 000	2 400 Cr

The partners agreed to take Thabiso as a partner on 1 January 1997, and on that day he introduced \$7 000 cash which included his fixed capital of \$6 000. He is entitled to a salary of \$3 000 per annum in addition to his share of the profits. Trust guarantees Thabiso that the aggregate of his salary and share of profit shall be not less than \$6 000 per annum.

The new profit and loss sharing ratios are to be Trust 3/10, Trymore 3/10 and Thabiso 1/10. Agreed profits for goodwill purposes for the past four years are as follows:

Year	\$
1996	32 674
1995	20 510
1994	21 516
1993	28 328

Adjusting entries for transactions between the partners regarding goodwill should be made in their current accounts as no goodwill account should be maintained in the books. The draft final accounts for the year ended 31 December 1997, before taking into account Thabiso's salary or interest on partners' accounts show a profit of \$35 280. Partners' drawings during the year are:

Trust	\$12 640
Thabani	\$ 9 800
Trymore	\$ 9 800
Thabiso	\$ 4 386 [inclusive of salary].

**Question 1**

You are required to prepare:

- a) a statement showing the division of profit for the year ended 31 December 1997. [14]
- b) partners' current accounts for the year ended 31 December 1997 showing the entries necessary for the admission of Thabiso as a partner. [11]

Round off your answers to the nearest \$.

**Scenario 2**

During the year ended 31 December 1998, the partners introduced a system of checking the work done by the accounts clerk through the use of control accounts. The following data relates to their sales ledger for the year ended 31 December 1998, which revealed some differences necessitating some investigations.

Balance on the sales ledger control on 1 January 1999	\$ 17 904
Sales as per posting summaries	149 506
Receipts from debtors	138 942
Discounts allowed	3 634

The clerk in charge had prepared from the debtors' ledger a list of outstanding balances on 31 December 1998 amounting to \$19 326 but this did not agree with the balance of the sales ledger control account. An investigation of the differences revealed the following:

1. Credit transfers of \$396 on the bank statement, which had been completely overlooked.
2. Debtors settled by contra entries of \$5 792 and bad debts of \$1 280 were correctly recorded in the sales ledger but had been overlooked when preparing control accounts.
3. When listing the debtor balances, a debtor's ledger balance of \$382 had been overlooked and thus omitted in the list of balances.
4. An old debtor's balance of \$427 had been incorrectly shown as \$27.
5. A receipt of \$2 346 from J. Ndlovu in the cash -book had not been posted as no account could be traced under that name in the sales ledger. It was later discovered that it was in payment of a second-hand typewriter, which had been sold to him, when computers were purchased recently.

**Question 2**

- a) Prepare a control account on 31 December 1999 before the errors were corrected. [5]
- b) Prepare an amended control account for the year taking into account the above adjustments. [5]
- c) Reconcile the clerk's balance of \$19 326 with the correct balance on the sales ledger account. [6]
- d) Explain four benefits of using control accounts. [4]
- e)

**Scenario 3**

The partners decide to expand their capital base by converting their business to a company on 1 July 2000. Subsequently, they prepare a trial balance on 31 December 2001 from which they want a manufacturing account prepared.

	\$	\$
Issued share capital		100 000
Plant & machinery @ NBV	90 000	
Debtors and creditors	60 000	55 000
Factory wages	245 000	
Purchases of raw materials	115 850	
Factory overheads (including depreciation of plant & machinery)	70 000	
Inventory of finished window frames (on 1 January 2001:		
In factory (330 window frames)	19 800	
In warehouse (475 window frames)	35 625	
Sales (7 430 window frames)		668 700
Provision for unrealised profit on inventory, 1 January 2001		7 125
Administration and selling expenses	171 900	
Bank balance	40 150	
Profit & loss account, 1 January 2001		17 500
	848 325	848 325

**NOTES**

- a) During the year ended 31 December 2001, 7 000 window frames were completed. 7 200 window frames were transferred from the factory to the trading account. These transfers are recorded in the manufacturing and trading account at factory cost plus 25%.
- b) Closing stock of finished goods in the factory is entered in the manufacturing account at factory cost. Costing inventory of unused materials was \$10 850.
- c) There is no inventory of work in progress at the beginning or end of the year.

**Question 3**

- a) prepare a manufacturing, trading and profit and loss account for the year ended 31 December 2001. [16]
- b) prepare a balance sheet on the same date. [10]
- c) Explain the concept of 'provision for unrealised profits' and how it affects the accounts. [4]

**Scenario 4**

The company considers an investment in upgrading their machinery to meet increased demand and improve efficiency. This is, believed will provide considerable cost savings. The two alternatives have the following profiles of returns:

	<u>Machine</u>	<u>Machine</u>
	<u>X</u>	<u>Y</u>
	\$	\$
Year 0 Original Investment	180 000	200 000
1 Cash Savings	50 000	80 000
2 Cash Savings	70 000	120 000
3 Cash Savings	60 000	20 000
4 Cash Savings	80 000	60 000
Disposal value of the machine at the end of year 4	20 000	20 000

The company's discount rate is 12% and relevant discount factors are as follows:

Year 1	0.893
Year 2	0.797
Year 3	0.712
Year 4	0.636

#### Question 4

- a] Calculate for both machines:
  - i] The payback period [6]
  - ii] Accounting rate of return, and [7]
  - iii] Net Present Value [6]
  
- b] Recommend which machine to invest in giving reasons for your decision clearly. [6]



## **1.1 REFERENCES**

- 1. ACCA news letters**
- 2. 'A' Level Accounting 3<sup>rd</sup> Edition : H Randal**
- 3. Principles of Bookkeeping and Accounting : Edward E Chamisa**
- 4. Zimsec past exam papers**
- 5. Cost and Management Accounting : T Lucey**
- 6. Management Accounting : Horngreen**
- 7. Practical Foundation in Accounting : Austin**
- 8. Introduction to Accounting : Andrew Thomas**
- 9. Business Accounting I : Frank Wood**