B.Com. Final Year

MANAGEMENT ACCOUNTING

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UNIT I MANAGEMENT ACCOUNTING

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Structure

1.0 OBJECTIVES

After going through this unit student will be able to:

- Get an idea about different types of accounting.
- Define the meaning, nature and scope of management accounting.
- Get an idea about the different techniques of management accounting.
- Structure how management accounting differ from Financial Account.

1.1 INTRODUCTION

Accounting serves the purpose of providing financial informations relating to activities of a business. Such information is provided to Owners (shareholders), managers, creditors, investors, employees, customers, bankers, and tax authorities. On the basis of types of accounting information and the purpose, for which such information is used accounting, may be divided into three categories.

(i) Financial Accounting

(ii) Cost Accounting

(iii) Management Accounting

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1.2 DIVISION OF ACCOUNTING

1.2.1 FINANCIAL ACCOUNTING

Financial Accounting is concerned with providing information to external users such as shareholders creditors, financial analysts, government authorities etc. Financial Accounting is oriented towards the preparation of financial statements, which summarise the results of operations for selected period of time and show the financial position of the business at particular date. The information supplied by financial accounting is summarized in the following two statements at the end of the accounting period, generally one year.

(a) Profit and Loss Account showing the net profit or Loss during the Period.

(b) Balance Sheet showing the financial position of the firm at a point of time.

1.2.2 COST ACCOUNTING

Financial accounting are unable to meet information needs about the cost structure of a product. Cost accounting as a tool of management. Provides management with detailed records of the cost relating to products, operations and functions. Cost accounting refers to the process of determining and accumulating the cost of some particular product or activity. The Institute of cost and Management Accountants, London, defines cost accounting as "the process of accounting for cost from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centers and cost units. In its widest usage it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of the profitability of activities carried out or planned.

1.2.3 MANAGEMENT ACCOUNTING

Management accounting may be defined as the application of accounting techniques for providing information designed to help all levels of management in planning and controlling the activities of a business enterprise and in decision making. According to the Institute of chartered Accountants of England "any form of accounting which enables a business to be conducted more efficiently" may be to regarded as management accounting information can help managers identify problems solve problems and evaluate performance.

1.3 MEANING AND DEFINITIONS

In the words of R. Anthony, "Management accounting is concerned with accounting information that is useful to management".

The Institute of Cost and Works Accountants of India (ICWAI) has defined management accounting as a system of collection and presentation of relevant economic information relating to an enterprise for planning, controlling and decision making.

The characterized Institute of Management Accounting (CIMA) of UK has gives a very comprehensive definition as follows:

"Management accounting is an integral part of management concerned with identifying, presenting and interpreting information used for

(i) Formulating Strategy
(ii) Planning And Controlling Activities
(iii) Decision Making
(iv) Optimizing the use of resources
(v) Disclosure To Shareholders
(vi) Disclosure employees
(vii) Safe Guarding Assets

These definitions make it clear that management accounting plays a vital role in providing the necessary information to managers in performing their functions of planning, controlling, organizing and decision making.

1.4 NATURE OR CHARACTERISTICS OF MANAGEMENT ACCOUNTING

1. Providing Accounting Information :- Management Accounting based on accounting information which is derived from financial and cost accounting records,
2. Useful In Decision Making – The essential aim of management accounting is to assist management in decision making and control. It is concerned with all such information, which can prove useful to management in decision making.
3. Technique Of Selective Nature: - Management Accounting takes into consideration only that data which include financial planning and analysis, standard costing, budgetary control, marginal costing etc.
4. Cause And Effect Analysis: - Financial Accounting is only confined with finding out profit or Loss, but management Accounting goes a further ahead. If discussed the cause and effect relationship in management accounting. If there is loss in the organisation, then find out the reasons for loss and what steps should be taken to over come the loss. So the study of cause and effect relationship is required in management accounting.

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5. Concerned With Future – As management accounting is involved with decision making, it is related to forecast with the future. It helps in planning the future because decisions are always taken for future course of action and not with the past.

6. Internet Use: - Information provided by management accounting is exclusively for use by management for Internet use. It is not given to parties like shareholders, creditors, banks etc.

7. Purely Optional – Management Accounting is a purely voluntary technique and there is no statutory obligation. Its adoption by any firm depends upon its utility and desirability.

8. No Set Formats for information – Management accounting does not provide information in a prescribed proforma like that of financial accounting. The form of presentation of information left to management accountant who decides which is required to management in taking various decisions on the various aspects of the business.

1.5 SCOPE OF MANAGEMENT ACCOUNTING

Scope of management accounting is very wide and broad-based. It not only includes financial accounting and cost accounting, but also considers all types of internal financial controls, internal accounting, office services. Cost control and other control procedures. The following activities are included in the scope of management accounting.

1. **Financial Accounting :** Financial Accounting provides historical information which helps management to forecast and plan its financial activities for the future period. So for an effective and successful management accounting, there should be a proper and well designed financial accounting system.

2. **Cost Accounting :** Many of the techniques of cost control like standard costing and budgetary control and techniques of profit planning like marginal costing. CVP analysis, differential cost analysis are used by management accounting.

3. **Budgeting :** Budgeting means expressing the plan, policies and goal of the enterprise for a definite period in future. Different targets are set for different departments. The comparison of actual performance with budgeted figures will give an idea to the management about the performance of different departments.

4. **Cost control procedures :** Any system of management accounting is incomplete without effective cost control procedures like inventory control, cost control, labour control, budgetary control and variance analysis etc.

5. **Reporting :** For effective and timely decisions, there should be a system of prompt and intelligent reporting to management. The reports are presented in the form of graphs, diagrams, index number and other devices in order to make the information move impressive and intelligent.

6. **Internal Audit :-** Management accounting includes the internal control methods like internal audit and internal check to plug loop holes in the financial system of the concern.

7. **Tax Planning :** In order to take advantage of various tax laws, management accountant has to depend upon tax accounting to minimise its tax liabilities and save more funds for the business.

8. **Interpretation :** Management accounts employs various techniques to analyse and interpret financial data to make it understable and useable to the management.

9. **Office Services :-** Management accountant is expected to maintain and control office routines and procedures like filing, copying communicating, electronic data processing and other allied services.

1.6 FUNCTIONS OR OBJECTIVES OF MANAGEMENT ACCOUNTING

The main functions of management accounting are –

1. **Planning :** Information and data provided by management accounting helps management to forecast and prepare short-term and long-term plans for the future activities of the business. For doing this, the management accountant uses techniques of statistics like probability, trend, study of correlation and regression, budgeting and standard costing, capital budgeting, marginal costing and funds flow statement etc.

2. **Organizing :** The management accountant helps the management in organizing the human and non-human resources of the business by analyzing different functions and assigning specific responsibilities.

3. **Co-ordination :** The co-ordination among different departments is essential for smooth running of the concern. While preparing budgets for various departments like production, sale, purchase etc. there should be full co-ordination, so that there is no contradiction.

4. **Controlling:** To control the performance of the organisation management accountant uses standard costing, budgetary control, accounting ratios, cash and funds flow statement, cost reduction programmes etc.

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5. **Financial analysis and interpretation :** In order to make accounting data easily understandable, management accountant explains these statements in non-technical manner along with the comments and suggestions so that owner and top level managers in the management may understand it without any difficulty.

6. **Motivating Employees:** Management accounting helps the management in selecting best alternatives of doing the things. When targets are set for the employees, they feel motivated in achieving their targets and further incentives may be given for improving their performance.

7. **Qualitative information :** Apart from monetary and quantitative data, management accounting provides qualitative information i.e. quality of goods, customers and employees, legal judgements etc. for better management.

8. **Tax policies :** Management accounting system is responsible for tax policies and procedures and supervises and co-ordinates the reports prepared by various authorities.

9. **Decision making :** Correct decision making is crucial to the success of a business. Management accounting has certain special techniques which help management in short-term and long-term decisions. For exp, techniques like marginal costing, differential costing help in decisions such an pricing of products, make or buy, discontinuance of a product line etc.

1.7 TOOLS AND TECHNIQUES OF MANAGEMENT ACCOUNTING

Management accounting uses a number of tools and techniques to help management in achieving business goals. Some of the important tools and techniques are as follows :-

1. **Financial Planning :** Planning is a statement of what should be done, how it should be done and when it should be done. So financial planning determines about the long term and short-term requirements of the enterprise. It also determines the amount of capital required, sources of funds, and distribution of income and acts as a guide between the equity capital and debt and determine the investment in the various assets.

2. **Analysis of Financial Statements :** Analysis means breaking up of an amount into its elements so that one can correlate or establish relationship between them and conclusions may be drawn on the data presented in financial statements. It pin points the strength and weakness of an undertaking by use of various techniques such as trend analysis, comparative financial

statements and ratio analysis etc. It ultimately helps the executives, investors and creditors.

3. **Historical Cost Accounting** : Historical cost accounting provides information of each job, process and department to the management. The actual cost is compared with the standard cost and the variation helps the management in taking cost control in future period.

4. **Standard costing:** In standard costing costs are determined in advance. Under this method comparisons are made between standard costs and actual costs and calculation of variance indicates to management whether costs are under control or not. A favourable variance occurs when actual costs are less than standard costs, but an unfavorable variance shows a remedial action to improve the performance.

5. **Budgetary control** : It is a powerful technique available to the management for the purpose of cost control and maximization of profits through the same. It enables the management to utilize the available resources in the most profitable manner.

6. **Marginal costing** : The management accountant uses the technique of marginal costing, differential costing and break even analysis for cost control, decision making and profit maximisation.

7. **Funds flow statement** : Funds flow statement is a technique to analyse the changes in the financial condition of a business enterprise between two dates. It gives an information where from the funds are coming and how these are being used in the business.

8. **Cash flow statement** : Cash flow statement is an important tool of cash control because it summarizes sources of cash inflows and uses of cash out flows of a firm during a particular period of time, say a month or a year. It is a very useful tool for liquidity analysis of the enterprise.

9. **Responsibility Accounting.:** Responsibility accounting is an important information system. It reports information of actual and planned performances, with variances, to managers at a time when they need it for effective control and improved future performance.

10. **Decision Making** : When different alternatives are there to do a particular work, it is necessary to select the best out of alternatives. Management accounting helps the management through the techniques of marginal costing, capital budgeting, differential costing to select the best alternative which will maximize the profit in the business.

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11. **Statistical and Graphical techniques :** Management accountant uses various statistical and graphical techniques so that it may help the management in decision making. The techniques are investment chart, linear programming, statistical quality control etc.

12. **Management Information system :** Now-a-days it is very easier to record and classify data, reporting to management with the development of electronic devices. Planning, organizing, co-ordinating and controlling all are possible in the organisation through management information system.

1.8. MANAGEMENT ACCOUNTING VS. FINANCIAL ACCOUNTING

Financial Accounting and Management Accounting are two major systems of accounting information system. Both are involved with revenues and expenses, assets and liabilities and cash flows. Though they have similarities, but major differences between the two arises because they serve different audiences. The main points of differences are

	Basis	Financial Accounting	Management Accounting
1.	Purpose	Financial accounting's purpose is to provide financial statements that will be meaningful to any invested parties i.e., share holders, creditors and bankers etc.	Managementaccounting purpose is specifically to assist management in planning and control.
2.	Users	The people who use financial informations are primarily external, that is outside the organisation.	The people who use management accounting informations are internal that is inside the organisation.
3.	Accounting Methods	It is based on double entry system for recording business transactions	It is not based on double entry system.
4.	Time orientation	The information that financial accountants gather relates primarily to the past or historical records.	Management accountant deals with the future plan and policies sometimes management relies on the past records for formulation of future policies.
5.	Analysis of cost and profit:	Financial accounting shows profit or loss of the business as a whole. It does not show the cost and profit of individual products, processes or departments etc.	Management Accounting provides detailed information about individual products, plants departments or any other responsibility centres.

6.	Compulsion	In each and every organisation the preparation of financial accounts is compulsory.	Management accounting is not compulsory. It is only a service function and is helpful to management in administration of the business.
7.	Statutory requirements	Under company law and tax laws, financial accounting is obligatory to satisfy various statutory provisions.	Management accounting is optional though its utility makes it highly desirable to adopt it.
8.	Accounting standards	Companies are required to prepare financial accounts according to Accounting standards issued by the Institute of Chartered Accountants of India (ICAI)	Management accounting is not bound by accounting standards. It may use any practice which gives useful information to the management.
9.	Precision	In financial accounting only actual figures are recorded and there is no room for using approximate figures.	In management accounting no emphasis is given to actual figures. As it relates to future plan so approximate figures are considered.
10.	Monetary and non-monetary transactions	Financial accounting provides information which can be measured in terms of money only.	It includes both monetary and non-monetary events. For exp-information may be expressed in terms of rupees, units of quantity, machine hours, labour hours etc.
11.	Period	In financial accounts profit and loss account are prepared for one accounting year and balance sheet is prepared for a particular date.	In management ccounting reports are prepared, i.e. these may be monthly, weekly or even daily depending on managerial requirements.
12.	Publication and Audit	Financial statements, that is profit and loss A/c and Balance sheet are published for general public use and also sent to share holders. These are required to be audited by chartered accountants.	Management accounting statements are for internal use and thus neither published for general public use nor these are required to be audited by chartered accountants.

1.9 LIMITATIONS OF MANAGEMENT ACCOUNTING

The management accounting renders various services to management, still it suffers from certain limitations.

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1. **Based on historical data :** Management accounting helps management in making decisions for the future but is mainly based on the historical data supplied by financial accounting and cost accounting. If financial data is not reliable or accurate, management accounting will provide absurd result.

2. **Lack of wide knowledge :** For taking a sound decisions management must have knowledge on various fields like accounting, statistics, economics, taxation and mathematical techniques etc. Lack of knowledge on these subjects limits the quality of management accounting.

3. **Complicated approach :** Management accounting provides various accounting and non- accounting subjects for decision making purpose. But sometimes management avoids this complicated and lengthy course of decision making and makes decisions based on intuition. This intuitive decision limit the usefulness of management accounting.

4. **Not a substitute of administration :** The techniques suggested by management accountant are not substitute of good administration, but a supplement to the sound management and administration.

5. **Costly system :** The installation of management accounting system in an organisation is a costly affair and can be used by big concerns only. Small concerns can not afford it suitably due to this heavy cost.

6. **Developing stage :** Management accounting is not yet reached a final stage and is in the process of development. This limits the utility of this system to management in making perfect and correct decisions.

7. **Biasness :** The interpretation of information provided by management accounting may be influenced by personal bias of the interpreter of data. Personal prejudices and bias affect the objectivity of decisions.

8. **Resistance from staff :** The existing accounting and management staff may not welcome the introduction of management accounting system. They look the system with suspicion that it will add to their work and responsibilities.

QUESTIONS

1. Define management accounting explain its objectives.
2. What are the functions of management accounting?
3. Explain the nature and scope of management accounting.
4. In what respect management accounting differs from cost accounting ?

UNIT II FINANCIAL STATEMENTS

NOTES

Structure

2.0 OBJECTIVES

After going through this unit student will be able to

- Define final statements
- Identify the different types of financial statistics
- Know the limitations of financial statements.
- Define Ratio Analysis & its classifications.

2.1 INTRODUCTION

Accounting refers to the recording of various financial transactions in the books of accounts which ultimately aims at preparing the 'Financial statements." Financial statements consist of balance sheet, profit & loss account and statement of changes in financial position in financial statements is useful to different categories of users of financial data. These are managers, shareholders, creditors, government, auditors and other interest parties who are interested to know the profitability and financial position of a firm.

In the words of John N. Myer, "the financial statements provide a summary of the accounts of a business enterprise, the balance sheet reflecting the assets, liabilities and capital as on a certain date and the income statement showing the results of operation during a certain period." Financial statements are prepared as on end result of financial accounting and the major sources of financial information of an enterprise.

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2.2 TYPES OF FINANCIAL STATEMENTS

The term financial statements refers to two basic statements:

1. Balance sheet
2. Profit and loss account

Other statements are:

3. Profit and loss appropriation account
4. Funds how statement
5. Cash flow statement.

Balance sheet

A balance sheet is an accounting statement prepared from accounting balances at a given date. It shows the financial position of a business by detailing the sources of funds and the utilization of these funds. Balance sheet communicates information about the assets, liabilities and owners equity for a business form on a specific date.

Profit and loss account

Profit and loss account reflects the results of operations for a period of time. It is a flow statement. It shows the summary of revenues, expenses and net income (or net loss) of a firm for a period of time. So it is called the "score board" of the firms performance during a particular period of time that is called one "accounting period." Normally it is prepared yearly basis.

Profit and loss appropriation account

This shows how profit of a business is utilised for declaring dividends, transfer to general reserve or other reserves etc. So this account show the utilisation of profits earned by the company. The balance of this account always shows a debit balance because appropriation can not be more than profits.

Funds Flow Statement

Funds flow statement shows the changes in the financial condition of a business enterprise between the opening and closing balance sheet dates. It shows the various means by which funds were obtained during a particular period and the ways to which these funds were employed. It shows two statements:

i. Statement of changes in working capital.

ii. Statement of sources and application of funds.

Cash flow statement

A statement of changes in cash position between the beginning and end of the accounting period is known as cash flow statement. It

focuses attention on cash changes only. It describes the inflow and outflow of cash.

2.3 IMPORTANCE OF FINANCIAL STATEMENTS

NOTES

The information given in the financial statement is very useful to a number of parties as given below:

1. **Owners:** The owners provide funds for the operation of a business and they want to know whether their funds are being properly usilised or not. Financial statements are prepared to satisfy their curiosity.
2. **Creditors:** Creditors include short term creditors like debentures holders and financial institutions etc are interested in the profitability because profit is viewed as the primary source for payment of interest on loans and debentures.
3. **Investors:** Prospective investors who want to invest money in a firm would like to know the future financial position of a concern. They not only analyse the present financial position but also study the future prospects and expansion plans of the concern.
4. **Employees:** Employees are interested to know the financial position of the concern, because the payment of bonus depends upon the size of profit earned.
5. **Government:** Financial statements are used by various government departments like income tax, sales tax, excise duty etc to determine the tax liability of the company. On the basis of such financial statements the government determines tax policy, import-export polity, industry policy etc.
6. **Research scholars:** Since, financial statements act as a mirror of the financial position of a firm, these statements are of immense help to the research scholar who wants to study the financial soundness of a particular firm.
7. **Consumers:** Consumers are interested in the establishment of good accounting control so that cost of production may be reduced with the reduction of the prices of goods they buy.
8. **Purchaser of business:** Any person interested in the purchase of a going concern analyse the financial statements to determine its real value. He can make an assessment of the strengths and weakness of the business.
9. **Trade associations:** Trade associations provide service and protection to the members. Worker trade union analyse the financial statements to prepare ground for collective bargaining, to claim bonus etc.

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10. **Stock exchange:** Stock exchange deal in purchase and sale of securities in different companies. Financial statement enable the stock brokers to judge the financial position of different concern. The fixation of price of securities is based on financial statements.

2.4 LIMITATIONS OF FINANCIAL STATEMENTS

Though financial statements are precise, exact and final, but sometimes it suffer from certain limitations. These are:

i. **Interim reports:** Financial statements do not depict the exact position of a concern. The data is only given in approximate manner. The exact data can only be known if the business is sold or closed.

ii. **Effect of accounting concepts and conventions:** Various concept and conventions of accounting affect the values of assets and liabilities as shown in the balance sheet. Similarly profit or loss disclosed by P&L A/C is also affected by these concepts and conventions. For exp, on account of the going concern concept and also the convention of conservatism the balance sheet does not show current economic values of various assets and liabilities.

iii. **Effect of personal judgement:** Financial statements are influenced by the personal judgement of the accountant. For exp- the amount of provision for bad and doubtful debts depends entirely on the judgement and past experience of the accountant. Similarly, an accountant has also to make a judgement about the method and rate of depreciation for fixed assets. The quality of the financial statements thus depends upon the competence and integrity of the accountant who are responsible for preparing these statements.

iv. **Record only monetary transactions:** Financial statements record only those items which can be expressed in terms of money. But there are many factors which are qualitative in nature and can not be expressed in terms of money. These non-monetary factors do not find any place in the financial statements.

v. **Historical in nature:** Financial statements disclose data which is basically historical in nature i.e. it tells what has happened in the past. These statements do not give future projections.

vi. **Ignores human resources:** No business can prosper without an efficient work force. But financial statements do not include human resources which is a very important asset for a business.

vii. **Ignores social costs:** Apart from earning a fair return on investments, a business has certain social responsibilities.

Financial statements do not make any attempt to show the social cost of its activities. Examples of social costs of a manufacturing company are air pollution, water pollution, occupational diseases etc.

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2.5 MEANING OF ANALYSIS OF FINANCIAL STATEMENT

Analysis is the process of critically examining in detail accounting information given in the financial statements. Financial analysis is the process of identifying the financial strength and weakness of the firm by properly establishing relationship between the items of the balance sheet and the profit and loss account. The purpose of financial analysis is to diagnose the information contained in financial statements so as to judge profitability and financial soundness of the firm. In the words of Myers "Financial statement analysis is largely a study of relationship among the various financial factors in a business as disclosed by a single set of statements and a study of the trend of these factors as shown in a series of statements."

Objectives of financial analysis:

The main objectives of financial analysis are:

i. To know the present and future earning capacity or profitability of the concern.

ii. To assess the operational efficiency of the concern as a whole and of its various parts or departments.

iii. To find out short term and long-term solvency of the concern for the benefit of the trade creditors and debenture holders.

iv. To have a clear idea regarding the financial stability of a business concern.

v. To judge the solvency of the undertaking.

vi. To know the real meaning and significance of financial data.

Methods of financial statement analysis:

Generally there are four methods which describe about the financial statement analysis:

1. Comparative financial statements
2. Common size financial statements
3. Trend percentages
4. Ratio analysis

Comparative Financial Statements

Comparative financial statements mean to compare the financial position in between two or more periods. The statements of two or more years are prepared to show absolute data of two or more years, increases

or decreases in absolute data in value and in terms of percentage. Comparative statements can be prepared for both income statement as well as position statement or balance sheet.

i) **Comparative Income Statement (or profit and loss A/c):-**

An income statement shows the net profit or net loss resulting from the operation of a business for a definite period of time. A comparative income statement is prepared to show the net profit or loss for a no of years in comparative form. By comparing income statement for two or more years, it is possible to observe the progress of a business.

Illustration: 2.1

From the following information, prepare a comparative income statement:

	31.03.2003 (Rs.)	31.03.2004 (Rs.)
Sales	10,00,000	8,00,000
Cost of goods sold	6,00,000	4,00,000
Adm, selling and distribution expenses	2,00,000	1,40,000
Other incomes	40,000	20,000
Income tax	1,20,000	1,40,000

Solution

Comparative income statement for two year 2003 and 2004

Particulars	Year		Change	
	2003	2004	Absolute	%
Sales	10,00,000	8,00,000	-2,00,000	-20,000
Less-cost of goods sold	6,00,000	4,00,000	-2,00,000	-33.33
Gross profit	4,00,000	4,00,000	Nil	Nil
Less-Operating Expenses				
Admn. Selling and dist. exp.	2,00,000	1,40,000	-60,000	-30.00
Net operating profit	2,00,000	2,60,000	60,000	30.00
Other Incomes	40,000	20,000	-20,000	50.00
Net profit before loan	2,40,000	2,80,000	40,000	16.67
Less-Income Tax (50% of Net profit)	1,20,000	1,40,000	20,000	16.67
Net profit after Income Tax	1,20,000	1,40,000	20,000	16.67

Comparative Balance Sheet

This statement prepared on two or more different dates can be used for comparing assets and liabilities and to find out any increase or decrease in these items. This facilitates the comparison of figures of two or more periods and provide necessary information which may be useful in forming an opinion regarding the financial condition as well as progressive outlook of the concern. This will be more clear from the following illustration.

Illustration : 2.2

From the following information prepare a comparative balance sheet:

Balance sheet

Liabilities	31st March 2003	31st March 2004	Assets	31st March 2003	31st March 2004
Equity share capital	400,000	6,00,000	Plant and machinery	1,00,000	2,00,000
Debentures	2,00,000	3,25,000	Land and building	3,60,000	5,40,000
Sundry creditors	2,55,000	1,17,000	Investments	2,70,000	1,70,000
Bank overdraft	7,000	10,000	Sundry debtors	1, 00,000	88,000
			Cash in hand	32,000	54,000
	8,62,000	10,52,000		8,62,000	10,52,000

Items	31st March		Increase or Decrease	
	2003	2004	Absolute Rs.	Percentage %
Equity share capital	4,00,000	6,00,000	2,00,000	50.00
Debentures	2,00,000	3,25,000	1,25,000	62.25
Sundry creditors	2,55,000	1,17,000	(-)1,38,000	(-)54.12
Bank overdraft	7,000	10,000	3,000	42.86
Total liabilities and capital	8,62,000	10,52,000	1,90,000	22.04
Plant and machinery	1,00,000	2,00,000	1,00,000	100.00
Land and building	3,60,000	5,40,000	1,80,000	50.00
Investments	2,70,000	1,70,000	(-)1,00,000	(-)37.04
Sundry debtors	1,00,000	88,000	(-)12,000	12.00
Cash in hand	32,000	54,000	22,000	40.74
Total Assets	8,62,000	10,52,000	1,9,000	22.04

Common Size Statements

Common size statement is a type of comparative financial statement in which each item of the financial statement is expressed as a percentage of the appropriate total. The appropriate total is taken as 100 percent and each item is shown as a proportion of this 100 percent. Such a statement is also known as 100 percent statement or "vertical analysis". A common size statement may be prepared for balance sheet as well as income statement.

Common size income statement

In the common size income statement, total sale figure is taken as 100 percent and each item is then calculated as a percentage of sales.

Illustration : 2.3

Use the data given in illustration 2.1 to prepare a common size income statement:

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Particulars	2003		2004	
	Rs.	% of sales	Rs.	% of sales
Sales	10,00,000	100.00	8,00,000	100.00
Less-cost of goods sold	6,00,000	60.00	4,00,000	50.00
Gross profit	4,00,000	40.00	4,00,000	50.00
Less-Operating Expenses	2,00,000	20.00	1,40,000	17.50
Net operating profit	2,00,000	20.00	2,60,000	32.50
Other Incomes	40,000	4.00	20,000	2.50
Net profit before tax	2,40,000	24.00	2,80,000	35.00
Less-Income Tax (50% of Net profit)	1,20,000	12.00	1,40,000	17.50
Net profit after Tax	1,20,000	12.00	1,40,000	17.50

Common Size Balance Sheet

In common size balance sheet, each item of asset is shown as a percentage of total assets and each item of capital and liabilities is shown as a percentage of total liabilities and capital. Both side of balance sheet is taken as 100 percent and each item appearing on assets and liabilities side is shown as a proportion of the total of 100.

Illustration: 2.4

Refer to illustration 2.2 A common size balance sheet is prepared as follows.

Common size balance sheet

Particulars	31st March 2003		31st March 2004	
	Rs.	% of total	Rs.	% of total
Liabilities and Capital				
Equity share capital	4,00,000	46.40	6,00,000	57.03
Debentures	2,00,000	23.20	3,25,000	30.89
Sundry creditors	2,55,000	29.58	1,17,000	11.13
Bank overdraft	7,000	.82	10,000	.95
Total liabilities and capital	8,62,000	100	10,52,000	100
Assets				
Plant and machinery	1,00,000	11.60	2,00,000	19.01
Land and building	3,60,000	41.76	5,40,000	51.33
Investments	2,70,000	31.32	1,70,000	16.16
Sundry debtors	1,00,000	11.60	88,000	8.37
Cash-in-hand	32,000	3.72	54,000	5.13
Total Assets	8,62,000	100	10,52,000	100

Interpretation

In 2003 out siders liabilities is more than share holders, where as in 2004 share holders is more than outsiders liabilities. Fixed assets investment in 2004 is more than in 2003. So it is a good sign that share holders fund invested more in fixed assets in 2004 than in 2003.

Trend Percentages

Trend percentages is a technique of studying financial statements of a company over a number of years. Under this method, a

representative year is selected as the base year are assumed to be 100. Then the relationship of each item in the subsequent years is expressed as a percentage of the same item in the base year. This means, when an item is expressed as 100 all other values expressed in terms of the base year will reflect in trend, upward or downward, in relation to 100. Any year may be taken as the base, but generally starting or initial year is taken as base year.

Advantages:

i. Trend percentages is of immense use in making a comparative analysis over a series of years.

ii. It is easy to identify changes and interpret the same because percentage figures disclose more than absolute figures.

Illustration : 2.5

Calculate trend percentages from the following figures taking 1995 on the base:

Year	Sales	Stocks	Profit before tax (PBT)
1995	1,881	709	321
1996	2,340	781	435
1997	2,655	816	458
1998	3,021	944	527
1999	3,768	1,154	672

Solution

The formula for calculating the trend percentages.

$$\frac{\text{Current Year}}{\text{Base Year}} \times 100$$

Year	Sales	Stock	PBT
95	100	100	100
96	$\frac{2340}{1881} \times 100 = 124.40$	$\frac{781}{709} \times 100 = 110.16$	$\frac{435}{321} \times 100 = 135.51$
97	$\frac{2655}{1881} \times 100 = 141.15$	$\frac{816}{709} \times 100 = 115.10$	$\frac{458}{3121} \times 100 = 142.68$
98	$\frac{3021}{1881} \times 100 = 160.61$	$\frac{944}{709} \times 100 = 133.15$	$\frac{527}{321} \times 100 = 164.18$
99	$\frac{3768}{1881} \times 100 = 200.32$	$\frac{1154}{709} \times 100 = 162.76$	$\frac{672}{321} \times 100 = 209.35$

Sales and profit are showing a rising trend there by indicating a smooth rate of growth of company over the years. It is important to note

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that while both sales and profit are rising, rate of increase of PBT is more than the rate of growth in sales. This means that quite a good part of the total cost is fixed in nature because total cost is not increasing in proportion to sales. The stock is also showing a rising trend.

Questions

1. What do you mean by financial statements? What are included in the financial statements?
2. Discuss the nature of financial statements.
3. Discuss the utility and significance of financial statements to various parties in the business concern.
4. Write the limitations of financial statements of a business enterprise.
5. Explain the different types of financial statements analysis that can be made in a business concern.
6. What do you understand by comparative financial statements? How these statements are prepared?
7. What is common-size balance sheet and income statement? Explain the technique of preparing common size balance sheet.

Practical problems

1. From the following information, prepare a comparative income statement:

	2003	2004
Sales	4,00,000	5,00,000
Cost of goods sold	2,00,000	3,00,000
Administrative, selling expenses	1,00,000	70,000
Other income	20,000	10,000
Income tax	60,000	70,000

From the following balance sheet prepare:

(a) Comparative balance sheet.

(b) Common size balance sheet.

Balance sheet

Liabilities	2003	2004	Assets	2003	2004
Equity sh. capital	5,00,000	10,00,000	Fixed assets	4,00,000	10,00,000
Preference sh capital	1,00,000	2,00,000	Investment	3,00,000	1,00,000
General reserve	1,00,000	2,00,000	Receivable	2,00,000	4,00,000
Outstanding expenses	50,000	50,000	Investment	1,00,000	4,00,000
P & L A/C	2,00,000	3,00,000	Cash	50,000	1,00,000
	10,50,000	20,00,000		10,50,000	20,00,000

3. From the following details construct statements showing

(a) Comparative changes in profit

(b) Causes for changes in profit

	2003	2004
Sales	5,00,000	6,00,000
Cost of sales	3,75,000	4,40,000
Selling expenses	20,000	40,000
Admn. Expenses	30,000	40,000
Financial expenses	10,000	5,000

4. Prepare a statement showing trend analysis (B. 4-1999)

	1999	2000	2001
Cash	200	240	160
Debtors	600	800	700
Inventory	800	1000	1000
Land	300	400	500
Building	1200	1400	1600
Plant	2500	2800	3000

2.6 RATIO ANALYSIS

Introduction

Generally, an absolute figure conveys no meaning. A figure may become meaningful if it is compared with some other information. To get a qualitative indication about the performance of the organisation the technique of "Ratio Analysis" comes in to the picture. Ratio Analysis is most widely used tool of financial analysis.

The term "ratio" implies arithmetical relationship between two related figures. It is expressed where one figure is divided by the other. If 10,000 is divided by 40,000 the ratio can be used as a yard stick for evaluating the financial position and performance of a concern either individually or in relation to those of other firms in the same industry. Proper comparison of ratios may reveal where a firm is placed as compared with earlier periods or in comparison with other firms in the same industry. It is one of the best possible techniques available to the management to impart the basic functions like planning and control.

As ratio analysis is concerned with all the aspects of a firm's financial analysis, i.e. liquidity, solvency, activity, profitability and overall performance, it enables the interested persons to know the financial and operational characteristics of an organisation and take the suitable decisions.

Classification of Ratios

Ratios may be classified in a variety of ways. Ratios indicating profitability are calculated on the basis of profit and loss account, those

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indicating financial position are computed on the basis of the balance sheet and those which shows operating efficiency or productivity are calculated on the basis of figures in the profit and loss account and the balance sheet.

For convenience purposes, we will classify the ratios under the following groups:

1. Liquidity Ratios
2. Capital structure Ratios
3. Turnover Ratios
4. Profitability Ratios

2.6.1 LIQUIDITY RATIOS

"Liquidity" means ability of a firm to meet its current obligations. Usually commercial banks and short term creditors may be basically interested in the ratios falling under this group. Following ratios indicate the liquidity of business.

1. Current Ratio (Working Capital Ratio):

This is the most widely used Ratio. It may be defined as the relationship between current assets and current liabilities.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Meaning of current assets - current assets include cash in hand, cash at bank, marketable securities, bills receivable, debtors, stock-in trade, pre-paid expenses and short-term loans and advances.

Current liabilities:

Current liabilities include sundry creditors, bills payable, bank overdraft, income tax payable, dividend payable, outstanding expenses, provision for taxation and the portion of long term debt to mature within one year.

Significance:

Current ratio shows the good light on the short-term financial position of a concern. A high current Ratio indicates that there are sufficient assets available with the organisation which can be converted into cash, without any reduction in value, in a short span of time, to pay off the liabilities. As such higher the current Ratio, better will be the situation. A current Ratio of 2:1 is supposed to be standard and ideal. A very high current Ratio is also not desirable because it indicates idleness of funds which is not a sign of efficient financial management.

Illustration : 2.6

The following is the balance sheet of X Ltd. as on 31st Dec. 2004. From the above data, current Ratio is calculated as : .

Liabilities	Rs.	Assets	Rs.
Equity Capital	50,000	Plant and Matching	95,000
Profit & Loss A/c	10,000	Sundry debtors	16,000
Debentures	30,000	Stock	30,000
Sundry creditors	50,000	Cash at bank	5,000
Taxation provision	10,000	Prepaid insurance	4,000
	1,50,000		1,50,000

From the above data, current ratio is calculated as

Current Assets = 16,000+30,000+5,000+4,000 = 55,000

Current Liabilities = 50,000 + 10,000 = 60,000

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{55,000}{60,000} = \frac{.92}{1}$$

Quick Ratio:

This Ratio is otherwise known as acid test ratio or liquid ratio. It shows a firm's ability to meet its current liabilities with its most liquid assets.

$$\text{Current Ratio} = \frac{\text{Quick (liquid) Assets}}{\text{Quick Liabilities}}$$

Quick Assets include all current assets except inventories and prepared expenses. Quick liabilities include all current liabilities except bank overdraft.

Significance :

Quick ratio is more rigorous test of liquidity than the current ratio. When quick ratio is used with current ratio, it gives a better picture of the firms ability to meet its short-term assets. This Ratio is of great importance to banks and financial institution. A liquid Ratio of 1:1 is supposed to be standard and ideal. If business is less than 1:1 then it may find itself in serious financial difficulties.

Absolute liquidity Ratios:

In order to test the exact liquidity position of the firm and to meet short-term obligations. Absolute liquidity Ratio may be calculated.

$$\text{Absolute Liquid Ratio} = \frac{\text{Absolute Liquid Assets}}{\text{Current Liabilities}}$$

Absolute liquid assets means cash and marketable securities or temporary investments.

The acceptable norm for this Ratio is 5:1 or 1:2 i.e. absolute liquid assets is half of the current liabilities.

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Illustration : 2.7

Calculate liquidity Ratios from the following information and comment on them.

Balance sheet of X Ltd. as on 31st Sept. 2004

Liabilities	Rs.	Assets	Rs.
Equity sh. Capital	12,00,000	Good will	2,00,000
7% preference sh. Capital	7,00,000	Land and building	4,60,000
Debentures	4,00,000	Plant and machinery	6,00,000
Bank overdraft	1,50,000	Trade Investments	6,00,000
Sundry creditors	1,20,000	Debtors	3,00,000
Bills payable	60,000	Bill receivable	80,000
Liability for tax	40,000	Cash in hand	1,00,000
		Cash at bank	1,20,000
		Stock	2,00,000
		Prepaid Rent	10,000
	26,70,000		**26,70,000**

Solution

(a) $$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Current Assets : 3,00,000+80,000 + 1,00,000 + 1,20,000 + 2,00,000 +10,000 = 8,10,000

Current Liabilities : 1,20,000 + 60,000 + 40,000 = 2,20,000

$$\text{Current Ratio} = \frac{8,10,100}{2,20,000} = 3.68$$

(b) $$\text{Acid Test Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

Liquid Assets = C.A. – (Stock+prepaid rent)

= 8,10,000 (2,00,000+10,000) = 6,00,000

$$\text{Acid Test Ratio} = \frac{6,00,000}{2,20,000} = 2.73$$

(c) $$\text{Absolute Liquid Ratio} = \frac{\text{Absolute Liquid Assets}}{\text{Current Liabilities}}$$

Absolute Liquid Assets = 1,00,000 + 1,20,000 = 2,20,000

$$\text{Absolute Liquid Ratio} = \frac{2,20,000}{2,20,000} = 1$$

Comments:

All the Ratios in the organisation is above the "rule of thumb". So it is not desirable for the ogranisation to keep so much assets in the hand to meet the current obligations. The company needs to reduce the current assets so that short-term financial position of the organisation is good.

Illustration : 2.8

Find out current assets when current Ratio is 2.4 and working capital is Rs. 1,40,000.

Solution:

Working Capital = Current Assets – Current Liabilities

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{2.4}{1}$$

Let the current liabilities be x

Current Assets will be 2.4x.

Working capital = 2.4x - x.

1,40,000 = 1.4x

$$x = \frac{1,40,000}{1.4} = \text{Rs. } 1,00,000$$

Current Assets = 2.4x = 2.4 X 1,00,000 = 2,40,000

Illustration : 2.9

From the following information calculate

(a) Current Assets

(b) Current Liabilities

(c) Liquid Assts

(d) Stock

When Current Ratio : 2.5

Liquidity ratio : 1.5

Working capital : Rs.60,000

Solution

Working Capital = Current Assets – Current Liabilities

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{2.5}{1}$$

Let the current liabilities be x

Current assets will be 2.5x.

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Working capital = 2.5x-x

60,000 = 1.5x

$$x = \frac{60,000}{1.5} = \frac{60,000 \times 10}{15} = \text{Rs. } 40,000$$

Current liabilities = Rs.40,000

Current Assets = 2.5 x 40,000 = Rs. 1,00,000

$$\text{Liquid Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

$$1.5 = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

Liquid Assets = 40,000 x 1.5 = Rs.60,000

Stock = Current Assets – Liquid Assets

= 1,00,000 – 60,000

= Rs.40,000

LONG TERM SOLVENCY

The term solvency refers to the ability of a firm to meet its long term obligations. Generally share holders, debenture holders and other lenders of long term loan, may be basically interested in the Ratios falling under this group. Following Ratios may be computed under this group.

$$\text{Debt Equity Ratio} = \frac{\text{Outside Fund}}{\text{Share holders Fund}}$$

Outsiders fund include all long term and short-term liabilities such as debentures, bonds, mortgages or bills. The shareholders fund consists of equity share capital, preference share capital, capital reserves, revenue reserves, accumulated profits, sinking fund etc. less fictitious assets.

(i) Interpretation :

This Ratio is calculated to measure the extent of outsider fund has been used in a business. A low debt equity Ratio implies a greater claim of owners on the assets of the company than the creditors. On the other hand, higher debt equity Ratio indicates that the claims of the creditors are greater than those of owners. The debt equity Ratio of 1:1 is generally acceptable.

When current liabilities are excluded from outsiders fund

$$\text{Debt Equity Ratio} = \frac{\text{Outside Fund}}{\text{Share holders Fund}}$$

(ii) Funded debt to Total Capitalisation Ratio:

This Ratio establishes a relation-ship between long-ter n funds raised from outsiders and total long-term funds available in the business.

$$\text{Funded Debt to Total Capialisation Ratio} = \frac{\text{Funded Debt}}{\text{Total Capitalisation}} \times 100$$

Funded Debt = Debentures + Mortgage loans + Bonds + other long term loans

Total Capitalisation = Equity share capital + Preference share capital + Reserve and Surplus + Other undistributed Reserves + Debentures + Mortgage loans + Bonds + other long term loans

Funded debt is that part of total capitalisation which is f nanced by outsiders. Though there is no "rule of thumb" but still the lesser the reliance on outsiders the better it will be. If the Ratio is upto 50% it is acceptable but not more than that.

(iii) Proprietary Ratio:

Proprietary Ratio which shows the relationship between shareholders funds and total tangible assets.

$$\text{Proprietary Ratio or Equit Ratio} = \frac{\text{Shareholders fund}}{\text{Total Tangible Assets}}$$

Share holders finds comprise of ordinary share capital, preference capital and all items of reserve and surplus. Tangible assets are those which have a definite realisable value.

The higher the proprietary Ratio, the greater the long term stability of the company and greater protection to creditors.

Illustration : 2.10 Balance sheet

Liabilities	Rs.	Assets	Rs.
Equity sh. Capital	1,50,000	Good will	50,000
8% preference sh. Capital	50,000	Plant and machinery	1,80,000
General reserve	70,000	Land and building	1,20,000
Profit & loss account	30,000	Stock-in-trade	60,000
6% debentures	1,00,000	Investments	40,000
Sundry creditors	95,000	Stock-in-trade	35,000
Wages outstanding	5,000	Cash at bank	15,000
	5,00,000		**5,00,000**

Calculate (i) Debt Equity Ratio

(ii) Proprietary Ratio

Solutions

(i) $$\text{Debt Equity Ratio} = \frac{\text{Outside Fund}}{\text{Share holders Fund}}$$

$$= \frac{1,00,000 + 95,000 + 5,000}{1,50,000 + 50,000 + 70,000 + 30,000} = \frac{2,00,000}{3,00,000} = \frac{2}{3}$$

(ii) $$\text{Debt Equity Ratio} = \frac{\text{Long Term Debt}}{\text{Share holders Fund}}$$

$$= \frac{1,00,000}{30,00,000} = 1.3$$

(iii) $$\text{Proprietary Ratio} = \frac{\text{Shareholders Fund}}{\text{Total Assets}}$$

$$= \frac{1,50,000 + 50,000 + 70,000 + 30,000}{50,00,000} = \frac{3,00,000}{5,00,000} = \frac{3}{5}$$

(iv) **Interest Coverage Ratio:**

This Ratio indicates whether the business earns sufficient profit to pay periodically the interest charges.

$$\text{Interest Coverage Ratio} = \frac{\text{Earning before Interest and taxes}}{\text{Fixed Interest Charges}}$$

This Ratio is very important from lenders point of view because it indicates the ability of a company to pay interest out of its profits. Higher the Ratio, more safe are the long term creditors, because even if the profit decrease, the firm is able to meet its commitment of fixed interest charges. The standard for this Ratio for an industrial company is that interest charges should be covered six to seven times.

Illustration : 2.11

Net profit after tax of a firm if Rs. 1,00,000 and fixed interest charges is Rs. 20,000. The rate of income tax is 50%. Calculate interest coverage Ratio.

$$\text{Interest Coverage Ratio} = \frac{\text{Net profit before interest and tax}}{\text{Fixed Interest Charges}}$$

$$= \frac{1,00,000 + 1,00,000 + 20,000}{20,000} = \frac{2,20,000}{20,000} = 11 \text{ times}$$

2.6.3 TURNOVER RATIOS

This Ratio is other wise known as performance Ratios or Activity Ratios. These Ratio are called turnover ratios because they indicate the

speed with which assets are being converted into sales. A higher turnover ratio generally indicates better use of capital resources which in turn has a favourable effect on the profitability of the firm.

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(i) **Inventory Turnover Ratio:**

The Ratio is calculated by dividing the cost of goods sold by average inventory.

(a) $$\text{Inventory Turnover Ratio} = \frac{\text{Cost of goods sold}}{\text{Average Inventory at cost}}$$

Where, cost of goods sold = Sales – Gross profit

Or, cost of goods sold

Opening stock + Purchases + direct expenses – closing stock

$$\text{Average stock} = \frac{\text{Opening stock + closing stock}}{2}$$

When cost of goods sold figure is not available, inventory turnover ratio may be calculated as

(b) $$\text{Invetory Turnover Ratio} = \frac{\text{Net Sales}}{\text{Average Invetory at cost}}$$

(c) $$\text{Invetory Turnover Ratio} = \frac{\text{Net Sales}}{\text{Average Invetory at selling price}}$$

Inventory Conversion Period:

To see the average time taken for clearing the stocks inventory conversion period is calculated. This is calculated by dividing the number of days by inventory turnover.

$$\text{Invetory Conversion period} = \frac{\text{Day in a year}}{\text{Invetory at Turnover Ratio}} = \text{? No. of days}$$

Indications:

A high inventory turnover Ratio indicates that maximum sales turnover is achieved with the minimum investment in inventory. So, high inventory turnover Ratio is desirable. A low inventory turnover Ratio may indicate over investment in inventory, improper inventory management or accumulation of obsolete stock. There can be no standard inventory turnover Ratio which may be considered to be ideal. It may depend on nature of industry and marketing strategies followed by the organisation.

Illustration : 2.12

X Ltd. supplies you the following information for the accounting year 2004

Total sales - Rs. 4,50,000
Return inward- Rs. 20,000
Stock at the beginning of the year = Rs. 35,000
Stock at the end of the year = Rs.45,000
Gross profit for the year = Rs. 70,000

You are required to calculate :

i) Inventory Turnover Ratio

ii) Inventory Conversion Period

Solution :

(i) Invetory Turnover Ratio $= \frac{\text{Cost of goods sold}}{\text{Average stock}}$

Cost of goods sold = Sales – return inward – Gross profit
= 4,50,000 – 20,000 – 70,000 = 3,60,000

$$\text{Average stock} = \frac{\text{Opening stock + closing stock}}{2}$$

$$= \frac{35,000 + 45,000}{2} = \text{Rs. } 40,000$$

$$\text{Inventory Turnover} = \frac{3,60,000}{40,000} = 9 \text{ times}$$

(ii) $\text{Inventory Conversion period} = \frac{365}{\text{Inventory Turnover}}$

$$= \frac{365}{9} = 40.5 \text{ or } 41 \text{ days}$$

(ii) Debtors Turnover Ratio

This ratio indicates the relationship between net credit sales and trade debtors.

$$\text{Debturs Turnover Ratio} = \frac{\text{Net credit sales}}{\text{Average Debtros}}$$

Debtors include trade debtors and bills receivable. Doubtful debts are not deducted from debtors.

Average collection period:

It represents the average no. days for which a firm has to wait before its receivables are converted into cash.

$$\text{Average Collection Period} = \frac{\text{Days in a year}}{\text{Debtors turnover Ratio}}$$

$$= \frac{\text{Debtors}}{\text{Net credit sales}} \times 365\text{days}$$

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Significance:

This ratio indicates the speed at which the sundry debtors are converted in the form of cash. The higher the value of debtors turnover the more efficient is the management. Changes in this Ratio shows the changes in the companys credit policy or changes on its ability to collect from its debtors.

Illustration : 2.13

Find out (a) Debtors Turnover (b) Average collection period from the following informations.

Annual credit sales = 6,00,000

Debtors at the beginning = Rs.80,000

Debtors at the end = Rs.1,20,000

Solutions

$$\text{Average debtors} = \frac{\text{Opening debtors + closing debtros}}{2}$$

$$= \frac{80,000 + 1,20,000}{2} = \text{Rs.}1,00,000$$

$$\text{Debtors Turnover Ratio} = \frac{\text{Net credit sales}}{\text{Average Debtors}}$$

$$= \frac{6,00,000}{1,00,000} = 6 \text{ times}$$

$$\text{Average Collection period} = \frac{\text{No of working days in year}}{\text{Debtors Turnover}}$$

$$= \frac{360}{6} = 60 \text{ days}$$

Creditors Turnover Ratio:

This Ratio gives the average credit period enjoyed from the creditors and is calculated as under.

$$\frac{\text{Credit purchases}}{\text{Average Accounts Payable (Creditors + BIP)}}$$

NOTES

A high Ratio indicates that creditors are not paid in time while a low ratio gives an idea that the business is not taking full advantages of credit period allowed by the creditors.

$$\text{Average Payment Period} = \frac{\text{Days in a year}}{\text{Creditors Turnover Ratio}}$$

Example:

Credit purchase during their = 6,00,000

Creditors at the beginning = Rs. 80,000

Creditors at the end = Rs. 40,000

$$\text{Credit Turnover Ratio} = \frac{6,00,000}{\frac{80,000 + 40,000}{2}} = \frac{6,00,000}{60,000} = 10 \text{ times}$$

$$\text{Average Payament Period} = \frac{365}{10} = 36.5 \text{ days} = 37 \text{ days}$$

Fixed Assets Turnover Ratio:

This Ratio indicates the efficiency with which the firm is utilising its investment in fixed assets such as plant and machinery, land and building etc. It is computed as under

$$\text{Fixed Assets Turnover} = \frac{\text{Sales (or cost of sales)}}{\text{Net Fixed Assets}}$$

This higher the Ratio, the better is the performance. The low ratio signify that the firm has an excessive investment in fixed assets.

Working Capital Turnover Ratio:

This Ratio shows the number of times working capital is turned over in a stated period.

$$\text{Working Capital Turnover Ratio} = \frac{\text{Sales}}{\text{Net Working Assets}}$$

The term net working capital means current assets minus current liabilities.

The higher the Ratio, the lower is the investment in working capital and the greater are the profits. A low Ratio indicates excess of net working capital which is not efficiently utilized.

Capital Turnover Ratio:

This Ratio shows the relationship between sales and total capital employed.

$$\text{Capital Turnover Ratio} = \frac{\text{Sales}}{\text{Total Capital Employed}}$$

Total capital employed means both long term liabilities and total of shareholders funds less fictitious assets like preliminary expenses, discount on issue of shares, debit balance of profit & loss account etc.

Significance:

A high capital turnover ratio indicates the possibility of greater profit. A low capital turnover ratio should be taken to mean that sufficient sales are not being made and profits are lower.

Illustration : 2.14

The following Balance sheet of X Ltd. is on 31st Dec.2003

Liabilities	Rs.	Assets	Rs.
Share Capital	2,30,000	Land and building	3,00,000
General Reserve	1,00,000	Plant and machinery	1,80,000
Debenture	2,20,000	Debtors	1,90,000
Profit & loss account	1,20,000	Cash-in-hand	1,10,000
Creditors	1,30,000	Cash at bank	90,000
Bills payable	1,00,000	Preliminary expenses	30,000
	9,00,000		**9,00,000**

Sales during the year 2003 amounted to Rs.6,00,000. Calculable

(i) Fixed Assets Turnover Ratio

(ii) Working Capital Turnover Ratio

(iii) Capital Turnover Ratio

Solutions

(i) $\text{Fixed Assets Turnover Ratio} = \frac{\text{Sales}}{\text{Fixed Assets}}$

$$= \frac{6,00,000}{3,00,000 + 1,80,000} = \frac{6,00,000}{4,80,000} = \frac{5}{4} = 1.25 \text{ times}$$

(ii) $\text{Woring Capital Turnover Ratio} = \frac{\text{Sales}}{\text{Networking Capital}}$

Current Assets = 1,90,000 + 1,10,000 + 90,000 = 3,90,000

Current Liabilities = 1,30,000 + 1,00,000 = 2,30,000

Net Working Capital = C.A. – C.L.

= 3,90,000 – 2,30,000

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= Rs. 1,60,000

$$= \frac{6,00,000}{1,60,000} = 3.75 \text{ times}$$

(iii) Capital Turnover Ratio = $\frac{\text{Sales}}{\text{Capital employed}}$

Capital employed : Fixed assets plus net working capital

= 4,80,000 + 1,60,000

= 6,40,000

$$= \frac{6,00,000}{6,40,000} = .94 \text{ times}$$

2.6.4. PROFITABILITY RATIOS

A company should earn profit to survive and grow over a lor period of time. Profit is the ultimate output of a company, and it will hav no future if it fails to make sufficient profits. The profitability ratios a calculated to measure the operating efficiency of the company. General profitability of a business may be measured in two ways: -

1. Profitability is relation to sales.
2. Profitability is relation to investment.

Profit in relation to sales indicates profit on each rupee of sale profitability in relation to investment indicates the amount of profit p rupees invested in assets.

The following are the important profitability Ratios.

1. Gross Profit Ratio:

This Ratio measures the relationship of gross profit to net sale

$$\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Net sales}} \times 100$$

A low gross profit Ratio may indicate a higher cost of goods sol due to higher cost of production. It may also be due to low selling price A high gross profit Ratio, on the other hand indicates relatively lowe cost and is a sign of good management.

Operating Ratio:

This Ratio explains the relationship between cost of goods sol and operating expense on the one hand and net sales on the other.

$$\text{Operating Ratio} = \frac{\text{Cost of goods sold + Operating expenses}}{\text{Net sales}} \times 100$$

Operating expenses include administrative expense and selling and distribution expense etc.

Lower the Ratio, the better it is. Higher the Ratio, the less favourable it is because it would have a smaller margin of operating profit.

NOTES

Operating Profit Ratio:

This Ratio is calculated by dividing the operating profit by sales.

Operating Profit = Net sales – (Cost of goods sold + operating expenses)

Or Operating profit = Net profit + Non-operating expenses – Non-operating incomes

$$\text{Operating Profit Ratio} = \frac{\text{Operating profit}}{\text{Sales}} \times 100$$

Expenses Ratio:

Expenses Ratios indicate the relationship of various expenses to net sales. The Ratio can be calculated for each individual item of expenses or group of items of a particular type of expenses. The lower the Ratio, the greater is the profitability and higher the Ratio, the lesser is the profitability.

$$\text{Particular expenses ratio} = \frac{\text{Particular expenses}}{\text{Net Sales}} \times 100$$

(a) $$\text{Raw material Ratio} = \frac{\text{Direct Material cost}}{\text{Net Sales}} \times 100$$

(b) $$\text{Labour Ratio} = \frac{\text{Direct Labour cost}}{\text{Net Sales}} \times 100$$

(c) $$\text{Cost goods sold Ratio} = \frac{\text{Direct Labour cost}}{\text{Net Sales}} \times 100$$

(d) $$\text{Administrative Overhead Ratio} = \frac{\text{Administrative expenses}}{\text{Net Sales}} \times 100$$

Net Profit Ratio:

Net Profit ratio establishes a relationship between Net Profit (after tax) and sales.

$$\text{Net Profit Ratio} = \frac{\text{Net profit}}{\text{Net Sales}} \times 100$$

Net profit = Gross Profit – All expenses + All other income

A firm with a high net profit ratio is in an advantageous position to survive in the face of rising cost of production and falling selling prices.

NOTES

Illustration : 2.15

The following is the revenue statement of X Ltd. for the year ending 2004.

Sales	10,00,000
Less-cost of goods sold	6,00,000
Gross profit	4,00,000
Less-operating expenses	2,40,000
Operating profit	1,60,000
Add –Non-operating Income	40,000
	2,00,000
Less-Non-operating expenses	20,000
Net profit	**1,80,000**

Calculate (a) Gross profit ratio (b) Operating ratio

(c) Operating profit ratio (d) Net profit ratio

Solutions

(a) $$\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$$

$$= \frac{4,00,000}{10,00,000} \times 100 = 40\%$$

(b) Operating Ratio =

$$\frac{\text{Cost of goods sold} + \text{operating expenses}}{\text{Net Sales}} \times 100$$

$$= \frac{6,00,000 + 2,40,00}{10,00,000} \times 100$$

$$= \frac{8,40,000}{10,00,000} \times 100 = 84\%$$

(c) Operating Profit Ratio =

100 – Operating ratio

= 100-84=16%

(d) $$\text{Net profit Ratio} = \frac{\text{Net profit}}{\text{Net sales}} \times 100$$

$$= \frac{1,80,000}{10,00,000} \times 100 = 18\%$$

PROFITABILITY RATIOS BASED ON INVESTMENT:

(a) Return On Investment (ROI):

This Ratio measures the overall profitability. It is ascertained by comparing profit earned and capital employed in the business.

$$\text{Return on Investment} = \frac{\text{Profit before Interest and Tax}}{\text{Capital Employed}} \times 100$$

Capital employed is computed as follows.

Equity share capital + Preference share capital +Reserve and other undistributed profit + long term loans and debentures – Fictions assets- Non operating assets

From assets side it can be computed as

Tangible fixed and Intangible assets + Current assets-current liabilities

Significance:

This Ratio measures the over all efficiency of business and evaluating the performance of various departments. A higher percentage of return on capital employed will satisfy the owners that their money is profitably utilised. Borrowing policy of the enterprise may be properly formulated. The outsiders like bankers, creditors and financial institution see that whether they can give loan to the concerns or not.

(b) Return on share holders fund:

It is the relationship between net profit after (interest and tax) and the proprietors fund.

$$\text{Return on shareholders fund} = \frac{\text{Net profit after interest and Tax}}{\text{Shareholders fund}}$$

The ratio of net profit to shareholders fund shows the extort to which the profitability of a concern is achieved. Higher the Ratio, the better it is.

Return on Equity Capital:

This Ratio establishes the relationship between the net profit available to equity share holders and the amount of capital invested by them.

$$\text{Return on Equity Capital} = \frac{\text{Net profit after Tax Dividend}}{\text{Equity share capital}} \times 100$$

Significance:

This Ratio shows the profit percentage for equity share holders who takes the highest risk in the company. A high rate of return on equity shareholders funds is favored by investors. For inter firm comparison this Ratio is use-ful to determine where the return is higher.

Earning Per Share (EPS):

This ratio measures the profitability of the firm on a per share basis. It is calculated as follows:

$$\text{Earning per share} = \frac{\text{Net profit after tax and preference dividend}}{\text{No. of Equity shares}}$$

Significance:

Earning per share is the most widely used data to represent the various financial operations of the company. A comparison of earning per share of the company with another company will also help in deciding whether the equity capital is being effectively used or not.

Illustration: 2.16

The following figure are available of X Ltd. for the year ended 31st March, 2004.

Net profit before interest and tax Rs. 3,00,000. Net profit after tax Rs. 2,25,000. Net profit after interest and tax 1,80,000. Preference dividend Rs. 40,000. Capital employed 12,00,000. Total assets 14,00,000. Equity share holders fund Rs. 7,00,000.

Calculate (i) Return on capital employed.

(ii) Return on total assets.

(iii) Return on share holder's funds.

Solutions :

(i) Return on capital employed

$$= \frac{\text{Net profit before interest and tax}}{\text{Capital employed}} \times 100$$

$$= \frac{3,00,000}{12,00,000} \times 100 = 25\%$$

(ii) Return on Total assets

Net profit after interest and tax

$$= \frac{\text{Net profit after interest and tax}}{\text{Total Assets}} \times 100$$

$$= \frac{1,80,000}{14,00,000} \times 100 = 12.8\%$$

(iii) Return on Eq. shareholders fund

$$= \frac{\text{Net profit after tax} - \text{pref. dividend}}{\text{Eq. share capital}} \times 100$$

$$= \frac{1,80,000 - 40,000}{7,00,000} \times 100$$

$$= \frac{1,40,000}{7,00,000} \times 100 = 20\%$$

Price Earning Ratio:

This Ratio indicates the market value of every rupee earning in the firm and is compared with industry average. High Ratio indicates the share is overvalued and low Ratio shows that share is under valued.

$$\text{Price Earning Ratio} = \frac{\text{Market price per Equity share}}{\text{Earning per share}} \times 100$$

This Ratio helps the shareholders to decide whether shares should be purchased or not in a company. If the shares are to be purchased then it indicates the possibility of capital appreciation.

Dividend payout Ratio =

$$\text{It is calculated as} = \frac{\text{Dividend per share}}{\text{Earning per share}} \times 100$$

It measures the relationship between the earning belongings to the equity shareholders and the amount finally paid to them by way of dividend. It indicates the policy of management to pay cash dividend.

Advantages of Ratio Analysis:

Ratio analysis is an important and useful technique to check upon the efficiency or financial health of the enterprise. It indicates the trend of progress or downfall of the firm. The use of Ratio analysis is not confined to the financial manager only. The credit supplier, banks, lending institutions and experienced investor all use Ratio analysis as their initial tool in evaluating the firm as a desirable borrower or as a potential investment outlet. With the use of ratio analysis one can measure the financial condition of a firm and can point out whether the condition is good, strong, questionable or poor. The following are the important managerial uses of Ratio analysis:

i. **Aid in financial fore castin**

Ratio analysis is very helpful in financial forecasting. Ratios relating to past sales, profits and financial position are the base for future trends. Meaningful conclusion can be drawn for future from these ratios.

NOTES

ii. **Aid in comparison:**

With the help of Ratio analysis ideal Ratios can be composed and they can be used for comparison of a particular firm's progress and performance.

iii. **Help in decision making:**

Accounting Ratios reveal the financial position of the concern. This helps the banks, insurance companies and other financial institutions in lending and making investment decisions.

iv. **Aid in cost control:**

Ratios are very useful for measuring the performance and very useful in cost control.

v. **Communication value:**

Different financial Ratios communitate the strength and financial standing of the firm of the internal and external parties.

vi. **Other uses:**

Financial Ratios are very helpful in the diagnosis of financial health of a firm. They highlight the liquidity, solvency, profitability and capital gearing etc of the firm.

Limitations of Ratio Analysis:

Though the Ratios are simple to calculate and easy to understand, they must be used very carefully. If due care is not taken they might confuse rather than clarify the situations. So following limitations should be kept in mind while making use of Ratio analysis in interpreting the financial statements.

1. **Limited use of a single Ratio:** Ratio can be use full only when they are computed in a sufficient large number. A single ratio would not be able to convey anything. At the same time, if too many ratios are calculated, they are likely to confuse instead of making any useful meaning.
2. **Lack of quantitative analysis of the problem:** Ratio analysis gives only a good basis for quantitative analysis of financial problems. But it suffer from qualitative aspects.
3. **Inherent limitations of Accounting:** Because ratio are computed from historical accounting records, so they also posses those limitation and weakness as accounting records posses.
4. **Lack of proper Standards:** While making comparison it is always a challenging job to find out an adequate standard. It is not possible to calculate exact and well accepted standard, so a quality range is used for this purpose.

5. **Window-dressing:** In ratio analysis window dressing is possible and firms may be successful in concealing the real position.

6. **Part is not indicator of future:** It is not always possible to make future estimates of the basic of the past as it does not always come true.

7. **Background is overlooked:** When an inter firm comparison is made on the basis of ratio analysis and they differ substantially in size, age and nature of products, ratio analysis can not give satisfactory results.

8. **Price level changes:** Both the inter firm comparisons are affected by price level changes. A change in price level can affect the validity of ratios calculated for different time periods. In such case the ratio analysis may not clearly inficate the trends in solvency and profitability of the company.

9. **Personal Bais:** Ratios are only means of financial analysis, not an end in itself. They can be effected with the personal ability and bias the analyst.

10. **Limited Loses:** Ratio analysis is not a substitute for sound judgement rather is a helpful tool to aid in applying judgement to otherwise complex situations. So conclusions drawn with the help of ratios should be verified with other techniques too.

PROBLEMS AND SOLUTIONS

Problem – 1

From the following information determine opening and closing stocks.

Stock Turnover : 5 times

Total Sales : Rs 2,00,000

Gross Profit : 25% of sales

The closing stock value was more by Rs 4,000 than the opening stock.

Solution

Gross Profit = 25% of sales

= 25% of 2,00,000

= Rs 50,000

Cost of goods sold = Sales – Gross profit

= 2,00,000 – 50,000

= Rs. 1,50,000

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of goods sold}}{\text{Average stock}}$$

NOTES

$$5 = \frac{1,50,000}{\text{Average stock}}$$

$$\text{Average Stock} = \frac{1,50,000}{5} = \text{Rs. } 30,000$$

Let the opening stock be Rs x Closing Stock x + 4,000

$$\text{Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$= 30,000 = \frac{x + x + 4,000}{2}$$

$$= 60,000 = 2x + 4,000$$

$$= 2x = 56,000$$

$$x = 28,000$$

Opening Balance is Rs 28,000

Closing Stock is Rs (28,000 + 4,0000) = Rs 32,000

Problem – 2

Current ratio 25, Acid – Test ratio = 1.75

Stock Rs. 1,50,000 Calculated net working Capital.

Solution:

$$\text{Current ratio} = \frac{CA}{CL} = \frac{25}{1}$$

Let current liabilities = x

Current Assets =2.5x

$$\text{Liquid ratio} = \frac{LA}{CL} = \frac{1.75}{1}$$

Liquid asset = 1.75x

Stock = Current Asset – Liquid Asset

1,50,000 = 2.5x – 1.75x

75x=1,50,000

$$x = \frac{1,50,000 \times 100}{75} = \text{Rs. } 2,00,000$$

Current liabilities = Rs. 2,00,000

Current Assets = 2.5X2,00,000 = Rs. 5,00,000

Working Capital = C.A – C.L = 5,00,000 – 2,00,000 = 3,00,000

Problem – 3

From the following financial statements you are required to calculate these ratios

(I) Debt – Equity Ratio

(II) Current Ratio

(III) Proprietary Ratio

(IV) Gross Profit Ratio

(V) Debtors Turnover Ratio

(VI) Stock Turnover Ratio

Bank overdraft is payable on demand.

B/S as at 31st March 2004.

NOTES

Liabilities	Rs.	Assets	Rs.
Paid up Capital	15,00,000	Fixed Assets	16,50,000
Reserve and Surplus	6,00,000	Stock in Trade	9,10,000
Debentures (L–T)	5,00,000	Book Debts	12,40,000
Bank Overdraft	2,00,000	Investment (S.T)	1.60,000
Sunday Creditors	12,00,000	Cash	40,000
	40,00,000		**40,00,000**
Annual Sales	**74,40,000**	**Gross Profit**	**7,44,000**

Solutions :

(i) $$\text{Debt – Equity Ratio} = \frac{\text{Outsiders fund}}{\text{Shareholders fund}}$$

$$= \frac{5,00,000 + 2,00,000 + 12,00,000}{15,00,000 + 6,00,000}$$

$$= \frac{19,00,000}{21,00,000} = .90$$

(ii) $$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$= \frac{9,10,000 + 12,40,000 + 1,60,000 + 40,000}{2,00,000 + 12,00,000}$$

$$= \frac{23,50,000}{14,00,000} = \frac{1.61}{1}$$

NOTES

(iii) $$\text{Gross Profit Ratio} = \frac{\text{G.P}}{\text{Net Sales}} \times 100$$

$$= \frac{7,44,000}{74,40,000} \times 100 = 10\%$$

(iv) $$\text{Proprietary Ratio} = \frac{\text{Shareholders fund}}{\text{Total Assets}}$$

$$\frac{15,00,000 + 6,00,000}{40,00,000} = \frac{21,00,000}{40,00,000} = \frac{.525}{1}$$

(v) $$\text{Debtors Turnover Ratio} = \frac{\text{Net Sales}}{\text{Trade Debtors}}$$

$$= \frac{7,44,000}{12,40,000} = 6 \text{ times}$$

(vi) $$\text{Stock Turnover Ratio} = \frac{\text{Cost of Goods sold}}{\text{Average Stock}}$$

Cost of goods sold = Sales – Gross profit

= 74,40,000-7,44,000=66,96,000

Average stock = 9,10,000

$$= \frac{66,96,000}{9,10,000} = 7.36 \text{ times}$$

Problem-4

The following are the figures extracted from the books of the x Ltd. an at 31.3.2004.

Particulars	**Amount**
Net sales	24,00,000
Operating expenses	18,00,000
Gross profit	6,00,000
Net operating expenses	2,40,000
Net profit	**3,60,000**

Balance Sheet

Net worth	15,00,000	Current Assets	7,60,000
Debt	9,00,000	Inventories	800,000
Current Liabilities	6,00,000	Fixed Assets	14,40,000
	30,00,000		**30,00,000**

Calculate (a) Gross Profit ratio (b) Net profit ratio (c) Return on Assets (d) Inventory Turnover (e) Working capital turnover (f) Net worth to debt.

Solutions

NOTES

(a) $\text{Groos Profit Ratio} = \frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$

$$= \frac{6,00,000}{24,00,000} \times 100 = 25\%$$

(b) $\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Net Sales}} \times 100$

$$= \frac{3,60,000}{24,00,000} \times 100 = 15\%$$

(c) $\text{Return of Assets} = \frac{\text{Net Profit}}{\text{Total Assets}} \times 100$

$$= \frac{3,60,000}{30,00,000} \times 100 = 12\%$$

(d) $\text{Inventory Turnover Ratio} = \frac{\text{Net Sales}}{\text{Inventory}}$

$$= \frac{24,00,000}{8,00,000} = 3 \text{ times}$$

(e) $\text{Working Capital Turnover Ratio} = \frac{\text{Net Sales}}{\text{Working Capital}}$

$$= \frac{24,00,000}{9,60,000} = 2.5$$

(f) $\text{No worth to Debt} = \frac{\text{Net worth}}{\text{Debt}}$

$$= \frac{15,00,000}{9,00,000} = \frac{1.67}{1}$$

Problem- 5

Using the information given below, compute the Balance sheet for a firm having a sales of Rs.36 lakhs.

$$\frac{\text{Sales}}{\text{Total Assets}} = 3$$

NOTES

Sales/Fixed Assets = 5

Sales / Current Asses = 7.5

Sales/Inventories = 20

Sales/Debtors = 15

Current Ratio = 2

Total Assets / Net worth = 2.5

Debt / Equity = 1

Solutions :

Sales are known to be Rs.36 lakhs

(1) $\frac{\text{Sales}}{\text{Total Assets}} = 3$

$\frac{36}{\text{Total Assets}} = 3$

Total Assets = 36/3 = 12 lakhs

(2) $\frac{\text{Sales}}{\text{Fixed Assets}} = 5$

$\frac{36}{\text{Fixed Assets}} = 5$

Fixed Assets = 36/5 = 7.2 lakhs

(3) $\frac{\text{Sales}}{\text{Current Assets}} = 75$

$\frac{36}{\text{Current Assets}} = 7.5$

Current Assets = 36/7.5 = 4.8 lakhs

(4) $\frac{\text{Sales}}{\text{Inventoties}} = 20$

$\frac{36}{\text{Inventoties}} = 20$

Inventories = 36/20 = 1.8 lakhs

(5) $\frac{\text{Sales}}{\text{Debtors}} = 15$

$$\frac{36}{\text{Debtors}} = 15$$

$$\text{Debtors} = \frac{36}{15} = 2.4 \text{ lakhs}$$

(6) Current Ratio = 2

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$$

$$\frac{4.8}{\text{Current Liabilities}} = 2$$

$$\text{Current Liabilities} = \frac{4.8}{2} = 2.4 \text{ lakhs}$$

7. $$\frac{\text{Total Assets}}{\text{Net worth}} = 2.5 \text{ lakhs}$$

$$\frac{12}{\text{Net worth}} = 2.5$$

$$\text{Net worth} = \frac{12}{2.5} = 4.8 \text{ lakhs}$$

Net worth = Equity = 4.8 lakns

8. $$\frac{\text{Debt}}{\text{Equity}} = 1$$

$$\frac{\text{Debt}}{4.8 \text{ lakhs}} = 1$$

Debt = 4.8 lakhs

Liquid Assets = Current Assets – Debtors – Inventories

= 4.8 – 2.4 – 1.8 = .6

Balance sheet

Liabilities	In lakhs	Assets	In lakhs
Net worth	4.80	Fixed Assets	7.20
Long term debt	4.80	Inventories	1.80
Current liabilities	2.40	Debtors	2.40
		Liquid Assets	.60
	12.00		**12.00**

NOTES

Problem-6

From the following given ratios and figures, prepare a summarised Balance sheet of X Ltd. for the year ended 31st Dec.2004

(a)	Working Capital	Rs.60,000
(b)	Reserve and Surplus	Rs.40,000
(c)	Bank overdraft	Rs.10,000
(d)	Proprietary Ratio (Fixed Assets/Proprietors Fund)	Rs..75
(e)	Current Ratio	2.5
(f)	Liquid Ratio	1.5

There are no long term debts or fictitious assets.

Answer:

Working Notes

(1) $\text{Current ratio} = \frac{\text{C.A.}}{\text{C.L.}} = \frac{2.5}{1}$

Let the current liabilities be x

Current assets 2.5 x

Working capital = Current Assets – Current Liabilities

$60,000 = 2.5x - x$

$1.5x = 60,000$

$x = \frac{60,000}{1.5} = \text{Rs.}40,000$

Current liabilities = Rs.40,000

Current assets = 2.5 x 40,000 = Rs.1,00,000

2. $\text{Liquid Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$

$1.5 = \frac{\text{Liquid Assets}}{40,000}$

Liquid Assets = 1.5 x 40,000 = 60,000

Stock=C.A-L.A.= 1,00,000 – 60,000 = Rs.40,000

3. $\text{Proprietary Ratio} = \frac{\text{Fixed Assets}}{\text{Properietors Fund}} = \frac{.75}{1}$

Let proprietors fund be x, Fixed Assets would be .75x.

Proprietors fund + Long term loans + Current Liabilities

= Fixed Assets + Current Assets + Fictitious Assts

= x + 0 + 40,000 = .75x + 1,00,000+0

Or, x -.75x = 1,00,000 – 40,000

Or .25 x = 60,000

$$\text{Or } x = \frac{60,000}{.25} - \text{Rs.2,40,000}$$

Proprietors funds are Rs.2,40,000

Fixed Assets are 75 / 100 x 2,40,000 = Rs.1,80,000

Capital

Proprietors funds = Share capital + reserves

2,40,000 = Sh. Capital + 40,000

Sh. Capital = 2,40,000 – 40,000 = Rs.2,00,000

Balance sheet as on 31.12.2004

Liabilities		Assets	
Share capital	2,00,000	Fixed Assets	1,80,000
Reserve surplus	40,000	Assets	
Bank overdraft	10,000	Stock	40,000
Liquid liabilities	30,000	Liquid assets 60,000	1,00,000
	2,80,000		**2,80,000**

Questions

1. What do you mean by ratio analysis ? Discuss its advantages and limitations.
2. Briefly explain the various profitability ratios.
3. Write short notes on
   (i) Liquidity ratio
   (ii) Stock turnover ratio
   (iii) Debt-Equity ratio
4. Discuss the accounting ratios to judge the liquidity position of a business.
5. "Ratio analysis is only a technique for making judgement and not a substitute for judgements" – Explain.

Practical Questions

1. Current liabilities of a company are Rs.3,00,000. Its current ratio is 3: 1 and Quick ratio 1:1 calculate the value of stock in trade. (Ans.Rs.6,00,000)

NOTES

2. Cost of goods sold Rs.1,60,000 stock turnover is 5 times closing stock is Rs.4,000 more than the opening stock. Calculate opening stock (Ans-Rs.30,000)

3. Long term debt equity ratio is 4.5. Equity amount is Rs.1,00,000 what is the value of the long term debt. (Ans-Rs.2,62,500)

4. From the following find out.

(a) Current Assets
(b) Current Liabilities
(c) Liquid Assets
(d) Proprietors funds
(e) Share capital
(f) Fixed Assets
(g) Stock-in-trade

Informations

(i) Current ratio 2.5 (ii) Liquid ratio 1.5 (iii) Proprietary ratio 0.75 (iv) Working capital Rs.60,000 (v) Reserve and surplus –Rs.40,000 (vi) Bank overdraft Rs.10,000. There is no long term loan or fictions assets.

[Ans : Current assets Rs.1,00,000 (b) Current liabilities Rs.40,000 (c) Liquid assets Rs.60,000 (d) Proprietors funds Rs.2,40,000 (e) Share capital Rs.2,00,000 (f) Fixed assets Rs.1,80,000 (g) Stock-in-trade Rs.40,000

5. From the following Balance sheet of X Ltd, compute

(a) Equity or proprietors ratio
(b) Debt-Equity Ratio
(c) Funded debt to total capitalisation
(d) Fixed assets to Net worth ratio
(e) Solvency ratio
(f) Current Assets to Proprietors fund ratio
(g) Fixed Assets Ratio

Balance Sheet

Liabilities		Assets	
Equity share capital	3,00,000	Good will	90,000
9% preference sh. Capital	1,50,000	Land and building	1,00,000
Reserve fund	50,000	Plant and machinery	2,50,000
Profit and loss a/c	20,000	Equipment	60,000
Share premium	10,000	Furniture and fittings	80,000
8% debenture	2,00,000	Sundry debtors	90,000

6% Mortgage loan	60,000	Bills receivable	1,00,000
Sundry creditors	80,000	Stock-in-hand	1,20,000
Income Tax provision	20,000	Cash balance	45,500
Depreciation fund	50,000	Prepaid insurance	1,500
		Preliminary expenses	2,000
		Discount in issue of debenture	1,000
	9,40,000		**9,40,000**

Ans.: (a) Proprietors ratio .59 (b) Debt equity ratio .68 (c) Funded debt to Total Capitalisation Ratio .33 (d) Fixed Assets to net worth ratio 1.01 (e) Solvency ratio .41 (f) Current assets to proprietors fund .68 (g) Fixed assets Ratio .67.

6. Following are the ratios relating to the activities of x Ltd.

Debtors velocity	-	3 months
Stock velocity	-	8 months
Creditors velocity	-	2 months
Gross profit	-	25 percent

Gross profit is Rs.4,00,000. Closing stock is Rs.10,000 more than opening stock. Bills receivable amount to Rs.25,000 and bills payable Rs.10,000. Find out (a) Sales (b) Sundry debtors (c) Closing stock (d) Sundry creditors

Ans. (a) Rs.16,00,000 (b) Rs.375,000 (c) Rs.10,66,667 (d) Rs.1,91,667

7. From the following information prepare Balance sheet for the year ended 31.12.2004

(a) Working capital Rs.1,20,000 (b) Reserve and surplus Rs.80,000 (c) Bank overdraft Rs.20,000 (d) Fixed Assets / proprietors fund .75 (e) Current ratio 2.5 (f) Liquid ratio 1.5

Ans.: (B/s total Rs.5,60,000)

8. From the following Informations prepare balance sheet for the year ended 31.12.2004

Fixed Assets to Networth	5:8
Current Ratio	2:1
Acid Test Ratio	1:1
Reserve to Proprietor fund	1:5
Current liabilities	Rs.3,60,000
Cash in hand	Rs.15,000
Fixed assets	Rs.6,00,000

Ans. : [Balance sheet Total Rs.13,20,000]

NOTES

9. From the following details, prepare statement of proprietary fund with as many details as possible. (i) Stock velocity – 6 (ii) Capital turnover Ratio-2 (iii) Fixed Assets Turnover ratio = 5, (iv) Gross profit turnover ratio=20 percent (v) debtors velocity – 2 month (vi) Creditors velocity=73 days.

The gross profit was Rs.60,000. Reserve and surplus amount to Rs.20,000 closing stock was Rs.5,000 in excess of opening stock.

(Ans.: Rs.1,50,000)

10. From the following details, complete the balance sheet. Gross profit (20% of sales) Rs.60,000, share holders, equity Rs.50,000, Credit sales to total sales 80%, total assets turnover 3 times, Inventory Turnover (to cost of sales) 8 times, Average collection period (a 360 day year) 18 days, long-term debt to equity 40%, current ratio 1.6, creditors Rs.30,000.

Ans.: [B/s Total Rs.1,00,000]

NOTES

UNIT III ABSORPTION AND MARGINAL COSTING

Structure

NOTES

3.0 OBJECTIVES

After going through this unit you should be able to:

- Get an idea about marginal cost, marginal costing, and absorption costing.
- Explain the p/v ratio, break even point and uses in managerial field.
- Bring out the relationship between absorption costing and marginal costing.
- Know the uses of marginal costing in various field in business.

3.1 INTRODUCTION

Marginal costing is the technique of product costing and income determination. It is the additional cost of producting an additional unit of product. It is the total of all variable costs.

3.2 MEANING OF MARGINAL COST AND MARGINAL COSTING

The elements of cost are classified into two categories, such as fixed cost and variable cost. Fixed cost remain constant in aggregate in spite of fluctuations in production. Variable cost increase or decrease in proportion to increase or decrease in output and remain constant for unit of output. Marginal cost means variable production costs, i.e the costs which tend to vary in direct proportion to the changes in the production level. If one unit increase in output, the total cost is increased and this increase in total cost from the existing to the new level is known as Marginal cost. For exp. Cost of production of 100 units is Rs. 5,000 and that of 101 units is Rs. 5;050 the marginal cost is Rs.50

Marginal costing is a costing technique in which only variable costs are considered and seed while valuing inventories and determining cost of goods sold. Only variable costs are considered as product cost and are allocated to products manufactured. These cost include direct materials direct labour and variable factory overhead. Fixed manufacturing costs are treated as period costs in marginal costing, because they are written off in the profit and loss account in the period in which these are incurred.

3.3 ABSORPTION COSTING

Absorption Costing is known as total cost technique or full costing because it includes both fixed as well as variable cost in the production cost. All manufacturing costs are fully absorbed into

Finished goods. Fixed overhead are also treated as a part of actual production cost. Stock and cost of goods manufactured are valued at total cost basis. This technique is useful if there is only one product, there is no inventory and overhead recovery rate is based on normal capacity instead of actual level of activity.

3.4 FEATURES OF MARGINAL COSTING

1. All types of overhead-Factory, office and administration and selling and distribution are divided into two such as fixed and variable.
2. Only variable costs are charged to products produced during the period, while the fixed costs are treated as period costs. Variable costs are regarded as the marginal cost of the product.
3. Fixed cost as treated as period cost, so they are charged to Profit and Loss account.
4. Closing stock of finished goods and work-in-process are valued at variable costs (marginal costs) only.
5. Profitability of department and products is decided in term of "contribution" i.e. (sales variable cost).
6. In marginal costing, prices are based on marginal cost plus contribution.
7. It helps management in making marginal decisions.

3.5 ASSUMPTION OF MARGINAL COSTING

The technique of marginal costing is based upon the following assumption.

(i) All elements of cost are divided into two, i.e. fixed and variable components.
(ii) Variable cost remain constant per unit irrespective of volume of output.
(iii) Selling price per unit remains constant at all level of activity.
(iv) Fixed costs in total remain constant irrespective of vo'ume of output.
(v) Volume of production is the only factor which influence the cost.

3.6 DIFFERENCE BETWEEN ABSORPTION COSTING AND MARGINAL

Marginal costing and Absorption costing differ from each other in the following aspects.

(i) **Cost elements in product cost :** In absorption costing, all costs, whether fixed or variable are treated as product costs. In marginal costing only variable costs are treated as product cost. Fixed cost is treated as period cost and is charged to P&L A/C for that period.

(ii) **Valuation of Innovatory :** The value of inventory under marginal costing is relatively at a low figure as inventories are valued at variable cost only. In absorption costing, the value of inventories is comparatively at a higher figure because it considers fixed as well as variable cost as production cost

(iii) **Profit :** In absorption costing profit is the difference between sales revenue and total cost. So "net profit" is the guiding figure for managerial decisions. In marginal costing profit is the difference between the sales and variable cost, which is otherwise known as contribution. Managerial decisions are guided by contribution.

3.7 INCOME DETERMINATION UNDER MARGINAL COSTING AND ABSORPTION COSTING

The net profit under the two systems may be same or different. Difference in profit may be because of the different basis of inventory valuation. In marginal closing, stock of work-in-progress and finished goods are valued at variable cost, where as in absorption closing, stocks are valued at total cost.

Illustration : 3.1

From the following information, prepare an Income Statement under (a) Marginal Costing (b) Absorption Costing.

	Pr-x Rs.	Pr-y Rs.	Pr-z Rs.
Direct Material	7,500	30,000	3,000
Direct wages	9,000	9,000	1,500
Factory overload-fixed variable	3,000	3,900	1,500
	9,000	1,500	4,500
Selling overload-fixed variable	1,500	900	600
	2,100	6,000	3,000
Sales	32,000	61,000	16,000

Solution:

a. Income Statement (Marginal costing)

	Products			
	X	Y	Z	Total
(A) Sales	32,000	61,000	16,000	1,09,000
Less variable cost				
Direct materials	7,500	30,000	3,000	40,500
Direct wages	9,000	9,000	1,500	19,500
Variable over head				
Factory	3,900	9,000	4,500	17,400
Selling	2,100	6,000	3,000	11,100
(B) Total variable cost	22,500	54,000	12,000	28,500
Contribution (A-B)	9,500	7,000	4,000	20,500
Less fixed cost (Total of fixed factory and selling overhead)				9,000
Profit				11,500

b. Income Statement (absorption costing)

	Products			
	X	Y	Z	Total
Direct Materials	7,500	30,000	3,000	40,500
Direct wages	9,000	9,000	1,500	19,500
Prime cost	16,500	39,000	4,500	60,000
Factory O.H	3,000	1,500	1,500	6,000
Fixed variable	3,900	9,000	4,500	17,000
Cost of production	23,400	49,500	10,500	83,400
Selling O.H	1,500	900	600	3,000
Fixed variable	2,100	6,000	3,000	11,100
Total cost	27,000	56,400	14,100	97,500
Profit	5,000	4,600	1,900	11,500
Sales	32,000	61,000	16,000	1,09,000

It may be noted from the above that total profit under marginal costing and absorption costing is the same i.e. Rs 11,500. This is because there are no opening and closing stock of finished goods or work in progress.

3.8 DIFFERENCE IN PROFIT UNDER MARGINAL COSTING AND ABSORPTION COSTING

Profit under two systems may be different because of difference in stock valuation.

(a) Production equal to sales

(I) When there is no opening or closing stock, profit under absorption and marginal costing systems are equal.

(II) When opening and closing stocks are equal, and fixed cost provided both in opening and closing stock are same amount, then profit in both costing are same.

NOTES

(b) When production more than sales

When production during a period is more than sales, i,e, when closing stock is more than the opening stock, the profit as per absorption costing will be more than that shown by marginal costing.

(c) Production less than sales:

When production during a period is less than sales, i,e when opening stock is more than the closing stock, profit shown by marginal costing will be more than that shown by absorption costing.

Illustration: 3.2

X Ltd supplies the following date for the year ending 31st Dec. 2004

Production 1100 units,

sales 1,000 units

Variable manufacturing cost per unit	Rs.	7
Fixed manufacturing overhead (Total)	Rs.	2,200
Variable selling and administrative overhead per unit	Rs.	50
Fixed selling and administrative overhead	Rs.	400
Selling price per unit	Rs.	15

Prepare Income Statement under (a) Absorption costing (b) Marginal costing

Solution :

Income statement (Absorption Costing)
For the Year ending 31.12.2004

Sales (1000 units @ Rs. 15)		15,000
Variables manufacturing overhead (1100 units @ Rs 2)		7,700
Fixed manufacturing overhead (1100 units @ Rs. 2)		2,200
Cost of goods produced		9,900
Less – Closing Stock (100 units @ Rs. 9)		900
Cost of goods sold		9,000
Add – Selling and Distribution Overhead		
Variable (1,000 units X 50)	500	
Fixed	400	900
Total Cost		9,900
Profit (Sales – Total Cost) =		5,100

Income Statement (Marginal Costing)
For the year ended 31.12.2004

Sales (1,000 units @ Rs. 15)		15,000
Variable manufacturing cost (1100 units @ Rs. 7)		7,700
Less – Closing Stock (100 units @ Rs. 7)		700
Cost of goods sold		7,000
Add – Variable selling and administrative overhead (1,000 units @ .50)		500
Total Variable cost		7,500
Contribution = (Sales – Variable Cost) = (15,000-7,500)		7,500
Less – Fixed Overhead		
Manufacturing	2,200	
Selling and administrative	400	2,600
Profit		4,900

Comments – Profit under absorption costing is Rs. 5,100 and under marginal costing Rs. 4,900. The difference of Rs. 200 in profit is due to over valuation of closing stock in absorption costing.

3.9 CONTRIBUTION AND MARGINAL COST EQUATION

Contribution is the difference between sales and the marginal cost of sales. It is also known as "contribution margin" or "gross margin". Contribution can be calculated as Contribution = Sales – Variable cost (S – V)

Or Contribution = Fixed cost + Profit (F + P)

Or Contribution = Fixed Cost – Loss (F – L)

Marginal Cost Equation

The elements of cost can be written in the form of an equation as follows.

Sales = Variable Cost + Fixed Cost ± Profit / Loss

Or Sales - Variable Cost = Fixed Cost ± Profit / Loss

Or $S - V = F \pm P$

Where, 'S' stands for sales for sale, V for variable Cost, F for fixed cost and + P for profit and – P for Loss

Or S – V = C, because F + P = Contribution

The marginal cost equation of $S - V = F \pm P$ is very useful to find out any of the four factors if any three of these is known.

Illustration : 3.3

Determine the amount of fixed expenses from the following particulars.

Sales : Rs. 3,00,000, Direct Materials : Rs. 1,00,000, Direct labour: Rs. 80,000, Variable overhead : 10,000 and Profit Rs. 60,000

Solution:

Marginal cost equation is

$S - V = F + P$

Variable cost $= 1,00,000 + 80,000 + 10,000$

$= 1,90,000$

$3,00,000 - 1,90,000 = F + 60,000$

or Fixed cost $= 1,10,0000 - 60,000$

$=$ Rs. 50,000

Illustration : 3.4

Defermine the amount of profit earned during the year from the following information.

Output	2,00,000 units
Selling price	Rs. 10 percent
Fixed Cost	Rs. 4,00,000
Variable Cost	Rs. 6 percent

Solution :

$S - V = F + P$

Sales $= 2,00,000 \times 10 =$ Rs. 20,00,000

Variable cost $= 2,00,000 \times 6 =$ Rs. 12,00,000

$20,00,000 - 12,00,000 = 4,00,000 +$ Profit

Or Profit $= 8,00,000 - 4,00,000$

$=$ Rs. 4,00,000

3.10 PROFIT VOLUME (P/V or C/S) RATIO

Profit / volume Ratio is other wise known as contribution / sales ratio (C/S ratio)

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{C}{S}$$

P/V ratio establishes the relationship between contribution and sales to study the profitability of the business Higher the P/V ratio, more will be the profit and lower the P/ V ratio lesser will be the profit. So every enterprise wants to increase the P/V ratio. P/V ratio can be increased by (I) increasing the selling price (ii) reducing the variable cost (iii) selling more profitable product (iv) altering the sales mixture.

As contribution = Sale – Variable = Fixed cost + Profit

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

or $$P/V \text{ ratio} = \frac{S - V}{S}$$

or $$P/V \text{ ratio} = \frac{F + P}{S}$$

or $$P/V \text{ ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} = \frac{\text{Change in Contribution}}{\text{Change in Sales}}$$

Sales volume to obtain a desired amount of profit will be

$$\text{Sales} = \frac{\text{Fixed cost + Profit}}{\text{P/V ratio}}$$

Illustration : 3.5

Sales = Rs. 1,50,000

Variable cost = 60 % of sales

Profit = Rs. 20,000

Find out (I) P/V Ratio (ii) Fixed Cost (iii) Sales volume to earn a profit of Rs. 30,000.

Solutions

Sales = Rs. 1,50,000

$$\text{Variable cost} = \frac{60}{100} \times 1{,}50{,}000 = 90$$

contribution = S – V

= 1,50,000 – 90,000 = 60,000

(I) $$P/V \text{ ratio} = \frac{C}{S} \times 100 = \frac{60{,}000}{1{,}50{,}000} \times 100 = 40\%$$

(II) Contribution = Fixed cost + Profit

60,000 = Fixed cost + 20,000

or Fixed cost = 60,000- 20,000

= Rs. 40,000

(III) $$\text{Sales} = \frac{\text{Fixed cost + Profit}}{\text{P/V ratio}}$$

$$= \frac{40{,}000 + 30{,}000}{40\%} = \frac{70{,}000 \times 100}{40\%} = \text{Rs. } 1{,}75{,}000$$

NOTES

Illustration:3.6

Calculate P/V ratio from the following information

(i) Selling Price Rs. 10 per unit variable cost Rs. 6 per unit

(ii) Given the profits and sales of two period as under.

	Sales	Profits
2003	1,50,000	20,000
2004	1,70,000	25,000

Solution:

(i) $$P/V\ ratio = \frac{Contribution}{Sales} x100$$

$$= \frac{S - V}{S} x100$$

$$\frac{10 - 6}{10} x100 = 40\%$$

(iii) $$P/V\ ratio = \frac{Change\ in\ profit}{Change\ in\ sale} x100$$

$$= \frac{25,000 - 20,000}{1,70,000 - 1,50,000} \times 100$$

$$= \frac{5,000}{20,000} \times 100 = 25\%$$

COST VOLUME PROFIT ANALYSIS

Cost-volume-profit analysis (CVP) is an extension of the principles of marginal costing. It is a study of relationship in between three basic factors i,e. Cost of production, volume of sales and the selling price of the product. Within these three factors there is a cause and effect relationship. For example, profit depends upon sales, selling price to a large extent depends upon cost and cost depends upon volume of production as it is only the variable cost that varies directly with production. CVP analysis is extremely useful to the management in budgeting and profit planning.

3.11 BREAK EVEN ANALYSIS

Break even analysis is a widely used technique to study the CVP relationship. In narrow sense, break-even analysis is concerned with determining break-even point, I,e. that level of production and sales where there is no profit and no loss. At this point, the total cost is equal to total sales revenue. In broad sense, break-even analysis is used to determine probable profit or loss at any given level of production or sales.

Assumptions :

The break-even-point is based on the following assumptions.

(i) All costs can be segregated into variable and fixed costs

(ii) Variable cost per unit remains constant and varies in direct proportion to the volume of out put.

(iii) Total fixed cost remains constant.

(iv) Selling price per unit remains unchanged as volume changes.

(v) There is only one product and incase of multi products, sales mix remain unchanged.

(vi) There will be no change in the general price level.

(vii) Productivity per worker does not change.

(viii) Volume of production equals volumes of sales

3.11.1 Computation of Break Even Point

The break over point can be computed by the following method.

(a) Algebraic Calculation

(b) Graphic Presentation

3.11.1(a) Algebraic Calculation

Break even Point – The break even point is the volume of output or sales at which total cost is exactly equal to sales. It is a point of no Profit and no Loss.

(a) $$\text{Break even Point (units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{F}{S-V}$$

(b) Break even point (in Rupees)

At break even point.

Total sales = Total Fixed Cost + Total Variable Cost

Or $S = F + V$

Or $S - V = F$

Divide both side by $S - V$

$$\frac{S-V}{S-V} = \frac{F}{S-V}$$

$$\text{Or } 1 = \frac{F}{S-V}$$

Multiply both side by S

$$1 \times S = \frac{F}{S-V} \times S$$

NOTES

$$\text{Break even Sales} = \frac{F}{C} \times S$$

$$\text{Break even Point} = \frac{\text{First Cost}}{\text{P/V ratio}}$$

Illustration : 3.7

Fixed Cost = Rs. 15,000

Selling Price = Rs 18 per unit

Variable Cost = Rs. 12 per unit

Fixed out (I) P/V ratio (ii) BEP (in units) (iii) BEP (money value)

Solution

$$\text{Contribution} = S - V$$
$$= 18 - 12$$
$$= \text{Rs. 6 per unit}$$

(i) $$\text{P/V ratio} = \frac{C}{S} \times 100$$

$$= \frac{C}{S} \times 100 = \frac{6}{18} \times 100 = 33\frac{1}{3}\%$$

(ii) $$\text{BEP (in units)} = \frac{\text{Fixed Cost}}{\text{Contribution per Unit}}$$

$$= \frac{15{,}000}{6} = 2{,}500 \text{ units}$$

(iii) $$\text{BEP (in money value)} = \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{15{,}000}{100/3\%} = \text{Rs. } 4{,}500$$

Illustration :3.8

From the following data you are required to calculate

(a) P/V ratio

(b) Break Even Sales

(c) Sales required to earn a profit of Rs. 1,50,000

Fixed expansion	Rs. 90,000
Direct Material	Rs. 6 per unit
Direct labour	Rs. 3 per unit
Direct expansion	Rs. 3 per unit
Selling price per unit	Rs. 15 per unit

Solutions:

Variable cost

Direct material : 6

Direct labour : 3

Direct expansion : 3

12

V = Rs. 12

S = Rs. 15

Contribution = S –V = 15 – 12 = Rs. 3

(i) $P/V\ ratio = \frac{Contribution}{Sales} \times 100$

$= \frac{3}{15} \times 100 = 20\%$

(ii) $Break\ Even\ Sales = \frac{Fixed\ cost}{P/V\ ratio}$

$= \frac{90}{20\%} = 90{,}000 \times 5 = Rs.4{,}50{,}000$

(iv) Sales required to earn a profit of Rs. 1,50,000

$Sales = \frac{Fixed\ cost + Described\ profit}{P/V\ ratio}$

$= \frac{90{,}000 + 1{,}50{,}000}{20\%} = \frac{2{,}40{,}000 \times 100}{20} = Rs.12{,}00{,}000$

Illustration:3.9

The following information is given

Sales = Rs. 2,00,000

Variable cost = Rs. 1,20,000,

Fixed cost = Rs. 30,000

Calculate

(a) Break Even Point

(d) New BEP if S.P reduced by 10 %

(e) New BEP if variable cost increased by 10 %

(f) New BEP if fixed cost increased by 10 %

NOTES

Solution:

$$P/V \text{ ratio} = \frac{S-V}{S} \times 100$$

$$= \frac{2,00,000 - 1,20,000}{2,00,000} \times 100 = \frac{80,000}{2,00,000} \times 100 = 40\%$$

(a) $$BEP = \frac{\text{Fixed cost}}{P/V \text{ ratio}} = \frac{30,000}{40\%} = \text{Rs. } 75,000$$

(b) when S.P reduced by 10 %

New S.P = 2,00,000 – 10 % of 2,00,000 = 1,80,000

$$BEP = \frac{\text{Fixed cost}}{\text{Contribution}} \times \text{Sales}$$

$$= \frac{30,000}{1,80,00 - 1,20,000} \times 1,80,000 = \frac{30,000}{60,000} \times 1,80,000 = 90,000$$

(c) When variable cost increased by 10 %

New V.C = 1,20,000 + 10 % 0f 1,20,000 = Rs. 1,32,000

$$BEP = \frac{\text{Fixed cost}}{\text{Contribution}} \times \text{Sales}$$

$$= \frac{30,000}{2,00,000 - 1,32,000} \times 2,00,000 = \frac{30,000}{68,000} \times 2,00,000$$

= Rs. 88,235

(d) When fixed cost increases by 10%.

New fixed cost = 30,000 + 10% of 30,000 = 33,000

$$BEP = \frac{\text{Fixed cost}}{\text{Contribution}} \times \text{Sales}$$

$$= \frac{33,000}{2,00,000 - 1,20,000} \times 2,00,000$$

$$= \frac{33,000}{80,000} \times 2,00,000 = \text{Rs. } 82,500$$

Illustration: 3.10

Following information is given.

Fixed expenses	Rs.4,000
B.E.P.	Rs.10,000

NOTES

Calculate

(i) P/v ratio

(i) Profit when sales are Rs.20,000

(ii) New B.E.P. if selling price is reduced by 20%.

Solutions

(i) $$P/V \text{ ratio} = \frac{\text{Fixed expenses}}{\text{BEP}} \times 100$$

$$= \frac{4,000}{10,000} \times 100$$

$$= 40\%$$

(ii) Profit when sales are Rs.20,000

$$\text{Sales} = \frac{\text{Fixed cost} + \text{Profit}}{P/V \text{ ratio}}$$

Or $$20,000 = \frac{4,000 + \text{Profit}}{40\%}$$

Or 40% of 20,000 = 4,000 + profit

Or 8,000 = 4,000 + profit

Or profit = Rs.4,000

(iii) New break-even point when selling price is reduced by 20%.

New sales = 20,000 – 20% of 20,000

= 20,000 – 4,000

= Rs.16,000

Variable cost = Rs.12,000

Contribution = Sales – variable cost

= 16,000 – 12,000

= Rs.4,000

New p/v ratio = c/s x 1000

$$= \frac{4,000}{16,000} \times 100 = 25\%$$

$$\text{New Break even point} = \frac{\text{Fixed cost}}{P/V \text{ ratio}}$$

$$= \frac{4,000}{25\%} = \text{Rs.}16,000$$

NOTES

Cash Break-even point

When break-even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break even point. This means that depreciation and other non-cash fixed costs are excluded from the fixed costs in computing cash break-even point.

$$\text{Cash break even point} = \frac{\text{Cash fixed cost}}{\text{Contribution per unit}}$$

3.10.1(b) Graphic Presentation

A break-even point can be represented by means of a graph. The chart shows the inter-relationship between profit, volume and cost. It shows the break even point and also indicates the estimated profit or loss at varying levels of activity. These have been explained with the help of the following illustrations.

Illustration : 3.11

From the following data calculate the break-even point and profit if output is 60,000 units by drawing a break-even chart.

Production	Fixed Expansion	Variable cost P.U.	Selling Price P.U.	Total Cost	Total Sales
0	1,50,000	10	15	1,50,000	0
10,000	1,50,000	10	15	2,50,000	1,50,000
20,000	1,50,000	10	15	3,50,000	3,00,000
30,000	1,50,000	10	15	4,50,000	4,50,000
40,000	1,50,000	10	15	5,50,000	6,00,000
50,000	1,50,000	10	15	6,50,000	7,50,000
60,000	1,50,000	10	15	7,50,000	9,00,000

First Method :

On the X-axis of the graph is plotted the number of units produced and on the y-axis are shown costs and sales revenue. The fixed cost line is drawn parallel to x-axis. The total cost for different levels of activity are plotted over the fixed cost line because it starts from the point where fixed cost has incurred. Sales values at various levels of output are plotted, joined and the line is called sales line. The sales line will cut the total cost line at a point where total cost are equal to total revenues and this point of intersection of two lines is known as break even point the point of no profit no loss.

Second method

A variation of the first method is that variable cost line is plotted first and then total cost line over the variable cost line. Then sales line is

drawn. The intersection of total cost line and sales line is the break even point.

The method is more helpful to the management for decision making because it shows the recovery of fixed cost at various levels of production before profit are realised. Contribution at various levels of production are automatically disclosed in the chart.

MARGIN OF SAFETY

Margin of safety is the difference between the actual sales and the sales at the break even point. Margin of safety may be expressed in absolute money terms or as a percentage of sales. Thus margin safety = Actual sales – Sales at B.E.P.

$$\text{Or} \qquad \text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V ratio}}$$

The size of the margin of safety indicates soundness of a business. When margin of safety is large it means the business can still make profits after a serious fall in sales. In such a situation, the business stands a better chance of survival in times of depression. When margin of safety is low it is an indicator of the weak position of business, because area small reduction in sale will adversely affect the profit position of the business.

When margin of safety is not satisfactory, the following steps may be taken to improve it (a) Increase the volume of sale (b) Increase the selling price (c) Reduce fixed cost (d) Reduce variable cost (e) Substitute the existing products by more profitable products.

ANGLE OF INCIDENCE

Angle of incidence is the angle at which the sales line cuts the total cost line at the break even point. This angle indicates the profit earning capacity of a business. Managements aim will be to have as large an angle of incidence as possible because a large angle of incidence shows a high rate of profit. A narrow angle of incidence shows a low rate of profit.

Illustration: 3.12

A company has fixed expenses of Rs.90,000, with sales Rs.3,00,000 and a profit of Rs.60,000 during the first half year. In the next half year, the company suffered a loss of Rs.30,000 calculate

(a) P/v ratio – break even point and margin of safety for the first half year.

(b) Sales volume for the next half year assuming that selling expenses and fixed expenses remain unchanged.

(c) Break-even point and margin of safety for whole year.

NOTES

Solution

(a) $$P/v \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$= \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}} \times 100$$

$$= \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}} \times 100$$

$$= \frac{90,000 + 60,000}{3,00,000} \times 100 = 50\%$$

(b) $$\text{Break even point} = \frac{\text{Fixed cost}}{\text{P/v ratio}}$$

$$= \frac{90,000}{50\%} = \text{Rs. } 1,80,000$$

Margin of safety = Actual sales – Break even sales

= 3,00,000 – 1,80,000

= Rs.1,20,000

(c) $$\text{Expected sales volume} = \frac{\text{Fixed cost loss}}{P/v \text{ ratio}}$$

$$= \frac{90,000 - 30,000}{50\%}$$

$$= \frac{60,000}{50\%} = \text{Rs. } 1,20,000$$

(d) Break Even Point (for the whole year)

$$= \frac{\text{Fixed cost for the whole year}}{\text{P/v ratio}}$$

$$= \frac{90,000 + 90,000}{50\%}$$

$$= \frac{1,80,000}{50\%} = \text{Rs.} 3,600,000$$

Total sales for the whole year (3,00,000 + 1,20,000) = 4,20,000

Margin of safety = Actual Sales – Break even sales =4,20,000-3,60,000

= Rs.60,000

Illustration : 3.13

You are given the following information.

Fixed cost Rs.4,000 Break even sales – Rs.20,000

Profit Rs.1,000 Selling price – Rs.20 per unit

Calculate (a) Sales and marginal cost of sales

(b) New B.E.P. if selling price reduced by 10%.

Solution:

$$P/v \text{ ratio} = \frac{\text{Fixed cost}}{\text{BEP (Sales)}} \times 100$$

$$= \frac{4,000}{20,000} \times 100 = 20\%$$

(i) $$\text{Sales} = \frac{\text{Fixed cost} + \text{Profit}}{\text{P/v ratio}}$$

$$= \frac{4,000 + 1,000}{20\%} = \frac{5,000}{20\%} = \text{Rs.}25,000$$

variable cost to sales = 100 – P/v ratio

= 100 – 20 = 80%

Marginal cost of sales = 80% of Rs.25,000= Rs.20,000

(ii) When selling price reduced by 10%

New selling price = 20-10% of 20

= 20-2= Rs.18

Variable cost = 80% of Rs.20 = Rs.16

New contribution per cent = 18-16 = Rs.2

New Break even point

$$= \frac{F}{C} \times \text{Sales} = \frac{4,000}{2} \times 18$$

= Rs. 36,000

Illustration : 3.14

A plant is operating at 60% capacity. Fixed cost is Rs.60,000 and variable cost is Rs.75,000. The sale proceeds is Rs.1,50,000.

Find out (i) Break even point (ii) Percentage of capacity of which the plant should work to earn a profit of Rs.40,000 (B.com. Bangalore)

NOTES

Solutions :

F = Rs 60,000

V=Rs.75,000

S=Rs.1,50,000

Contribution = S-V

=1,50,000 – 75,000

= Rs.75,000

(a) $P/v\ ratio = \frac{C}{S} \times 100$

$= \frac{75,000}{150,000} \times 100 = 50\%$

$BEP = \frac{Fixed\ cost}{P/v\ ratio} = \frac{60,000}{50\%0} = Rss.120,000$

(ii) $Sale\ to\ earn\ a\ profit = \frac{F+P}{P/v\ ratio}$

$= \frac{60,000 + 40,000}{50\%} = \frac{100,000}{50\%} = Rs.2,00,000$

Sales at 60% capacity in Rs.1,50,000

Sales at 100% capacity in 1,50,000 / 60 x 100 = Rs.2,50,000

$Capital\ utilization = \frac{2,00,000}{2,50,000} \times 100 = 80\%$

Illustration: 3.15

You are given the following data :

	Sales	Profit
rear 2003	Rs.1,20,000	8,000
Year 2004	Rs.1,40,000	13,000

Find out

(b) P/v ratio

(ii) BE.P.

(iii) Profit when sales are Rs.1,80,000

(iv) Sales required to earn a profit of Rs.12,000

(v) Margin of safety in year 2004 (BBM)

Solution

	Sales	Profit
Year 2003	1,20,000	8,000
Year 2004	40,000	13,000
Difference	20,000	5,000

NOTES

(i) $$P/v\ ratio = \frac{Change\ in\ profit}{Change\ in\ Sales} \times 100$$

$$= \frac{5,000}{20,000} \times 100 = 20\%$$

$$P/v\ ratio = \frac{Fixed\ cost + profit}{Sales}$$

$$25\% = \frac{Fixed\ cost + 8,000}{1,20,000}$$

* 25% of 1,20,000 = Fixed cost + 8,000
* 30,000 = Fixed cost + 8,000
* Fixed cost = 30,000 – 8,000 = Rs.22,000

(ii) $$BEP = \frac{Fixed\ cost}{P/v\ ratio}$$

$$= \frac{22,000}{25\%} = Rs.88,000$$

(iii) Profit when sales are Rs.1,80,000

$$Sales = \frac{F + P}{P/v\ ratio}$$

$$1,80,000 = \frac{22,000 + P}{25\%}$$

Or 25% of 1,80,000 =22,000 + P

Or 45,000 = 22,000 + Profit

Or Profit = 45,000 – 22,000 = Rs.23,000

(iv) Sales to earn a profit of Rs.12,000

$$Sales = \frac{F + Desired\ profit}{P/v\ ratio} = \frac{22,000 + 12,000}{25\%} = Rs.1,36,000$$

(v) Margin of safety in 2004

Margin of safety = Actual sales – Break even sales

= 1,40,000 – 88,000

= Rs.52,000

NOTES

Practical Applications of Marginal Costing

The technique of marginal costing can be profitably employed in the following situations.

(i) Profit Planning :

Marginal costing helps profit planning. Because profit planning is made for future operation in such a way as to maximize the profits or to maintain a specified level of profit.

$$\text{Desired Sales} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{P/v ratio}}$$

Illustration: 3.16

The following data are obtained from the record of a factory.

	Per cent (Rs.)
Material	10
Labour	5
Overheld	3
Selling price	25

Total fixed overhead expenses is Rs.18,000

No. of units sold is 4,000 units.

It is proposed to reduce the selling price 20%. What extra units should be sold to obtain the same amount of profit ?

Solution

	Rs.
Total Sales – 4,000 x 25 =	1,00,000
Total variable cost	
Materials = 4,000 x 0 = 40,000	
Labour = 4,000 x 5 = 20,000	
Overhead = 4,000 x 3 = 12,000	72,000
Contribution	28,000
Loss fixed overhead	18,000
Profit	10,000

If selling price reduced by 20%

New selling price = 25 – 20% of 25 = Rs.20 per unit

Variable cost per unit= (10+5+3) = Rs.18

Contribution per unit = 20 – 18 = Rs.2

$$BEP = \frac{\text{Fixed} + \text{Desired profit}}{\text{Contribution per unit}}$$

$$= \frac{18,000 + 10,000}{2} = \frac{28,000}{2} = 14,000 \text{ units}$$

Additional units to be sold (14,000 – 4,000) = 10,000 units

(ii) **Make or Buy Decisions**

A make or buy decisions is basically one of determining factor which most effectively utilizes the firms resources. This decision arises when a company with unused production capacity consider the following alternatives

(i) To buy raw materials from outside suppliers.

(ii) To use available capacity to produce the items within the company.

In arriving at such a decision the price asked by the outside suppliers should be compared with the marginal cost of producing the component parts.

If purchase price < variable cost, go in for purchase proposition.

If purchase price > variable cost, go in for manufacturing proposition.

Before taking any make or buy decision only on the basis of marginal cost analysis, following points should also be taken into considerations.

(i) Quality of goods supplied by the supplier.

(ii) Reliability of delivery of goods.

(iii) Price stability from suppliers.

Illustration: 3.17

A manufacturing company finds that cost of making a component is Rs.10, the same is available in the market at Rs.8 with an assurance of continuously supply. Give your suggestions whether to make or buy. Give your suggestions if the supplier reduces the price from Rs.8 to Rs.7.

Material	3.00
Labour	3.00
Variable expenses	1.50
Fixed expenses	2.50
	10.00

NOTES

Solution :

Fixed expenses should not be added to the cost while deciding whether to make or buy.

Marginal cost	
Material	3.00
Labour	3.00
Variable expenses	1.50
	7.50

Here market price more than marginal cost, so the company should manufacture the component in the factory. If the supplier reduces the price from Rs.8 to Rs.7 i.e. market price <variable cost, so it is better to purchase from the market.

(iii) Optimising product mix :

If a concern is dealing in a number of products, a problem arises to decide a mix or proposition in which the sales of the various products should be made so that the profits can be maximised. Such a problem can be solved by studying the contribution generated by various products individually and by selecting that mix which generates the maximum total contribution.

Illustration: 3.18

Following is the information given by a manufacturing concern.

Direct materials per unit	**Direct Wages**
X – Rs.8	X-24 hrs @ 25 per per hr.
Y – Rs.6	Y-16 hrs @ 25 p. per hr.

Variable over head = 15% of wages

Fixed overhead = Rs.750

Selling price X – Rs.25

Y – Rs.20

Sales mix budgets

(a) 250 units of x and 250 units of Y.

(b) 400 units of 4 only.

(c) 400 units of x and 100 units of y.

(d) 150 units of x and 350 units of y. State which of the alternatives you would recommend to management.

Solution

Statement of contribution per unit	Product-x	Product-y
Selling price per unit	25	20
Lon-Variable cost per unit		
Direct material	8	6
Variable 0.4 (150% of wages)	8	4
	9	6
Contribution per unit	23	16
	2	4

Evaluation of various alternatives :

(a) 250 units of x and 250 units of y

Contribution		
x – 250 x 2		
y-250 x 4	=	500
	=	1,000
		1,500
Less fixed overhead		750
Profit		750

(b) 400 units of y only

Contribution		
Y-400 x 4		
Less fixed 0.4	=	1,600
Profit	=	750
	=	850

(c) 400 units of x and 100 units of x.

x – 400 x 2	=	800
Y-100x4	–	400
		1,200
Less fixed overhead	=	750
Profit		450

(d) 150 units of x and 350 units of y

x – 150 x 2	=	300
Y – 350 4	=	1,400
		1,700
Less fixed cost	=	750
Profit	=	950

As alternative (d) i.e. 150 units of x and 350 units of y generates maximum of profit, it will be recommended to the management.

(iv) Fixation in selling price :

The technique of marginal costing may be applied in the area of price fixation in such a way that the prices fixed should cover atleast the variable cost. Some times selling price may be reduced due to competition, depression, expansion programme etc.

NOTES

Illustration : 3.19

The following data are available from the company.

Sales - 1,00,000

Variable cost - 50,000

Fixed cost - 25,000

You are required to

(i) Calculate p/v ratio, Break even point and margin of safety at this level.

(ii) Calculate effect of there is 10% increase in selling price.

(a) Contribution = S-V

= 1,00,000-50,000

= 50,000

$$\text{P/v ratio} = \text{C/s} \times 100 = \frac{50,000}{1,00,000} \times 100 = 50\%$$

$$\text{BEP} = \frac{\text{Fixed cost}}{\text{P/v ratio}} = \frac{25,000}{50\%} = \text{Rs.}50,000$$

Margin of safety = Actual sales – Sales at B.E.P.

= 1,00,000 – 50,000

= Rs.50,000

(ii) 10% increase in selling price.

New selling price = 1,00,000 +10% of 1,00,000

= 1,00,000 + 10,000

= Rs.1,10,000

$$\text{P / v ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$= \frac{1,10,000 - 50,000}{1,00,000} \times 100 = 54.55\% = 50\%$$

$$\text{BEP} = \frac{\text{Fixed cost}}{\text{P / v ratio}} \times \frac{25,000}{54.55\%} = 45,830$$

Margin of safety = Actual sales – Sales at B.E.P.

= 1,10,000 – 45,830

=64,170

(v) **Limiting of key factor**

The objective of a business is to earn maximum profit. However it is not always easy to achieve this objective because profit earning is affected by a variety of factors. For example, an undertaking may have sufficient orders in hand ample skilled labour and production capacity, but material is not sufficiently available. Thus material is the limiting factor for maximising the profits. A limiting factor may be sales, materials, labour, machine hour and financial sources.

The purpose of the limiting factor technique is to indicate the most profitable course of action in all such cases where alternatives are possible.

Illustration : 3.20

The following data are given.

	Pr. A	Pr.B
Direct materials	Rs. 24	14
Direct labour @ Rs.3 per hr.	Rs. 6	9
Variable overhead @Rs.4 per hr.	Rs. 8	12
Selling price	Rs. 100	110
Standard time	2 hrs.	3 hrs.

State which product you would recommend to manufacture when

(a) Labour time is the key factor.

(b) Sales value is the key factor.

Solution

	Pr. A	Pr.B
Selling price (s)	100	100
Variable cost		
Direct material	24	14
Direct labour	6	9
Variable O.H.	8	12
Variable cost (v)	38	35
Contribution (s-v)	62	75
(a) Contribution per labour hour	62/2=Rs.31	75/3= Rs.35
(b) Contribution per rupee of sales value	62/100=62 paise	75/110=68 paise

NOTES

Conclusion

(a) Product A is recommended when labour time is the key factor because contributionper labour hour of product A is more than that of product B.

(b) When sales value is the key factor, Product B in recommended because contribution per rupee of sales value of product B is more than that of product A.

(vi) **Decision Making**

Fixing selling price is one of the important functions of management. Prices generally determined at various circumstances.

(a) **Prices under normal condition :** In normal condition the selling price is fixed on the basis of marginal cost by adding a high margin which contribute towards fixed expenses and profit.

(b) **Selling price below marginal cost :** sometimes selling price of a product is below the marginal cost (I) to introduce a new product in the market (ii) to popularize a particular product (iii) to eliminate the competitor from the market (iv) to avoid the extra losses by closing down the business (v) to dispose off the product of perishable nature (vi) to dispose off surplus product.

(c) **Pricing during stiff compitition :** During stiff compition products may have to be sold at a price below the total cost. In such case, the price should be fixed on the basis of marginal cost in such a manner, so as to cover the marginal cost and contribute something towards fixed express. Sometimes to eliminate the competitor from the market, price may be fixed below the marginal cost.

(d) **Accepting additional orders, exploring additional market and exploting :** when additional orders are accepted at a price below the normal price to utilise idle capacity, it will be very carefully seen that they will not affect the normal market and good will of the company. The order from a local market can not be accepted because it will affect the relationship of the concern with other customers who purchase at a normal price. In case of foreign markets, goods may be sold at a price below normal prices but it must be seen that the goods sold are not dumped in the domestic market.

NOTES

Illustration : 3.21

The cost sheet of a product is given as under:

	Rs.
Direct materials	5.00
Direct wages	3.00
Factory overhead	
Fixed - .50	
Variable - .50	1.00
Administrative expenses	.75
Selling and distribution expensess	
Fixed - .25	
Variable - .50	.70
Total cost	10.50

Selling prices per unit is Rs. 12.

The above figures are for an output of 50,000 units. The capacity for the firm is 65,000 units. A foreign customer wants to buy 15,000 units at a price of Rs. 10 per unit. Advance the manufacturer whether the other should be accepted.

Solution

Additional cost for 15,000 units

	Per unit	15,000 units
Direct material	5.00	75,000
Direct wages	3.00	45,000
Prime cost	8.00	1,20,000
Variable O.H Factory	.50	7,500
Selling and distribution	.50	7,500
Marginal cost	9.00	1,35,000
Sales	10.00	1,50,000
Contribution	1.00	15,000

The order from the foreign customers will give an additional contribution of Rs. 15,000. Hence the order should be accepted because additional contribution of Rs. 15,000 will increase the profit.

(vii) Attention method of production

Marginal costing is helpful in comparing the alternative methods of production i.e. machine work or hand work. The method which gives the highest contribution is to be adopted, keeping the limiting factor in view.

NOTES

Illustration : 3.22

Product x can be produce either by Machine A or Machine B. Ma-A produce 100 units per hour. Ma-B produce 150 units per hour. Total machine hours available during the year are 2500 hours. Taking into account the following data determine the profitable method of manufacture.

	Per unit of product x	
	Machine-A	Machine-B
Marginal cost	5	6
Selling price	9	9
Fixed cost	2	2

Solution

Profitability statement

	Machine-A	Machine-B
Sales	9	9
Loss marginal cost	5	6
Contribution per unit	4	3
Output per hour	100 units	150 units
Contribution per hour	Rs.400	Rs.450
Machine Hours per year	2,500 hrs	2,500 hrs
Annual contribution	Rs.10,00,000	Rs.11,25,000

Hence production by Machine-B is profitable.

ADVANTAGES OF MARGINAL COSTING

1. The techniques is simple to understand and easy to operate.
2. Since overheads are not allocated, there is no question of under or over absorption of overhead.
3. Marginal cost per unit remains constant irrespective of the level of activity. It is constant in nature and helps the management in production planning.
4. Since fixed costs are not considered in valuation of closing stock there is no possibility of false profit.
5. It helps management in taking many valuable decisions, such as fixing selling price below cost, make or buy, introduction of a new product line etc.
6. It is a valuable adjunct to standard costing and buddgetary control.

7. Greater control over cost is possible because its only variable or marginal cost that is controllable by the top management

8. It helps management in profit planning by studying a relationship between cost, volume and profit.

LIMITATIONS OF MARGINAL COSTING :

(i) Marginal costing based upon a number of assumptions which may not hold good under all circumstances.

(ii) It is difficult to classify all expenses into fixed and variable whereas marginal costing assumes that all expenses can be analysed into fixed and variable.

(iii) Time factor is not given due attention because marginal cost exclude expenses which are connected with time. Fixed expenses should be considered if suitable comparision of two jobs is to be made.

(iv) Marginal costing technique does not provide any standard for the evaluation of performance. The techniques of budgetary control and standard costing may be considered to be better technique.

(v) Fixation of selling price on marginal cost basis may be useful for short-term only. Over the long run, the prices should be decided on total cost basis only. Fixation of selling price on the marginal cost basis in the long run may be dangerous.

(vi) Marginal costing does not take into consideration the fixed overheads, as such the problem of under or over absoprtion can be avoided. But the problem of under or over-absorption of variable overheads can not be avoided.

(vii) Marginal costing can not be applied in contact or ship building industry, because the value of work-in-progress is very high and exclusion of fixed overhead may result into losses every year and huge profit in the year of completion of the job.

(viii) The elimination of fixed cost renders the cost comaprision of jobs difficult specially when both jobs have the same marginal costs but one of them takes a longer time than other.

QUESTIONS

1. What do you mean by marginal costing. Discus its usefulness and limitations.

2. Explain the following terms in relation to marginal costing.

   (a) Contribution (b) P/v ratio

   (c) Margin of safety (d) key factor

3. Explain the difference between marginal costing and absorption costing.

NOTES

NOTES

4. What are the assumptions and uses of break-even analysis?
5. Write short-notes on
(a) Break even point
(b) Cost-volume profit analysis

Practical Problems

1. You are given the following data. Sale prie – Rs.350 per unit, variable cost – Rs.200 per unit Fixed expenses – Rs.16,30,000

Find out

(a) Break even point
(b) Sales per unit, if break-even point is brought upto 15,000 units.
(c) Sales per unit, if break even point is brought down to 10,000 units.

Ans.: (a) 11,000 units (b) Rs.310 (c) Rs.365. (B.com.)

2. You are given the following information

	Rs.
Selling price per unit	20
Variable cost	12
Total fixed cost	96,000

Calculate

(a) Break even units and value
(b) Profit and margin of safety when sales would be Rs.4,00,000

Ans: (i) 12,000 units (ii) Rs.2,40,000
(iii) Rs.64,000 (iv) Rs.1,6,000

3. From the following data you are required to calculate Break even point and net sales value of this point.

	Rs.
Selling price per unit	25
Direct national cost per unit	8
Direct labour cost per unit	5
Variable overhead @ 60% on direct labour	
Trade discount 4%	

If sales are 15% and 20% above the break even volume determine not profits.

Ans.: BEP3,000 units (ii) Rs.3,600 (ii) Rs.4,800.

4. following data.

Fixed cost	-	2,000
Profit	-	2,000
Sales	-	10,000
Variable cost – 60% of sales		

Find (i) Break even sales

(ii) What should be the sale to earn a profit of Rs.6,000

Ans.: (i) 5,000 (ii) 20,000.

5. You are given the following information

Sales (1,00,000) units

Variable cost	-	Rs.1,00,000
Fixed cost	-	Rs.40,000
	-	Rs.50,000

(a) Find out p/v ratio break even point and margin of safety.

(b) Evaluate the effects of p/v ratio, break even point and margin of safety of the following.

(i) 20% increase in sales volume.

(ii) 10% increase in fixed costs

(iii) 5% decrease in variable cost

(iv) 10% increase in selling price

Ans. A. 60%, Rs.83,333 Rs.16,667

B. (i) 60, Rs.83,333 Rs.36,667

(ii) 60%, Rs.91,667 Rs.8,333

(iii) 62%, Rs.80, 645 Rs.19,355

(iv) 63.64% Rs.78.567 Rs.31,426

6. The trading results of a company for two periods are as under.

	Sales	Profit
Period-I	1,30,000	6000
Period-II	1,50,000	10,000

Calculate (a) P/v ratio (b) BEP

Ans.: (a) 20% (b) Rs.1,00,000

7. The following data are obtained from the records of a company.

	1st year	2nd year
Sales (Rs.)	80,000	90,000
Profit (Rs.)	10,000	14,000

Calculate B.E.P.

Ans.: Rs.55,000

NOTES

8. The sales and profit during two years are given below.

	Sales	Profit
Year 2003	Rs.20 lakh	Rs.2 lakhs
Year 2004	Rs.30 lakh	Rs.4 lakhs

Calculate (a) P/v ratio (b) Sales required to earn a profit of Rs.5 lakhs

Ans.: (a) 20% (b) Rs.35 lakhs

9. Sales and profit for two years.

	Sales	Profit
1st year	1,50,000	20,000
2nd year	1,70,000	25,000

Calculate

(a) P/v ratio (b) BEP (c) Sales required to earn a profit of Rs.40,000

(b) Margin of safety at a profit of Rs.1,25,000 (e) Profit when sales are Rs.1,80,000

Ans.: (a) 25% (b) Rs.70,000 (c) Rs.2,30,000 (d) Rs.5,00,000 (e) Rs.27,500

10. Sales and profits for two years.

	Sales	Profits
1st year	8,10,000	21,600
2nd year	10,26,000	44,800

Calculate

(a) P/v ratio (b) Fixed cost (c) The amount of profit or loss when sales are Rs.6,48,000. (d) The amount of sales required to earn a profit of Rs.1,08,000

Ans.: (a) 20% (b) Rs.1,40,000 (c) Rs.10,800 (loss) (d) Rs.12,40,000

11. Two business X and Y Ltd. sell same type of product in the same type of market.

	X Ltd.	Y Ltd.
Sales	1,50,000	1,50,000
Less-variable cost	1,20,000	1,00,000
Fixed cost	15,000	35,000
	1,35,000	1,35,000
Net profit	**15,000**	**15,000**

(a) Calculate break-even point of each business (b) Calculate the sales volume at which each of the business will earn Rs.5,000

Ans.: (a) X Ltd. –Rs.75,000 Y Ltd.1,05,000

(b) X ltd.Rs.1,00,000 Y Ltd.1,20,000

12. A company sold in two successive periods 7000 units and 9000 units and has incurred a loss of Rs.10,000 and earned Rs 10,000 as profit respectively. The selling price per unit can be assumed at Rs.100.

You are required to calculate.

(a) Amount of fixed cost

(b) The no. of units to break even.

(c) The number of units to earn a profit of Rs.40,000

Ans.: (a) P/v ratio, 10% fixed cost 80,000
(b) BEP 8,000 units (c) Required sales 12,00,000

13. You are given the following data

	Rs.
Variable cost	3,00,000
Fixed cost	1,50,000
Net profit	50,000

Find out (a) P/v ratio (b) break even point (c) margin of safety

Ans.: (a) 40% (b) Rs.3,75,000 (c) Rs.1,25,000

14. X Ltd. furnishes the relating information to the half year ended 30th June 2004.

Fixed cost	Rs.45,000
Sales	Rs.1,50,000
Profit	Rs. 30,000

During the second half year, the company has projected a loss of Rs.10,000.

Calculate

(a) The break even point and margin of safety for the six months.

(b) Expected sales volume for the second half of the year assuming that fixed costs and p/v ratio remain constant for the second half year.

(c) The break-even point and margin of safety for the whole year.

Ans.: (a)Rs.90,000, Rs.60,000 (b) 70,000 (c) Rs.1,80,000 Rs.40,000

15. From the following particulars draw a break-even chart and find out break even point.

Variable cost per unit	Rs.15
Selling price per unit	Rs.20
Fixed cost	Rs.54,000

(b) What should be the selling price of break-even point is to be brought down to 6,000 units

Ans.: (a) 10,800 units (b) Rs.24.

UNIT IV BUDGETARY CONTROL

NOTES

Structure

4.0 OBJECTIVES

After going through this unit student will be able to:

- identify the importance of budgeting and Budgetary Control.
- distinguish the different types of Budgetary Control
- Know the application of Zero Base Budgeting

4.1 INTRODUCTION

Budgets are an important tool of profit planning. The purpose of this unit is to present a general view of budgeting as advise of planning and illustrate the preparation of various types of budgets.

4.2 MEANING OF A BUDGET

The basic objective of cost accounting is to provide information to business management for planning and control. Budgeting is considered to be one of the most effective tool of both planning and control. In the business world, a budget is the formal expression of the expected incomes and expenditure for a definite future period. In the word of Crown and Howard,". A budget is a predetermined statement of management policy during a given period, which provides a standard for compassion with the results actually received.

4.2.1 CHARACTERISTICS

(1) Budget acts as tool of both planning and control.

(2) It is prepared for a definite future period.

(3) Budget is prepared in monetary terms / or quantitative terms.

(4) Budget includes both income expenditure and the employment of Capital.

(5) Purpose of a budget is to implement the policies formulated by the management for attaining the given objectives.

4.3 MEANING OF BUDGETARY CONTROL

The use of a budget to control a firms activities is known as budgeting control. First of all budgets are prepared and then actual results are recorded. The comparison of budgeted and actual figures may give a variation and effective steps should be taken to overcome the variation.

4.3.1 CHARACTERISTICS

(1) Establishment of budget for each department of the organization.

(2) Formulating necessary plans to achieve the desired objectives.

(3) Comparison of actual performance with the budgeted figures to know the variations.

(4) Taking suitable measures or remedial action to achieve the desired objective if there is a variation.

(5) Revision of budget due to changed circumstances.

NOTES

(6) To co-ordinate all activities of various departments of a business firm in such a manner that the maximum profit will be achieved for the minimum use of resources.

4.3.2 OBJECTIVES OF A BUDGETARY CONTROL

An effective budgeting system is vital to the success of a business firm. The following are the objectives of a budgetary control system.

1. Planning : Budget is a formal planning framework that provides specific deadlines to achieve departmental objectives and contribution towards the overall objectives of an organisation. Detailed plans relating to objective production, sales, raw materials, labour, advertising, capital additions etc are drawn up. By planning many problems are find out and solutions can be made.

2. Co-ordination: The budgetary control co-ordinated the various activities of the firm, so that the common objective of the firm may be successfully achieved. Effective planning and organization contributes a lot in achieving co-ordination. For exp. – Sales budget must be co-ordinated with production budget and production budget with purchase budget.

3. Communication : It is necessary in an efficient management that all people from top to bottom should be informed about the objectives, policies, programmes and performances. Budgets inform each manager of what others have agreed to do. They also inform managers to achieve objectives and targets.

4. Motivation : Budget motives the manager to perform work to achieve the objectives of the concern. If individuals actively involved in the concern, then the manager must achieve the targets.

5. Control : Budgeting enters into control at three points :

(1) When a budget is formulated, departments analyse their plans for the future and submit estimates as per their requirements.

(2) After budget becomes approved, it becomes necessary to accomplish it within a minimum cost.

(3) At the end comparison is made between plans and actual performance. The difference between two is reported to the management for taking corrective action.

Performance Evaluation : A budget provides a useful means of informing managers how well they are performing in meeting targets. It is more accurate, reliable and reasonable to measure current performance against a budget. In many concern, managers are rewarded or get promotion by achieving the target records.

Advantages of Budgetary Control: Budgeting plays an important role in the effective use of resources and achieving over all organizational goals. It has the following advantages

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(1) Budgeting compels and motivates management to make an early and timely study of its problem.

(2) Budgeting provides a valuable means of controlling income and expenditure of a business as it is a "plan for spending".

(3) Budgeting co-ordinates the activities is various departments and functions of the business.

(4) It increases production efficiency, eliminate waste and control the cost.

(5) Budgeting helps in directing capital and other resources into the most profitable channels.

(6) It provides a norm basis or yard stick for measuring performance of departments and individuals working in organization.

(7) Budget ensures proper and effective utilization of " 4M" i,e men, material, machines and money, because production is planned according to the availability of these items.

(8) Budgeting aids in obtaining bank credit.

(9) Budgeting enables management to decentralize responsibility without losing control over the business.

(10) It ensures availability of sufficient working Capital and diverts capital expenditure into the most profitable channels.

(11) As a sales guide, it provides accurate forecast of customers demand. It avoids sales of unprofitable and less profitable products.

(12) Budgeting provides a tool through which managerial policies and goals are periodically evaluated, tested and established as guide line for the entire organization.

(13) Budgeting provides a systematic and disciplined approach to the solution of problems in the organization.

(14) Budgeting helps the total national economy by providing stability of employment, economic use of resources and effective prevention of waste.

4.3.3 LIMITATION OF BUDGETARY CONTROL

Though budget has a lot of advantages, but it is not a cure for all organizational ills. It has certain limitations, which require careful consideration.

1. Budget based on estimates : Planning, budgeting or forecasting is not an exact science, it uses approximations and judgement which may not be cent percent accurate. As budget is based on estimates, no one knows precisely what will happen in the future.

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2. Lack of Co-operation : The success and utility of budgeting depends on the co-operation and participation of all members of management. If the members are not well related with each other then they can not fulfill the target.

3. Continuous Revision: In a rapidly changing condition it is not possible to achieve the targets. So budgets have to be revised from time to time, so that it will be helpful to the concern.

4. Budgeting is only a tool of Management : Budgeting can not take the place of management but is only a tool of management. The budget should be regarded not as a master but as a servant. Execution of budget is successful when entire organisation must participate enthusiastically in the programme.

5. Expensive Tool : The installation and operation of a budgetary control system is a costly affair as it requires the employment of specialized staff and involves other expenditure which small concerns may find it difficult to incur.

Budgeting and budgetary control is no longer a luxury one. The management, which aims at more efficiency and reduction in cost must use budgetary control efficiently and effectively.

4.3 BUDGETARY CONTROL AND STANDARD COSTING

Points of Similarly:

There are certain basic principles which are common both to standard costing and budgetary control. These are

(1) The establishment of pre-determined targets.

(2) The measurement of actual performance.

(3) Comparison of actual performance with pre-determined targets.

(4) The analysis of variance between the actual and standard performance.

(5) To take corrective measures where necessary.

Points of Differences

(1) In budgetary control budget is prepared for whole concern such as sales, purchase, production, cash, capital expenditure etc. where as standard costing is applied to manufacturing of a product, and some times for marketing and administration functions.

(2) Budgets are prepared for incomes, expenditure and other activities, while standers are set up for expenditure only I,e material, labour and overhead.

(3) Budgets are prepared on past datas, where as standard costing is based on technical estimates.

(4) Budgetary control is extensive in nature and the intensity of analysis is much less than that in standard costing. Standard costing is intensive in application as it calls for detailed analysis of variances.

(5) Budgetary control is related to financial accounts, where as standard costing related to cost accounts.

(6) In standard costing variances are usually revealed through accounts, but in budgetary control budget expenses and actual expenses are put side by side to find out the variation reliable.

(7) Standard cost represent yardsticks, so it is more useful for controlling and reducing costs. Budgets are usually represent an upper limit on spending without considering the effectiveness of expenditure.

(8) Review and revision of budgets is more frequently based on the changing circumstances than those of standard costs. Standard costs are more static and subject to less change.

(9) Budgets are equally important for planning organization co-ordination and control functions of management. Standard cost contribute more to the control function than other managerial functions.

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4.5 TYPES OF BUDGET

4.5.1 FUNCTIONAL BUDGETS

A functional budget is a budget of income and expenditure applicable to a particular function. There are many types of functional budget, but the following budgets are generally prepared.

(1) Sales Budget

(2) Production Budget

(3) Production cost Budget

(4) Material Budget

(5) Labour Budget

(6) Purchase Budget

(7) Administrative cost Budget

(8) Selling and Distribution cost Budget

(9) Capital expenditure Budget

(10) Cash Budget

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4.5.2 SALES BUDGET

Sales budget is not only the most important but also the most difficult budget to prepare. So it is known as the nerve centre of the enterprise. This budget is a forecast of quantities and values of sales to be achieved in a budget period. While preparing sales budget three main factors should be considered by management (a) information about past performance, (b) information about present conditions within individual company and in each sales territory and (c) data concerning the industry and general business condition.

The information about past performance is the starting point for sales forecasting. The record of previous years sales is the most reliable basis on which sales budgets should be based.

The second essential step in forecasting sales is the accumulation of data regarding condition within the company and in each sales territory. The management can obtain a good picture of sales prospects through information sent to the head office by sales man, dealer, sales officer of different territory.

Information about general business conditions are known as "barometers" and they should be considered in preparing the sales forecasts. These are personal income and purchasing power of the population, unemployment condition wholesales price indices, business failures, industrial production index, governmental policies etc.

The sales budget can be prepared to show sales classified according to products, salesman, customers, territories etc.

4.5.3 PRODUCTION BUDGET

After preparing sales budget the production budget is prepared. A production budget is stated in physical units. It specifies the no of units of each product that must be produced to satisfy the sales forecast and to achieve the desired level of closing finished good inventory. Units to produce = Budgeted sales +closing inventory of finished good beginning inventory of finished goods.

In preparing production budgets following factors are taken into consideration.

1. The Production budget is fixed with sales budget, because on the basis of volume of sales no of units should be produced.
2. The management decision regarding quantities needed in stock at all times to meet customer requirement in an important factor.
3. The production capacity of each department should be worked out and budget figures should be within these limits.
4. Production policy of the management plays an important role. If the management decide to buy a particular component from outside instead of manufacturing it, will influence the production budget.

4.5.4 PRODUCTION COST BUDGET

Production budget shows the quantities of production. When these quantities of production are expressed in terms of money is known as cost of production budget or production cost budget. The cost of production is shown in detail in respect of material cost, labour cost and factory overhead.

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4.5.5 MATERIAL BUDGET

This budget specifies the cost of direct material used and the cost to the direct material purchased. Raw material budget serves the following purpose.

(1) It helps the purchasing department in planning the purchases.

(2) It helps in fixing minimum and maximum levels of inventories in the stores departments.

(3) It helps the finance manager to determine the financial requirement to meet production targets.

The material budget deals with the direct material only. Supplies and indirect materials are generally included in the factory overhead budget.

4.5.6 DIRECT LABOUR BUDGET

The labour budget represents the forecast of labour requirement to meet the demands of the company for the budget period. It is generally preferable to prepare a separate direct labour budget and to include indirect labour in the factory overhead budget. The labour budget prepare must disclose the following information.

(i) The number of each type or grade of workers required in each period to achieve the budgeted output.

(ii) Budgeted cost of such labour in each period

(iii) Period of training is necessary for different types of workers.

4.5.7 PURCHASE BUDGET

The purchase budget provides details information about materials purchase during the period to meet the needs of the business. Its represents

(1) The quantities of each type of raw material and other items to be purchased.

(2) The timing of purchase.

(3) The estimated cost of material purchase. While preparing purchase budget, a number of factors must be considered.

(i) Opening and Closing stock to be maintained.

(ii) Maximum and minimum quantities.

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(iii) Economic order quantities.

(iv) Financial resources available.

(v) Materials to be manufactured as separate from those purchased from outside.

The purchase budget differs from raw materials budget is that the purchase budget specifies both quantities and money value where as raw material budget is limited to quantities only. Secondly, purchase budget includes direct and indirect materials, finished goods for resale etc. while raw material budget include only direct material requirements.

4.5.8 ADMINISTRATIVE COST BUDGET

This budget represent the expenditure on all administrative expenses for non-manufacturing business activities. The administrative expense budget contains expenses like directors remuneration, legal charges, audit fees, salaries, office expenses, etc. These expenses are mostly fixed in nature, so they should not be too difficult to forecast.

4.5.9 SETTING AND DISTRIBUTION COST BUDGET

Selling and distribution cost budget shows the budgeted costs of promoting sales for the budget period. It is also known as the marketing expenses budget. So sales budget and selling and distribution cost budget are prepared simultaneously, since each has a definite impact on other. While preparing sales budgets usually we are giving emphasis to direct selling expenses, sales office expenses, distribution expenses and advertising expenses etc.

4.5.10 CAPITAL EXPENDITURE BUDGET

The capital expenditure budget represents the expenditure on all fixed assets during the budget period. It includes the items like new buildings, machinery, land etc. The main features of the budget is

(i) It includes with items not directly related to profit and loss account.

(ii) Capital, expenditure is frequently planned a number of years in advance. As compared to this budget other functional budgets are normally prepared.

(iii) This budget involves a large amount of expenditure, which needs top management approval. So this budget need a strict management control.

The objective of capital expenditure budget is

(i) Give prior information to the company before such expenditure incurred.

(ii) To provide tool for controlling capital expenditure.

(iii) To correct capacity imbalances.

(iv) To calculate the estimated return on capital employment.

(v) To provide some of the fixed assets figure required for the forecast of balance sheet.

4.5.11 CASH BUDGET

A Cash budget contains detailed estimates of cash receipts (cash inflows) and disbursement (cash outflows) for the budget period. It makes certain that the business has sufficient cash available to meet its needs as and when they arise. The period of time covered by a cash budget depends on the type of business, management planning, needs and cash position.

1. **Operational Cash Planning** : Cash budgets may be prepared monthly, weekly daily to meet informational requirements of management.
2. **Short Range** : Short-range cash budget is prepared annually and as in "correspondence with the annual profit plan".
3. **Long – Range** : Long range budgeting does not disclose revenue and expenses in detailed. The effect of business expansion and long term trends are incorporated in long- range Cash Budgeting.

The preparation of cash budget has the following objectives.

(i) It indicates that sufficient cash is available when required.

(ii) It indicates the effect on the cash position of seasonal requirements large inventories etc.

(iii) It shows whether Capital expenditure may be financed internally.

(iv) It shows the availability of excess funds for short – term investments.

4.5.12 FIXED AND FLEXIBLE BUDGET

Fixed Budgeting:

A fixed budget is one, which is prepared keeping in mind one level of output. It is designed to remain unchanged irrespective of the level of activity actually attained. Fixed budgets do not change when production level changes. But in practice fixed budgeting is rarely used, because the fixed budget is unable to provide use full information when actual output differs significantly from expected or budgeted output. A fixed budget can be usefully employed when budgeted output is close enough to the actual output.

Flexible Budgeting :

Flexible budget is prepared for more than one level of activity. It is a set of alternative budgets to different expected level of activity. The flexible budget is also known as variable budget, dynamic budget, step budget etc. As every business is dynamic, ever changing and never static, so flexible budget helps the management to utilize capacity for various levels of activity, say 70%, 80%, 90% and 100% etc. Among different levels of activity the most likely activity level is made the basis for planing

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business operations. The flexibility involved in this budget makes a very useful decision making tool for management.

Flexible budgets are prepared in those companies where it is extremely difficult to forecast output and sales, such as demand for luxury goods; where sales are effected by weather condition or company introduce new product.

PREPARATION OF FLEXIBLE BUDGETS

(1) Deciding the range of activity to which the budget is to be prepared.

(2) Analyse all costs into fixed, variable and semi-variable.

(3) Selecting the activity levels to prepare budgets at those levels.

(4) Prepare the budget at each activity level selected by associating the activity level with corresponding costs.

Illustration: 4.1

Prepare the flexible budget for overheads on the basis of data given below. Ascertain overhead rates at 50% 60%, and 70% capacity.

	At 60% capacity
Variable overheads	
Indirect Material	6,000
Indirect Labour	18,000
Semi-variable overhead	
Electricity (40% fixed, 60% variable)	30,000
Repair Maintenance (80% Fixed, 20%) variable	3,000
Fixed overheads	At 60% capacity
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Estimated direct labour hours	1,86,000

Solution

Calculation of Overheads

	At 50% capacity	At 60% capacity	At 70% capacity
Variable overheads			
Indirect maternal	5,000	6,000	7,000
Indirect labour	15,000	18,000	21,000
Semi-variable overheads			
Electricity	27,000	30,000	33,000
Repair & maintenance	2,900	3,000	3,100
Fixed overheads			
Depreciation	16,500	16,500	16,500
Insurance	4,500	4,500	4,500
Salaries	15,000	15,000	15,000
Total overheads	85,900	93,000	1,00,100
Estimated Direct Labour hours	1,55,000	1,86,000	2,17,000
Labour Rate per hour	Rs.55	Rs.50	Rs.46

Calculation of Semi-variable overhead.

Electricity : Fixed-40% of 30,000 = 12,000

(At 50%) Variable-60% of 30,000 = $\frac{18,000}{60} \times 50$ = 15,000

27,000

At 70% capacity

Fixed = 12,000

Variable (18,000 / 60 X 70) = 21,000

33,000

Similarly repair and maintenance will be calculated.

Illustration: 4.2

With the following data for a 60% activity prepare a budget at 80% and 100% capacity.

Production at 60% capacity	-	600 units
Material	-	Rs.100 per unit
Labour	-	Rs.40 per unit
Expenses	-	Rs10 per unit
Factory expenses	-	Rs.40,000 (40% Fixed)
Administration expenses	-	Rs.30,000 (60% fixed)

Solution

Capacity	60% (600)	80% (800)	100% (1000)
Material	60,000	80,000	1,00,000
Labour	24,000	32,000	40,000
Expenses prime cost	6,000	8,000	10,000
Factory expenses (fixed)	90,000	1,20,000	1,50,000
Variable	16,000	16,000	16,000
At 80% (24,000/60X80)	-	32,000	-
100% (24,000/60x100)	-	-	40,000
Factory cost	1,30,000	1,68,000	2,06,000
Add-Administrative O.H.			
Fixed (60% of 30,000)	18,000	18,000	18,000
Variable (40% of 30,000)	12,000	-	-
At 80% (12,000/60X80)	-	16,000	-
100% (12,000/60X100)	-		20,000
Total cost	**1,60,000**	**2,02,000**	**2,44,000**

Illustration: 4.3

The expenses for the production of 5,000 units in a factory are given as follows.

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	Per Unit (Rs.)
Materials	50
Labour	20
Variable overhead	15
Fixed overhead (50,000)	10
Administrative expenses (5% variable)	10
Selling expenses (20% fixed)	6
Distribution expenses (10% fixed)	5
Total cost	**Rs.116**

You are required to prepare a budget for 7,000 units.

	Output-5,000 units		Output-7,000 units	
	Per unit	Total	Per uni t	Total
Materials	50.00	2,50,000	50.00	3,50,000
Labour	20.00	1,00,000	20.00	1,40,000
Prime cost	70.00	3,50,000	70.00	4,90,000
Factory overhead				
Variable	15.00	75,000	15.00	1,05,000
Fixed	10.00	50,000	7.14	50,000
Work cost	95.00	475,000	92.14	6,45,000
Administrative expenses	10.00	50,00	7.28	51,000
Cost of production	1,05,00	5,25,000	99.42	6,96,000
Selling & distribution expenses				
Selling expenses	6.00	30,000	5.66	39,600
Distribution expenses	5.00	25,000	4.86	34,000
Total cost of sales	**116.00**	**5,80,000**	**109.94**	**7,69,600**

Calculation at 7,000 units

Administrative expenses

Variable-5% of Rs.10 = .50 x 7,000 = 3,500

Fixed : (95% of Rs.10) = 9.50 x 5000 = 47,500

51,000

Selling Expenses

Variable : 80% of Rs.6 =4.80 x 7,000 = 33,600

Fixed : (20% of Rs.6) = 1.20 x 5,000 = 6,000

= **39,600**

Distribution Expenses

Variable (90% of Rs.5) = 4.50 x 7,000 = 31,500

Fixed (10% of Rs.5) =50 x 5,000 = 2,500

34,000

4.5.13 ZERO BASE BUDGETING (ZBB)

Zero base budgeting is an elaborate, time consuming budgeting practice, where managers have to justify all their activities and costs if they were being undertaken first time. This ZBB involves starting from scratch or zero. This technique was first introduce by Jimmy Carter in 1962, who was the Governor of the states of Georgia, for controlling state expenditure.

In traditional budgeting cost levels of the previous year are taken as base to start with and budget units give emphasis that what changes are required from previous year. Thus an incremental approach to budgeting carries forward previous year inefficiencies because previous year is taken an a base for the development of a budget.

But in zero base budgeting incremental approach should not be followed and previous years figures are not adopted as a base, rather, as the name goes, zero is taken as a base. Taking zero as a base, a budget is developed on the basis of likely activities for the future period. In ZBB a manager is to justify why he wants to spend. So it is successfully used in many non profit organisation. In the words of Peter A Pyher "A planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (zero base) and shifts the burden of proof to each manager to justify why he should spend money at all. The approach requires that all activities be analysed in "decision packages" which are evaluated by systematic analysis and ranked in order of preference".

APPLICATION OF ZBB

ZBB involves the following steps

1. Determine goals, operations and costs of all activities under managers jurisdiction i.e called a decision package.
2. Each decision package must be justified.
3. If justified, then cost of minimum efforts required for each decision package is determined.
4. Alternatives means of conducting each activity should be considered to select better and cheaper options for the package.
5. Evaluate budgetary implications of increasing or decreasing the level of each activity.
6. Establish measures of workload and performance.
7. Rank all activities in order of their performance i.e. in order of priority for resource allocation.

ADVANTAGES OF ZBB

1. It allocates the resources according to the need and benefit.
2. It identifies and eliminates wastages and obsolete operations.

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3. It suggests the best possible methods of performing jobs.
4. It leads to increase staff involvement which may lead to improved motivation and greater interest in the job.
5. It increases communication and coordination within the organisation.
6. Managers become more aware of the cost of inputs.
7. The decision packages provides management with a deep, coordinated knowledge of all the organizations activities.
8. It is especially useful for service departments.

DISADVANTAGES OF ZBB

1. The cost involved in preparing a vast number of decision packages in a large firm are very high.
2. It is very time consuming and a large amount of additional paper work is required.
3. Ranking of decision packages and allocation of resources is subjective, so it can creates conflict within the department.
4. As ZBB shifts burden to managers, so they do not want to adopt a new technique.

4.4.14 PERFORMANCE BUDGETING

Performance budgeting is a system in which input costs are related to the performance, i.e. end results. In other words, the performance has to match the targets and the expenditure that is budgeted must result in the achievement of physical targets. The concept of performance budgeting is used extensively in the Government and public sector undertakings.

Government has realised that budgeting should be on the basis of what is meant to be achieved and the expenditure has to compare with the achievement of targets. So the first requirement is to determine the various activities and the targets to be achieved. Suppose Govt. decide to open training centres for handicapped persons. Now we have to see how many institutions are there, where it will be opened, how many persons are benefited from such institutions and lastly the expenditure of all institutions as a whole. The performance of the people and departments concerned shall be judged not only by the amount of money spent but also by the number of handicapped persons trained in different skills. Thus expenditure will be linked with performance and amount spent shall be fruitful. So Govt. has taken the correct step of decentralizing accounting work, otherwise such a system of reporting would not be possible. So performance budgeting is very much a useful technique in a good industrial concern.

QUESTIONS

1. What is a budgetary control system? State the advantages of budgetary control system.
   Discuss the advantages and limitations of budgetary control.
2. Describe the types of budgets.
3. Differentiate between fixed and flexible budget.
4. What do you mean by zero base budgeting? Write the advantages
5. and disadvantages of ZBB.
   Differentiate between standard costing and budgetary control.
6. Write short notes on
7. (a) Performance budget
   (b) Cash budget
   (c) Sales budget

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PRACTICAL PROBLEMS

1. Prepare a flexible budget for production at 80% and 100% activity on the basis of following information.

   At 50% capacity

   Material Rs. 80 per unit

   Direct labour Rs.50 per unit.

   Direct Expenses Rs.15 per unit

   Factory Expenses Rs.50,000 (50% fixed)

   Administrative Expenses – Rs.60,000 (60% variable)

Ans: At 80% capacity – 13,06,600 . At 100% capacity -Rs.16,21,000.

2. Draw up a flexible budget for overhead expenses @ 70%, 80% and 90% plant capacity.

	At 80% capacity (Rs.)
Variable overheads	
Indirect labour	12,000
Stores (including spares)	4,000
Semi-variable overheads	
Power (30% fixed)	20,000
Repair & Maintenance (60% fixed)	2,000
Fixed overheads	
Depreciation	11,000
Insurance	3,000
Salaries	10,000
Total overheads	**62,000**
Estimated direct labour hours	1,24,000

Ans.: Direct labour hour rate

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(a) At 70% -Re.536, (b) At 80% Re.50 (c) At 90% Re.72.

3. The expenses budgeted for production of 10,000 units in a factory are furnished below.

	Per unit (Rs.)
Material	70
Labour	25
Variable overhead	20
Fixed overhead (Rs.1,00,000)	10
Variable expenses (direct)	5
Selling expenses (10% fixed)	13
Distribution expenses (20% fixed)	7
Administration expenses (50,000)	5
Total	**155**

Prepare a budget for the production of (a) 8,000 units (b) 6,000 units

Assume that administration expenses are rigid for all levels of production.

Ans.: At 8,000 units – Rs.12,75,400
At 6,000 units – Rs.10,00,800
At 10,000 units – Rs.15,50,000

4. A factory is currently working at 50% capacities and produces 10,000 units. Estimate the profits of the company when it works at 60% and 80% capacity.

At 60% working raw material cost increases by 2% and selling price falls by 2%. At the 80% working, raw material cost increases by 5% and selling price falls by 5%.

At 50% capacity the product costs Rs.180 per unit and is sold at Rs.200 per units. The unit cost of Rs.180 is made up as follows.

	Rs.
Material	100
Labour	30
Factory overhead	30 (40% fixed)
Administrative overhead	20 (50% fixed)

Ans.: Rs.2,00,000. Rs.2,12,000, Rs.2,12,000.

5. A factory engaged in manufacturing plastic toys is working at 40%

capacity and produces 10,000 toys per month. The present cost breakup for one toy is as under Materials-Rs.10, Labour-Rs3, Overhead-Rs.5 (60% fixed).

The selling price is Rs.20 per toy. If it is decided to work factory at 50% capacity, the selling price falls by 3%. At 90% capacity the selling price falls by 5% accompanied by a similar fall in the price of material. You are required to prepare a statement showing profit at 50% and 90% capacities.

Ans: Profit 40% capacity – Rs.20,000, 50% capacity – Rs.25,000, 90% capacity –Rs.71,250

UNIT V STANDARD COSTING AND VARIANCE ANALYSIS

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Structure

5.0 OBJECTIVES

After going though this unit you should be able to

- Explain the meaning of standard cost, standard costing etc.
- Identify the uses of standard costing in various field.
- Know the various types of variance analysis.
- Get a good idea about how to solve different types of problems in variance analysis.

5.1 INTRODUCTION

The determination of actual cost or historical cost is no doubt important in costing, but such actual cost involves some limitations.

(i) The actual cost information is available only after the completion of the job, so it has of no practical utility.

(ii) Historical costs do not serve the purpose of cost control because the cost has already been incurred before cost figures are available for managerial control.

(iii) Historical costs do not provide any yardstick against which efficiency can be measured.

(iv) Actual costing is comparatively expensive as it involves the maintenance of various records and documents.

The above stated limitations involved with the determination of actual costs has given rise to the technique of standard costing.

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5.2 MEANING OF STANDARD COST

The standard means a norm or criterion. It is a planned or predetermined or targeted cost which is calculated from the management's standards of efficient operation and the relevant necessary expenditure. The main object of standard cost is to look forward and assess what the cost "should be" as distinct from what he cost has been in the past.

5.3 MEANING OF STANDARD COSTING

The technique of using standard costs for the purpose of cost control is known as standard costing. So in standard costing systems stanard costs are determined and subseqeuntly compared with actual costs to find out the differences in between two and if any differences or variances occur, then it should be analysed to know the cause and provide a control over it.

The process of standard costing involves the following stages.

(i) Predetermination of standard costs in full details under each element of cost i.e. labour, material and overhead.

(ii) Ascertain actual costs.

(iii) Comparison of the actual costs with standard cost to find out the variances.

(iv) Analysis of variances in order to determine the reasons for deviations of actuals from the standards.

(v) Presentation of information to the appropriate level of management to enable suitable action being taken or revision of standards.

It should be noted in this connection that standard costing is not a separate system of accounting but only a technique used with the intention of controlling the costs.

5.4 ADVANTAGES OF STANDARD COSTING

1. **Effective cost control :** standard costing provides a yard stick with reference to which the efficiency or inefficiency in performacne may be established. This facilities the basic management function of cost control.

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2. **Provides Incentives :** Standard costing provides the incentive and motivation to work with greater effort for achieving the standard.

3. **Fixing prices :** Standard cos may be used as the basis for the process of price fixation, filing the tenders and offering the quotations. If prices are quoted on cost plus basis, actual costs may not be available in which case standard cost may be the base for fixation of selling price.

4. **Delegation of Authority :** This system facilitates delegation of authority and fixation of responsibility for each individual or department. Thus analysis of variance will fix responsibility for inefficiencies.

5. **Facilitates co-ordination :** While setting standards, the performance of different departments such as production, sales, purchases etc. is taken into account. Thus through standard costing co-ordination of various functions is achieved.

6. **Reduce Waste :** By fixing standards certain wastes such as material waste, idle time, lost machinse hours etc. are reduced.

7. **Inventory valuation :** Standard costing makes the work of valuation of inventory easier because the inventory is valued at predetermined costs.

8. **Budgetary planning :** Standard costs are very much useful in planning, budgeting and decision making. Production is useless without proper planning and budgeting. Once the production is properly planned, it will lead to save cost.

9. **Timely Reporting :** Standard costing facilitates timely presentation of cost reports to management pinpointing the significant variances. Timely reporting faciitates correction of such variances.

10. **Responsibility can be fixed :** standard costing makes all the executives cost concious which increases efficiency and productiivty all around. All executives are motivated to achieve the standard performance.

5.5 LIMITATIONS OF STANDARD COSTING

(1) Establishment of standard costs is difficult in practice. Fixation of inaccurate standards adversely affect the morale of the employees and acts as hindrance to increase efficiency.

(2) Standard costing is not suitable to industries which are subject to frequent technological changes. Industries may avoid revising standards as it is a costly affair.

(3) Operation of the standard costing system is a costly affair and small firms can not afford it.

(4) Standard costing can not be used in those concerns where non-standard products are produced.

(5) In case industries where products take more than one accounting period to complete, i.e. contract jobs where standard costing may not be suitable.

(6) Sometimes, standards set create adverse affects. If standards are set tightly and there is non-achievement of the same, it creates frustration.

(7) The staff may not be capable of operating the system.

(8) Lack of interest in standard costing on the part of the management makes the system ineffective and can not be used as a proper means of cost control.

5.6 VARIANCE ANALYSIS

Cost control is a very important functions of management. The deviation of the actual cost or profit or sales from the standard cost or profit or sales is known as variance. Analysis of variances is helpful in controlling the performance and achieving the profits that have been planned.

Favourable and Unfavourable Variances :

When actual cost is less than standard cost or actual profit is better than standard profit it is known as favourable variance and such a variance is usually a sign of efficiency of the organisation. It is called "favourable" or "credit" variance. When actual cost is more than standard cost or actual profit (sale) is less than standard profit (sale) it is called "unfavourable" or "adverse" or "debit" variance and usually an indicator of inefficiency of the organisation.

Controllable and Uncontrollable Variances :

If a variance is due to inefficiency of a cost centre i.e. individual or department, it is said to be controllable variance. Such a variance can be corrected by taking a suitable action. For exp, if actual quantity of material used is more than the standard quatity, the foreman would be responsible for it. If excessive use is due to defective supply, the purchasing department is responsible for it.

If a variance arises due to external factors, it is known as uncontrollable variance. For exp –change in the market price of material, increase in labour rates, increase in the rates of power are beyond the control of management. This type of variances can not be assigned to any person or department. The management should place more emphasis on controllable variance which require investigation and possibly corrective action. This follows the well known "principle of exception", because this technique is considered as an efficient way of exercising control on cost.

NOTES

5.7 TYPES OF VARIANCE ANALYSIS

Variances can be classified as :

(i) Material cost variance.

(ii) Labour cost variance

(iii) Overhead cost variance

5.7.1 MATERIAL VARIANCES

Materials variances can be analysed as follows.

(a) Material cost variances

(b) Material price variances

(c) Material usage variances

(d) Material Mine variances

(e) Material field variances

Material Cost Variance

Material Cost Variance is the difference between standard material cost and actual material cost.

Material Cost Variances = SC ~ AC

= SQ X SP ~ AQ x AP

Where SQ will be determined on the basis of actual output.

SQ = Actual output x Standard quantity of materials per unit

Material Price Variance

Material Price Variance is the difference between standard price and actual price multiplied by actual quantity.

Material Price Variance = AQ (SP ~ AP)

Material price variance arise due to

(i) Change in prices of materials

(ii) Inefficient purchasing

(iii) Not availing cash discounts

(iv) Change in delivery cost

(v) Off-season purchasing

Material Usage (or Quantity) Variance :

This is the difference between standard quantity and actual quantity multipled by the standard price.

Material Usage Variance = SP (SQ~AQ)

Material Usage Variance arise due to

NOTES

(i) Use of defective or sub-standard materials.
(ii) Pilferage,
(iii) Poor work man ship
(iv) Change in the quality of materials
(v) Use of substitute materials
(vi) Use of non-standard material mixture.

So material cost variance = Material price variance + material usage variance

Illustration : 5.1

Standard quantity of material required for 1 unit is 4 kg standard price per kg. is Rs.5. Actual production 1000 units. Actual quantity used 4,300 kg. actual price per kg Rs.5.50. Calculate

(i) Material Cost Variance
(ii) Material Price Variance
(iii) Material Usage Variance

Solutions

SQ = Actual output x Standard quantity per unit

= 1000 x 4 = 4000 kg.

AQ = 4,300 kg SP = Rs.5 AP=5.50

(i) Material Cost Variance

= SQ . SP ~ AQ . AP

= 4000 x 5 ~ 4300 x 5.50

= 20,000 ~ 23,650

= 3,650 (A)

(ii) Material Price Variance

= AQ (SP ~ AP)

= 4300 (5 ~ 5.50)

= 2150 (A)

(iii) Material Usage Variance

= SP (SQ ~ AQ)

= 5 (4000 ~ 4300)

= 1500 (A)

MCV=MPV + MUV

3650 (A) = 2150 (A) + 1500 (A)

NOTES

Material Mix Variance

Material Mix variance arises only when more than one type of material is used to get the final product. It is that portion of the material usage variance which is due to difference between the standard and actual composition of materials. This variance arises because the ratio of materials being changed from the standard ratio set.

Material Mix Variance = SP (RSQ ~ AQ)

RSQ can be calculated as

$$RSQ = \frac{\text{Standard quantity of one material}}{\text{Total of standard quantities of material}} \times \text{Total of actual input}$$

Illustration : 5.2

From the following data calculate material mix variance.

Raw material	Standard	Actual
X	40 units @ Rs.50 per unit	50 unit @ R.50 per unit
Y	60 units @ Rs.40 per unit	60 units @ Rs.45 per unit
Total	**100 units**	**110 units**

Solutions

As total standard input and actual input are different so RSQ will be determined.

RSQ of X = 40 / 100 x 110 = 44 units

RSQ of y = 60 / 100 x 110 = 66 units

Material Mix Variance = SP (RSQ ~ AQ)

Material x = 50 (44 ~ 50) = Rs.300 (A)

Material Y = 40 (66-60) = Rs. 240 (F)

Material mix variance = Rs. 60 (A)

Material Yield Variance

Material yield variance is that portion of material usage variance which may arise due to difference between standard yield expected and the actual yield obtained. This variance measures the abnormal loss or saving of materials. This variance is important in case of process industries where certain percentage of loss of materials is inevitable.

(a) When standard and actual mix do not differ.

Material yield variance = SR (AY-SY)

$$\text{Standard Rate} = \frac{\text{Standard cost of standard mix}}{\text{Net standard output}}$$

$$\text{(Gross output – Standard loss)}$$

NOTES

When standard and actual mix differ

Material yield variance = SR (AY-RSY)

Where standard Rate = $\frac{\text{Standard cost of revised standard mix}}{\text{Net standard output}}$

Illustration: 5.3

During a particular period following informations are available.

Raw material	Standard mix			Actual mix		
	Unit	Price	Amount	Unit	Price	Amount
X	60	25	1500	56	25	1,400
Y	40	50	2,000	44	50	2,200
Total	100			100		
Less-Loss	30			26		
Yield	70			74		

Calculate (a) Material mix variance

(b) Material yield variance

Solution

As both standard input and actual input are same so SQ=RSQ.

a) Material Mix Variance

SP (RSQ ~ AQ)

Material X = 25 (60-5) = 100 (F)

Material Y =50 (40-44) = 200 (A)

MMV = 100 (A)

b) Material Field variance

SR (AY-SY)

AY=74

SY=70

$SR = \frac{\text{Standard cost of standard mix}}{\text{Net standard output}}$

= 3500/70= Rs.50

= 50 (74-70)

=200 (F)

Illustration: 5.4

Quantity of materials purchased = 3,000 units

Value of materials purchased = Rs.9,000

Standard quantity of material required per tone = 30 units

Standard rate of material = Rs.2.50 per unit

NOTES

Opening stock of raw material = Nil
Closing stock of raw material = 500 units
Output during the period = 80 tons

From the following compute

(a) Material cost variance

(b) Material price variance

(c) Material usage variance

Solutions

SQ = Output x Standard quantity per tonne

= 80 x 30 = 2400

AQ = Opening stock + Purchase – closing stock

= Nil + 3,000 – 500

= 2,500 units

SP = Rs.2.50

AP = 9,000/3,000 = Rs.3.00

(a) Material cost variance = SQ X SP ~ AQ x AP

=2400 x 2.50 ~ 2500 x3.00

=6,000 ~ 7.500

=1500(A)

(b) Material price variance = AQ (SP~AP)

=2500 (2.50 ~3.00)

=1250 (A)

(c) Material Usage Variance = SP (SQ~AQ)

=2.50 (2400~2500)

=250 (A)

Check

MCV = MPV + MUV

1500(A) = 1250(A) + 250 (A)

Illustration: 5.5

A manufacturing concern furnishes the following informations.

Standard-Material for 70 kg. finished products = 100 kg

Price of Material : Re 1 per kg.

Actual –	Output	- 2,10,000 kg.
	Material used	- 2,80,000 kg.
	Cost of materials	- Rs.2,52,000

Calculate (a) Material cost variance
(b) Material price variance
(c) Material Usage variance

Solutions

SQ = 100/70 x 2,10,000 = 3,00,000 kg.

AQ = 2,80,000 kg.

SP = Re 1

$$AP = \frac{2,52,000}{2,80,000} = \text{Rs. 90 per kg.}$$

Material cost variance = SQ.SP ~ AQ.AP

=3,00,000 x 1 ~ 2,80,000 x .90

=3,00,000 ~ 2,52,000 = Rs.48,000 (F)

Material price variance = AQ (SP~ AP)

=2,80,000 (1.00 ~.90)= Rs.28,000 (P)

Material Usae variance = SP (SQ~ AQ)

=1 (3,00,000 ~2,80,000)= Rs.20,000 (P)

Check

MCV = MPV + MUV

48,000 (F) = 28,000 (F) + 20,000 (F)

Illustration: 5.6

80 kgs of Material-A at a standard price of Rs.2 per kg. and 40 kgs of material B at a standard price of Rs.5 per kg were to be used to manufacture 100 kgs of a chemical.

During a month, 70 kgs of material A priced at Rs.2.10 kg and 50 kgs of material B priced at Rs.4.50 per kg were actually used and the output of the chemical was 102 kgs.

Find out material variousness.

Solution

Raw material	Standard			Actual		
	Qty.	P.U.	Total	Qty.	P.U.	Total
A	80	2	160	70	2.10	147
B	40	5	200	50	4.50	225
Total	120		360	120		372
Loss	20			18		
Output	100			102		

NOTES

As both standard input and actual input are some so RSQ for A=80, B=40. As both standard output and actual output are different so Standard Quantity (SQ)

For A = 80 / 100 x 102 = 408/5

B = 40 / 100 x 102 = 204/5

(a) Material Cost Variance SQ.SP ~ AQ.AP

Material A = 408/5 x 2 ~ 70 x 2.10

=163.20 ~ 147 = 16.2 (F)

Material B = 204 /5 x 5 ~ 50x4.50

= 204 ~ 2.25 = 21 (A)

Total material cost variance = 21(A) + 16.2(F)=4.80(A)

(b) Material price variance = AQ (SP~AP)

Material A = 70 (2.00 ~ 2.10) = Rs. 7(A)

B = 50 (5.00 ~ 4.50) = Rs25 (F)

Total material price variance = 18(F)

(c) Material usage variance

SP (SQ~AQ)

A = 2 (408/5 ~ 70) = 23.20 (F)

B = 5 (204/5 ~ 50) = 46.00 (A)

Total material large variance = **22.80 (A)**

(d) Material mix variance = SP (RSQ ~ AQ)

Material A = 2 (80~70) = 20 (F)

Material B = 5 (40~50) = 50 (A)

Total material mix variance = 30 (A)

(e) Material yield variance = SR (AY ~ SY)

$$SR = \frac{\text{Standard cost of standar dmix}}{\text{Net standard output}}$$

$$= \frac{360}{100} = \text{Rs. } 3.60$$

AY = 102, SY=100

=3.60 (102 ~ 100)

= Rs.7.20 (F)

NOTES

Illustration: 5.7

The standard cost of a chemical mixture is as follows.

40% of Material A @ Rs.20 per kg.

60% of Material B @ Rs.30 per kg.

A standard loss of 10% of input is expected in production. The cost records for a period showed the following usage.

90 kg of material A @ Rs.18 per kg.

110 kg. of material B @ Rs.34 per kg.

The quanitty produced was 182 kg of good product.

Calculate all material variances.

Solutions

	Qty.	Rate	Amount	Qty.	Rate	Amount
A	80	20	1600	90	18	1,620
B	120	30	3,600	110	34	3,740
Total	200		5,200	200		5,360
Less-Loss	20			18		
	180		5,200	182		5,360

As both standard input and actual input are same so RSQ for A=80 kg @ B-120 kg. As both standard output and actual output are different.

So SQ for

A = 80 / 180 x 182 = 728 / 9

B 120/180 x 182 = 364 /3

(a) Material cost variance = SQ.SP ~ AQ. AP

$$\text{Material A} = \frac{728}{9} \times 20 \sim 90 \times 18$$

$$= 1617.78 \sim 1620 = 2.22 \text{ (A)}$$

$$\text{Material B} = \frac{364}{3} \times 30 \sim 110 \times 34$$

$$= 3640 \sim 3740 = 100 \text{ (A)}$$

Total material cost variance = 102.22(A)

(b) Material Price Variance = AQ (SP~AP)

Material A = 90 (20-18)	= 180 (F)
Material B = 110 (30~34)	= 440 (A)
Total Material price variance	= 260 (A)

(c) Material Usage Variance = SP (SQ~AQ)

Material A = 20 (728/9 ~ 90) = 182.22 (A)

Material B = 30 (364/3 ~ 110) = 340.00 (F)

Total material Usage various =157.78 (F)

Material Mix variance = SP (RSQ~AQ)

Material A = 20 (80~90) = 200 (A)

Material B = 30 (120~110) = 300 (F)

Total M. M.V. = 100 (F)

(d) Material Yield Variance = SR (AY-SY)

$$SR = \frac{\text{Standard cost of st.mix}}{\text{Net standard out put}}$$

= 5,200 / 180 – 28.89

MYV = 28.89 (182~180) = Rs.57.78 (F)

Illustration : 5.8

The standard material cost to produce one tonne of chemical X is.

300 kg of Material A @ Rs.10 per kg.

400 kg of Material B @ Rs.5 per kg.

500 kg of Material C @ Rs.6 per kg.

During a period, 100 tonnes of chemical X were produced from the sage of.

35 tonnes of Material A at a cost of Rs.9000 per tone

42 tonnes of Material B at a cost of Rs.6000 per tone

53 tonnes of Material C at a cost of Rs.7000 per tone

Calculate material variances.

Solution

Tonne = 1000 kg

	Standard			Actual		
	Qty.	Rate	Total	Qty.	Rate	Total
A	30,000	10	30,000	35,000	9	3,15,000
B	40,000	5	2,00,000	42,000	34	2,52,000
C	50,000	6	3,00,000	53,000	7	3,71,000
Total	1,20,000		8,00,000	1,30,000		9,38,000
Loss	20,000			30,000		
Output	1,00,000			1,00,000		

NOTES

As both standard input and actual input are different So RSQ for

Material $A = \frac{30,000}{1,20,000} \times 1,30,000 = 32,500$ kg

$B = \frac{40,000}{1,20,000} \times 1,30,000 = \frac{1,30,000}{3}$ kg

$C = \frac{50,000}{1,20,000} \times 1,30,000 = \frac{1,62,500}{3}$ kg

As both output are same so,

SQ for A=30,000 B=40,000 C=50,000

(a) Material cost variance = SQ. SP ~ AQAP

Material A – 30,000 x 10 ~ 35,000 x 9

= 3,00,000 ~ 3,15,000 = 15,000 (A)

B =40,000x5 ~ 42,000 x 6 =

=2,00,000 ~ 2.52,000 = 52,000 (A)

C = 50,000 x 6 ~ 53,000 x 7

= 3,00,000 ~ 3,71,000 = 71,000 (A)

MCV - 1,38,000(A)

(b) Material price variance = AQ (SP~AP)

A =35,000 (10~9) = 35,000 (F)

B =42,000 (5~6) = 42,000 (A)

C =53,000 (6~7) = 53,000 (A)

MPV 60,000 (A)

(c) Material Usage Variance = SP (SQ~AQ)

A =10 (30,000~35,000) = 50,000 (A)

B =5 (40,000~42,000) = 10,000 (A)

C =6 (50,000~53,000) = 18,000 (A)

MUV 78,000 (A)

(d) Material Mix Variance = SP (RSQ~AQ)

A =10 (32,500~35,000) = 25,000 (A)

B =5 (1,30,000/3 ~42,000) = 6,667(F)

C =6 (1,62,500/3~53,000) = 7,000 (F)

MMV 11,333(A)

NOTES

(e) Material yield variance SR (AY-SY)

$$SR = \frac{\text{Sta cost of standard mix}}{\text{Net standard output}}$$

$$= \frac{8,00,000}{1,00,000} = Rs.8$$

AY = 1,00,000 K.g

$$SY = \frac{130,000}{1,20,000} \times 100,000 = \frac{13,00,000}{12}$$

$$MYV = 8\left(190,009 - \frac{13,00,000}{12}\right) = 66,667(A)$$

5.7.2 LABOUR VARIANCES

Labour Variances can be analysed as follows.

(a) Labour cost variance
(b) Labour rate variance
(c) Labour efficiency variance
(d) Idle time variance
(e) Labour mix variance
(f) Labour yield variance

The analysis and computation of labour variance is quite similar to material variances.

Labour Cost Variance

Labour cost variance is the difference between standard cost of labour allowed for the actual output achieved and the actual cost of labour employed.

Labour Cost Variance = Standard cost ~ Actual cost

= SC ~ AC

= SH x SR ~ AH x AR

Or = ST x SR ~ AT x AR

Where Standard Time (ST) is calculated in the basis of actual output.

Labour Rate Variance

It is that portion of Labour cost variance which is the difference between the standard rate and actual rate multiplied by the actual hours.

$$LRV = AT(SR \sim AR)$$

Labour Efficiency Variance :

This portion of the labour cost variance is due to the difference between standard time and actual time multiplied by standard rate.

$$LEV = SR (ST ~ AT)$$

Illustration : 5.9

The following information is given.

Standard	hours per unit	15 hrs
Standard	rate	Rs 4 per hour
Actual	production	1000 units
Actual	hours	15,300 hrs
Actual	rate	Rs. 3.90 per hour

Calculate

(a) Labour Cost Variance

(b) Labour Rate Variance

(c) Labour Efficiency Variance

Solution

ST = Actual Production × SH Per Unit

= 1000 x 15 = 15,000 hrs

At = 15,300 hrs

SR = Rs. 4

AR = Rs. 3.90

Labour Cost variance = ST . SR ~ AT . AR

= 15000 x 4 ~ 15,300 x 3.90

= 60,000 ~ 59,670

= Rs 330 (F)

Labour Rate Variance = AT (SR ~ AR)

= 15,300 (4 –3.90)

= Rs 1530 (T)

Labour Efficiency Variance

= SR (ST ~ AT)

= 4 (15,000 ~ 15,300)

= 1200 (A)

Labour Efficiency Variance is further divided into the following sub-variance.

NOTES

a) Idle time Variance

b) Labour Mix Variance

c) Labour yield Variance

Idle time Variance :This variance represents that portion of the labour efficiency variance which is due to abnormal idle time, such as time, lost due to machine break down, power failure strike etc. It is calculated by the formulate.

Idle time Variance = Idle Time x SR

Idle time variance is always unfavorable.

When idle time variance is part of a labour cost variance then actual time, of labour efficiency variance is (actual time – idle time)

Labour Mix Variance (Gang Composition Variance)

This variance is similar to material mix variance. It arises only when more than one grade of workers are employed and the composition of actual grade of workers differ from those specified.

Labour Mix Variance = SR (RST~AT)

Revised Standard Time (RST) can be calculated as

$$RST = \frac{\text{ST hours of the grade}}{\text{Total standard hours}} \times \text{Total actual hours}$$

Labour yield variance. It is like material yield variance.

LYV = SR (ST ~ RST)

Or LYV = St labour cost per unit of output (AY-SY)

Illustration: 5.10

Using the following information, calculate labour variances.

Gross direct wages = Rs.3,000

Standard hours produced =1600 hrs

Standard rate per hour = Rs.1.50

Actual hours paid 1500 hours, out of which abnormal idle time is 50 hours.

Solution

ST=1600 hrs AT=1500 hrs

R = Rs.150 AR = 3000/1500 = Rs.2.00

(a) Labour cost Variance = ST X SR ~ AT X AR

= 1600 X 1.50 ~ 1500 X 200

= 600 (A)

NOTES

(b) Labour Rate Variance = AT (SR ~ AR)
=1500 (150~2.00) = 750(A)

(c) Labour Efficiency Variance = SR (ST~AT)
Here AT=(1500-50) = 1450 hrs
1.50 (1600 ~1450) = Rs.225 (F)

(d) Idle time variance = Abnormal Idle time x SR
50 x 1.50 = Rs75 (A)

Check

LCV = LRV + LEV + ITV
600 (A) = 750 (A) + 225 (P) + 75 (A)

Illustration: 5.11

From the following, calculate labour variances for Department A and B.

	Deptt.A	Deptt.B
Actual direct wages	Rs.2,000	Rs.1,800
Standard hours produced	8,000	6,000 hrs
Standard rate per hr.	30 paise	35 paise
Actual worked	8,200 hrs	5,800 hrs

Solutions

For Department A
ST = 8,000 hrs
AT=8,200 hrs
ST=30 paise
AR = 2000/8200 = 20/82

For Department B
ST = 6,000 hrs
AT=5,800 hrs
SR=35 paise
AR = 1800/5800 = 18/58

Labour cost variance = ST.SR ~ AT.AR

Deptt. A = (8,000 x 3.0 ~ 8,200 x 20/82) = 400 (F)
Deptt. B = (6000 x 35 ~ 5.800 x 18/58) = 300 (F)
Labour Rate variance = AT (SR ~ AR)
Dept. A = 8,200 (.30 ~ 20/82) = Rs.460(F)
Dept. B = 5,800 (.35 ~ 18/58) = Rs.230(F)
Labour Efficiency variance = SR (ST~AT)
Deptt. A = .30 (800 ~ 8,200) = Rs.60(A)
Deptt. B = .35 (6,000 ~ 5,800) = Rs.70(F)

NOTES

Illustration: 5.12

The standard cost for one unit of product shows the following costs for material and labour.

Material – 80 kg. @ Rs.1.50 per kg.

Labour – 18 hrs @ Rs.1.25 per hr

On completion of the production of a unit it was found that 75 kg of material costing Rs.1.75 per kg. has been consumed and that the time taken was 16 hours, the wage rate being Rs.1.50 per hour.

You are required to analyse material and labour variances.

Solutions

Materials

SQ=80 kg SP=Rs.1.50

AQ=75 kg. AP=Rs.1.75

Labour

ST=18 hrs SR=Rs.1.25

AT=16 hrs AR=rs.1.50

Material Variances

(a) Material cost variance = SQ x SP ~ AQ x AP

= 80 x 1.50 ~ 75 x 1.75 = 11.25 (A)

(b) Material price variance

AQ (SP ~ AP)

= 75 (150 ~ 175) = 18.25 (A)

(c) Material usage variance

= SP (SQ ~ AQ)

= 1.5 (80 ~ 75) = 7.50 (F)

Labour Variances

(a) Labour cost variance = ST.SR AT.AR

= 18 x 1.25 ~ 16 x 1.50 = Rs.1.50 (A)

(b) Labour rate variance = AT. (SR~AR)

= 16 (1.25 ~ 1.50) = Rs.4.00 (A)

(c) Labour Efficiency variance = SR. (ST~AT)

= 1.25 (18-16) = Rs.2.50 (F)

Illustration : 5.13

The standard cost of a product is as follows.

Material cost 2 kg @ Rs.2.50 each	= Rs.5 per unit
Wages 2 hours @ Rs10 each	= Rs.20 per unit
Actual which have emerged from business operations production.	= 8000 units

Material consumed = 16,500 kg @ Rs.2.40 = Rs.39,600
Wages paid = 18,000 hrs @ Rs.8 each = Rs.1,44,000
Calculate appropriate material and labour variances.

Solutions

Material	Labour
SQ=8,000 x 2 = 16,000 kg	ST=8,000x2 = 16,000 hrs
AQ=16,500 kg	AT=18,000 hrs
SP=Rs.2.50	ST=Rs.10
AP=Rs.2.40	AR=Rs.8

(a) Material cost variance SQ.SP ~ AQ.AP
=16,000 x 2.50 ~ 16,500 x 2.40
= 40,000 ~ 39,600 = 400 (F)

(b) Material price variance =AQ (SP ~ AP)
= 16,500 (2.50 ~2.40) = 1650 (F)

(c) Material Usage Variance = SP (SQ~AQ)
= 2.50 (16,000 ~ 16,500) = 1250 (A)

Labour Variances

(a) Labour cost variance = ST.SR ~ AT.AR
= 16,000 x ~ 18,000 x 8 = 16,000 (F)

(b) Labour rate variance AT (SR ~ AR)
=18,000 (10 ~ 8)
=36,000 (F)

(c) Labour Efficiency variance = SR (ST~AT)
= 10 (16,000 ~ 18,000) = 20,000 (A)

Illustration: 5.13

The details regarding the composition and the weekly wage rates of labour force engaged on a job scheduled to be completed in 30 weeks are as follows.

Workers	No. of workers	Weekly wage rate	No. of workers	Weekly wage rate
	Standard		Actual	
Skilled 75	60	70	70	
Semi-skilled	45	40	30	50
Un-skilled	60	30	80	20

The work was completed in 32 weeks. Calculate various labour variances.

NOTES

	Standard		Actual	
	Standard Time	Rate	Standard Time	Rate
Skilled	75x30=2250	60	70x32=2,240	70
Semi-skilled	45x30=1,350	40	30x32=960	50
Un-skilled	60x30=1,800	30	80x32=560	20
Total		**5,400**		**5,760**

As both input time are different so

Revised Standard Time (RST) =

$$\frac{\text{Standard Time of grade}}{\text{Total standard time}} \times \text{Total actual time}$$

Skilled = 2250 / 5,400 x 5,760 = 2,400 weeks

Semi skilled = 1350 / 5,400 x 5,760 = 1,440 weeks

Unskilled = 1800 / 5,400 x 5,760 = 1,920 weeks

(a) Labour cost Variance = ST.SR ~ AT.AR

Skilled 2250x60 ~ 2240 x 70	=	21,800 (A)
Semi-skilled 1350x40 ~ 960 x 50	=	6,000 (F)
Unskilled 1800x30 ~ 2560 x 20	=	2,800 (F)
LCV		**13,000 (A)**

(b) Labour rate Variance = AT.(SR ~ AR)

Skilled = (60-70) x 2,240	=	22,400 (A)
Skilled = (40-50) x 960	=	9,600 (A)
Unskilled = (30-20) x 2560	=	25,600 (F)
LRV		**64,000 (A)**

(c) Labour Efficiency Variance = SR.(ST ~ AT)

Skilled = 60 (2250~2240)	= Rs. 600 (F)
Semi-skilled = 40 (1350~960) x	= Rs.15,600 (F)
Unskilled = 30(1800~2560)	= 22,800 (A)
LEV	**6,600 (A)**

(d) Labour Mix Variance = SR.(RST ~ AT)

Skilled = 60 (2400~2240)	= Rs.9,600 (F)
Semi-skilled = 40 (1440~960) x	= Rs.19,200 (F)
Unskilled = 30(1920~2560)	= Rs.,19200 (A)
LMV	**9,600 (F)**

NOTES

(d) Labour Yield Variance = SR. (ST ~ RST)

Skilled = 60 (2250~2400) = Rs. 9,000 (A)

Semi-skilled = 40 (1350~1440) x= Rs. 3,600 (A)

Unskilled = 30(1800~1920) = Rs. 3,600 (A)

LYV **16,200 (A)**

5.7.3 OVERHEAD VARIANCE

Overhead is the aggregate of indirect materials, indirect labour and indirect expenses. Analysis of overhead variances is most complex task than the calculation of material and labour variances. It is so due to the fact that establishment of a standard overhead absorption rate is difficult as apart of total overheads is fixed, which affects the overhead absorption rate with the change in volume. Overhead rates are predetermined in terms of either labour hours or production units.

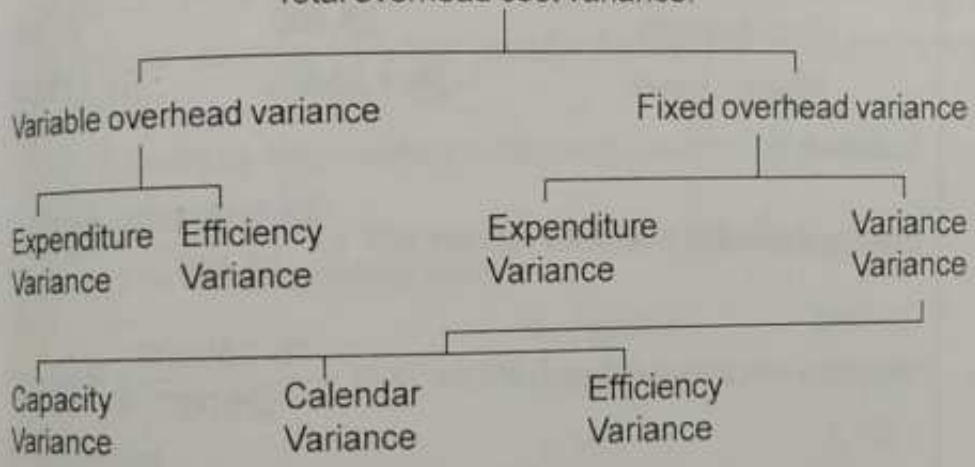
(a) If the overhead rate is expressed in terms of labour hours.

$$\text{Hourly rate} = \frac{\text{Budgeted overhead cost}}{\text{Budged output in hrs}}$$

The following diagram shows the entire classification of overhead cost variance.

(b) If the overhead rate is expressed in terms of units produced

$$\text{Unit rate} = \frac{\text{Budgeted overhead cost}}{\text{Budged output in units}}$$



Overhead cost variance

This variance is the difference between total standard overhead absorbed and actual overhead incurred.

Actual output x st. overhead rate per unit ~ Actual overhead cost Or (St hours for actual output x st. overhead rate per hour) ~ Actual overhead cost.

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Variable overhead cost variance

It may be defined as the difference between absorbed variable overhead and actual variable overhead.

(actual output x st. variable overhead rate per unit) ~ Actual variable overhead cost

Or (St. hours for actual output x st. variable overhead rate per hour) ~ Actual variable overhead cost

Variable overhead expenditure variance

This variance wises due to the difference between standard variable allowed and actual variable overhead incurred.

VoEV=(Actual hours worked x St variable overhead rate per hour) ~ Actual variable overhead

Variable overhead Efficiency variance :

This variance arises due to the difference between standard hours allowed for actual output and actual hours.

V.O. Efficiency Variance =

(St hour for ~ Actual) x St. variable over head rate
actual output hours

Illustration: 3.14

From the following data, calculate variable overhead variances.

	Budgeted	Actual
Variable overhead	Rs.2,50,000	Rs.2,60,000
Output in units	25,000	20,000
Working hours	Rs.1,25,000	Rs.1,10,000

Solution

$$\text{Standard variable overhead rate per unit} = \frac{\text{Rs. 2,50,000}}{25,000} = \text{Rs.10}$$

$$\text{Standard variable overhead rate per hour} = \frac{\text{Rs.2,50,000}}{1,25,000} = \text{Rs.2}$$

$$\text{Time allowed per unit of output} = \frac{\text{Rs.1,25,000}}{25,000} = 5\text{hours}$$

(a) Variable overhead cost variance

Actual output x St rate per unit ~ Actual overhead

=20,000x10 ~ 2,60,000=Rs.60,000(A)

(b) Variable overhead expenditure variance

Actual hours worked x St rate per hour – Actual overhead

1,10,000 x 2 ~ 2,60,000 = Rs.40,000 (A)

(c) Variable overhead Efficiency variance

(St time for actual production x St variable overhead rate per hour) ~ (Actual hours worked x St variable overhead rate per hour)

= (20,000 x 5 x 2) ~ (1,10,000x2)

=2,00,000 ~ 2,20,000 = Rs.20,000 (A)

Fixe overhead variance

It is difference between standard fixed overhead cost for actual output and actual fixed overhead.

FOV = (Actual output x St fixed overhead rate per unit) ~ Actual Fixed overheads.

Or (St hours for actual out x St fixed overhead cost) ~ Actual fixed overheads

Fixed overhead Expenditure variance

This variance arises due to the difference between budgeted fixed overhead and actual fixed overhead.

F.O. Expenditure variance = (Budgeted Fixed O.H. ~Actual Fixed O.H.)

Fixed overhead Volume variance

This variance arises due to the difference between standard fixed overhead cost for actual output and the budged fixed overhead cost.

F.O. volume variance = (Actual output x Standard rate) ~ Budged fixed over head.

Or = (St hours for actual output ~ Budgeted hours) x SR

Illustration : 5.15

The following data is given

	Budgeted	Actual
Production in unit	12,500	11,000
Man hours	6,250	5,750
Overhead costs :		
Fixed	12,500	13,000
Variable	50,000	45,000

Calculate fixed and variable overhead various.

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Solution

Basic calculations

Standard fixed overhead rate per hour $= \frac{12,500}{6,250} = Rs.2$

Standard variable overhead rate per hour $= \frac{50,000}{6,250} = Rs.8$

Standard hours for actual output $= \frac{6,250}{12,500} \times 11,000 = 5,500hrs$

Variable overhead variance

(a) Variable O.H. cost variance

(St hours for actual output x St rate) ~ Actual overhead cost

= (5,500x8) ~ 45,000 = Rs.1,000 (A)

(b) Overhead Expenditure Variance

= (Actual hours x St rate) ~ Actual overhead cost

= (5,750x8) ~ 45,000

= 46,000 ~ 45,000 = Rs.1000 (F)

(c) Overhead Efficiency variance

(St hours for actual output ~ Actual hours) x St overhead rate

= (5500 ~ 5750) x 8 = Rs.2000 (A)

Fixed Overhead variances

(a) Fixed overhead cost variance

(St hours for actual output x St overhead) ~ Actual fixed O.H cost

= (5500 x2) ~ 13,000 = Rs.2,000 (A)

(b) Overhead Expenditure variance

= Budgeted over head ~ Actual overhead

=12,500 ~ 13,000 = Rs.500 (A)

(c) Overhead volume variance

= (St hours for actual production ~ Budgeted hours) SR

= (5500 ~ 6,250) x 2 = Rs.1,500 (A)

Overhead volume variance sub-divided into the following variances.

(a) Efficiency variance

(b) Capacity variance

(c) Calendar variance

(a) **Efficiency variance** : This variance shows, that the actual quantify produced is different from standard quantity.

Fixed O.H. Efficiency variance (Actual hours – Standard hours for actual production) x St fixed overhead rate per hour

Or = (Actual production ~ Standard production as per actual time) x St fixed overhead rate per unit.

(b) **Capacity variance** : This variance arises due to difference between the actual capacity (in hours) worked during a given period and the budgeted capacity. The formula is capacity variance (Actual hours ~ Budgeted hours) x St. fixed overhead rate per hour

In case actual number of days and budgeted number of days are also given, then budgeted capacity hours will be calculated in terms of actual number of days and it will be known as revised budgeted capacity hours.

Capacity variance = (Actual capacity hours ~ Revised budgeted capacity hours) x St. fixed overhead rate per hour.

Calendar variance – This variance arises due to the difference between actual number of days and the budgeted days.

Calendar variance =(No. of working days ~ No. of budgeted working days) x St. fixed overhead rate per day.

Or

= (Revised budgeted capacity hours~ Budgeted hours) x St. fixed overhead rate per hour.

Illustration: 5.16

The following data is available in connection with the fixed overheads of a factory.

Budgeted fixed overhead	Rs.1,00,000
Budgeted output	50,000 units
Standard time for 1 cant	5 hours
Actual hours worked	2,55,000
Actual fixed overhead	Rs.1,10,000
Units produced during the month	52,000

Calculate fixed overhead variances

Solution

Basic calculations

Standard fixed overhead Rate = 1,00,000 / 50,000 = Rs.2 per unit

Revised Budgeted units RBQ = 2,55,000 /5,000 = 51,000 units

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(a) Fixed overhead cost variance
= Actual output x SR ~ Actual Fixed overhead
=52,000 x 2 ~ 1,10,000 = Rs.6,000 (A)

(b) Fixed overhead expenditure variance
=Budged fixed overhead ~ Actual fixed overhead
=1,00,000 ~ 1,10,000 = Rs.10,000 (A)

(c) Volume variance
(Actual output x SR) ~ Budgeted fixed overhead
-(52,000 x2) ~ 1,00,000 = Rs.4,000 (F)

(d) Capacity variance = SR (RBQ ~ BQ)
= 2 (51,000 ~ 50,000_ = Rs.2,000 (F)

(e) Efficiency variance = SR (AQ ~ SQ)
=2 (52,000 ~ 51,000)=2000 (F)

Illustration: 6.17

From the following information calculate various overhead variances.

	Budgeted	Actual
Output	15,000 units	16,000 units
No. of working days	25	27
Fixed overhead	Rs.30,000	Rs.30,500
Variable overhead	Rs.45,000	Rs.47,000

There was an increase of 5% in capacity.

Solution

$$\text{Standard rate (Total cost)} = \frac{\text{Standard overhead}}{\text{Standard output}} = \frac{75,000}{15,000} = \text{Rs.5}$$

$$\text{Standard rate (fixed)} = \frac{30,000}{15,000} = \text{Rs.2}$$

$$\text{Standard rate (variable)} = = \frac{45,000}{15,000} = \text{Rs.3}$$

(a) Total overhead cost variance
= Actual units x SR ~ Actual overhead cost
=(16,000 x5) ~ (30,500 + 47,000)
=Rs.2,500 (F)

Fixed overhead variance

(c) Actual units x St rate ~ Actual Fixed cost

=16,000 x 2 ~ 30,500 = Rs.1,500 (E)

Volume variance

(d) Actual units x SR ~ Budgeted fixed overhead

=16,000 x2 ~ 30,000 = Rs.2,000 (F)

Expenditure variance

(e) Budgeted fixed overhead ~ Actual Fixed overhead

=30,000 ~ 30,500 = 500 (A)

Capacity variance

(f) SR (Revised Budgeted units ~ Budgeted units)

Budgeted units for 25 days = 15,000 units

Budgeted units for 27 days = 15,000/25 x 27=16,200 units

Revised Budgeted Units (after 5% increase in capacity

= 16,200 + 5/100 x 16,200

=17,010

Capacity variance = 2 (17,010 ~ 16,200) = Rs.1,620 (F)

(g) Calendar variance

Increase or decrease in production due to more or less

Working days x SR per unit

Within 25 days St production =15000 units

Within 2 days st. production = 15000/25 x 2 = 1200 units

Calendar variance = 1200 x 2 = Rs.2400 (F)

(h) Efficiency variance =

SR (Actual production – Revised Budgeted units)

=2 (16,000 – 17,010) = 2,020 (A)

Questions

1. What is standard cost and standard costing? Define it clearly.
2. Define standard costing. In what type of industries is standard costing employed?
3. Show the difference between historical costing and standard costing.
4. State the advantages and limitations of standard costing.

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Practical Questions

1. In a factory standard estimates for material for the manufacture of 1,000 units of product x is 4000 kg at Rs.250 per kg. When 2000 units of product x are produced it is found that 825 kg of materials are consumed at Rs.2.70 per kg. Calculate material variances.

Ans.: MCV Rs.227.50 (A), MPV – Rs.165 (A), MUV-Rs.6250 (A)

2. Given that the cost standards for material consumption are 40 kg. @ Rs.10 per kg. compute (a) material price variance (b) Material usage variance when actuals are

(i) 40 kg @ Rs.10 per kg

(ii) 40 kg @ Rs.12 per kg.

(iii) 48 kg. @ Rs.12 per kg

(iv) 36 kg for a total cost of Rs.360.

Ans.: MPV – (i) Nil (ii) Rs.80 (A) (iii) 96(A) (iv) Nil

MUV = (i) Rs.80 (A) (iii) Nil Rs.90 (A) (iv) Rs.40 (F)

3. From the following data calculate:

(i) Material cost variance

(ii) Material price variance

(iii) Material usage variance

Products Quality	Standard price	Standard Quality	Actual	Actual price
A	1,050	2.00	1.100	2.25
B	1,500	3.25	1,400	3.50
C	2,100	3.50	2,000	3.75

Ans.: (I) 550 (A) (ii) Rs.1125(A) (iii) Rs575 (F)]

4. From the following information calculate material mix variance.

Materials Quality	Standard Quality	Actual Price (P.U.)	Standard Price (P.U.)	Actual
A	100	150	5	5.50
B	200	250	6	6.00
C	300	400	4	3.50

Due to shortage of B, it was decided to reduce consumption of B by 5% and increase that of A by 10%.

Ans.: Rs. 3.33 (F)

5. X Company Ltd. produce a product A by mixing three materials. For every 100kg of P. 125 kg of raw materials are used. In Dec. 2004, there was an output of 5,600 kg of P. The standard and actual production are as follows.

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Raw material	Standard mix	St price per kg.	Actual mix	Actual price per kg.
I	50%	40	60%	42
II	30%	20	20%	16
III	20%	10	20%	12

Calculate all material variances assuming actual quantity of material consumed was 7000 kg.

Ans: MCV – Rs.19,600(A), MPV Rs.5,600 (A) MUV=Rs.14,000 (A) MMV Rs.14,000 (A) MYV-Nil.

6. X ltd. is producing a standard mix by using 60 kg of material X and 40 kg of material Y. The standard loss in production is 30%. The standard loss in production is 30%. The standard price of X is Rs.5 per kg and that of Y is Rs.10 per kg. The actual mixture and yield mix as follows.

X 80 kg @ Rs.4.50 per kg.

Y 70 g @ Rs.8 per kg.

Actual yield is 115 kg.

Calculate material variances.

7. The standard cost of a certain chemical mixture is 35% of Material A @ Rs.25 per kg. 65% of material B @ Rs.36 per kg. A standard loss of 5% expected in production. The actual mixture 125 kg of material (a) Rs.27 per kg and 275 kg of material B @ Rs. 34 per kg. The actual output was 365 kg. Calculate (a) MCV (b) MPV (c) MMV (d) MYV

Ans.: @Rs.372.97 (A) (b) Rs.300 (F) (c) Rs.165 (A) (d) Rs.507.97(A)

8. Findout different labour variance

Standard	Actual
Output – 1000 units	1200 units
Rate of payment Rs.6 per unit	Wages paid with bons Rs.8,000
Time taken 50 hrs	40 hrs.

Ans.: LCV Rs.800(A) LRV Rs.3,200 (A) LEV Rs.2400 (F)

(Hints-st rate per hour Rs.120, Actual rate per hour Rs.200)

9. The standard cost of a product is 10 hours per unit at Rs.5 per hour. The actual data is production for units

Hour and taken -	Production	10,400 hours
	Idle time	400 hours
	Total time	10,800 hours

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Payment made Rs.56,160 @ Rs.5.20 per hour. Calculate

(a) Labour cost variance

(b) Labour rate variance

(c) Labour efficiency variance

(d) Idle time variance

Ans.: (a) Rs.6,160(A) (b) Rs.4,000 (A) (c) Rs.2,160 9(A) (d) Rs.2,000(A)]

10. Calculate Labour variances from the following date.

	Standard	Actual
No. of workers employed	600	550
Average wages per worker per month	Rs.250	Rs.264
Working days in a month	25	24
output in units	Rs.30,000	Rs.28,000

Ans.: (a) LCV=Rs.5200 (A) (b) LRV=Rs.13,200(A) (c) LEV=Rs.8,000(F)

11. The standard cost for one unit of product x shows the following costs of material and labour.

Material 4 pieces @ Rs.5.00

Labour 10 hours @ Rs.1.50

5,700 units of product were manufactured with the following material and labour costs.

Material – 23,000 pieces @ Rs.4.95

Labour-56800 hours @ Rs.1.52

Calculate appropriate material and labour variances.

Ans.: (i) MCV-Rs.150 (F), MPV Rs.1150 (F), MUV-Rs.1000 (A)

(ii) LCV Rs. 836(A), LRV Rs.1136(A) LEV-Rs.300(F)

12. For a unit of product A the standard data is given below.

Material 5 kg @ Rs.40 per kg. =Rs.200

Labour 4o hours @ Rs.100 per hour =Rs.40

Actual data

Actual production – 100 units

Materials – 490 kg @ Rs.42 kg

Labour-3,960 hours @ Rs1.10 per hour

Calculate appropriate material and labour variances.

Ans: (i)MCV-Rs.580(A) MPV – Rs.980(A) MUV-Rs.400(F)

(II) LCV-Rs.356(A)- LRV-s.396(A) LEV-Rs.40(F).

13. Calculate overhead variances from the following data.

	Standard	Actual
Fixed overhead	Rs.8,000	Rs.8,500
Variable overhead	Rs.12,000	Rs.11,200
Output units	4,000	3,800

Ans.: O.H.Cost variance Rs.700(A) Variable O.H. Variable Rs.200(F). Fixed O.H. Variance Rs.900(A), Volume Variance Rs.400(A) Overhead Expenditure Variance Rs.500(A)

14. From the following, compute different overhead variances.

In a factory 10,000 units are budgted to be product in a month with budgteted fixed expenses being Rs.15,000 i.e. Rs.1.50 per unit. The actual output during the month was 11,000 units and actual fixed expensio being Rs.15,500. The increase in output was due to 5% increase in capacity. The budgeted working days were 25 but facotry worked for 27 days.

Ans.: O.H. Variance Rs.1000(F), Exenditure Variance Rs.500(A), Volume Variance Rs.1500(F), Calander variacne Rs.1200(F) Capacity varince Rs.810 (F). Efficiency Variance Rs.510(A)

15. The following data are available.

	Standard	Actual
No. of working days	25	27
Man hours per month	5,000	5,400
Output in units	500	525
Fixed overhead	Rs.2500	Rs.2,400

Calculate fixed overhead variance for the month.

Ans. Total fixed O.H. Variance Rs.225 (F), Volume Variance Rs.125 (F), Expenses Variance Rs.100 (F), Capacity Variance Nil, Calender Variance Rs.200(F), Efficiency Variance Rs.75(A)

16. The following informations are available.

	Standard	Actual
Fixed overhead	Rs.10,000	Rs.12,000
Production in June (units)	Rs.2,000	Rs.2,100
Standard time per (hours)	10	
Actual hours worked		22,000

Complete fixed overhead variances.

Ans.: Fixed O.H. Cost variance Rs.1500(A) Expenditure variance. 2000(A) Volume Variance Rs.500(F) Capacity variance Rs.1000 (F), Efficiency Variance Rs.500(A).

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5.6 RESPONSIBILITY ACCOUNTING

Introduction

In small organizations a single individual often does decisions and management of the business. But in large organization where multiple products are produced it is more difficult on the part of the top management to control the whole departments. In order to overcome this difficulty the large organization is decentralized into different responsibility centers where individual managers have the authority over a given area of operation and freedom to take their own decisions. It becomes easy for the manager of a department to prepare his own cost budget, then he will be responsible for keeping the budgets under control. If in case the costs are more than the budgeted costs, then manger will try to find out reasons and take necessary corrective measures. Manager will personally responsible for the performance of his department. In the words of louiderback "Responsibility Accounting is the name given to that aspect of the managerial process dealing with the reporting of information to facilitate control of operations and evaluation of performance".

Responsibility accounting is used as a controlling device by top management for controlling the performance of other executives. The executives decision are judged on the basis of their performance and they are made responsible for the out come of their actions.

Steps involve in Responsibility Accountancy:

Responsibility accounting is a systems of accumulating and reporting both actual and budgeted costs (and revenues) by individuals responsible for them. The aim of responsibility accounting is to help management in achieving organizational goals. The basic principles underlying in responsibility accounting are

1. The organization is divided into various responsibility centres. Each responsibility centre is put under the charge of a manager and manager is responsible for the performance of the centre.
2. For each responsibility centre the extent of responsibility is defined. The manager is well known about the goal of the centre and he is to act accordingly the goal of the responsibility centre.
3. The actual performance of each responsibility centre is communicated to the executive concern and actual performance is compared with the goal and the variation should be ascertained.
4. If the actual performance is less than the target amount then the variance should be informed to the top level management with the name of the manager who is responsible for that centre.
5. Necessary actions should be taken to correct the variations as early as possible to avoid the loss in the future. The directions of

the top level management are communicated to the responsibility centre, so that correction should be made immediately.

All these steps are taken by top management against the centre manager so that they can fulfill their target within a stipulated period of time and minimum cost. Responsibility accounting will certainly act as control device and help in improving the overall performance of the business.

A responsibility centre is a unit of an organization under the supervision of a manager who has the responsibility for the activities of that responsibility centre. The usual objective of a responsibility centre is to put some material, labour and service to produce outputs like goods and services. These goods or services either transferred to other responsibility centres within the company or to sold customers in the outside of the company.

Both inputs and outputs in the responsibility centre can be measured in terms of money. The money value of inputs consumed in a responsibility centre is called cost. The outputs are measured as revenues when goods and services are sold to outside customers. If output is meant for outsiders, then it is easy to measure the monetary value of output, but if the output is used to within the responsibility centre by other department then it is difficult to valued. So responsibility accounting is used in measuring costs and revenues. Responsibility cerntres for planning and control purpose are classified into three classes. (1) Cost centres (2) Profit centres (3) Investment centres.

(1) **Cost centre:** A cost or expense centre is a segment of an organization in which the managers are held responsible for the costs incurred in that segment. Responsibility in a cost centres is confined only with cost. A comparison between the actual input used and the predetermined budgeted inputs is made to determine the variances which represent the efficiency of the cost centre. Cost centre managers have control over some or all of the costs in their segment of business, but not over revenues. In manufacturing organizations the production and service department are classified as cost centre. In production departments output can be measured, but in service department it only incur expenses and output can not be measured so it is called Expenses centre. Cost centre mangers are responsible for the cost that are controllable by them and their sub-ordinates.

(2) **Profit centre :** A responsibility centre is called a profit centre when the manager is held responsible for both costs (input) and revenues (output), and thus for profit. The main purpose of profit centre is to earn profit. Profit centre mangers aim at both the production and marketing of a product. If the output is sold to outsiders, then the revenue will be measured. If the output sold to

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often responsibility center then to other the center as profit center transfer the output at a profit (or at a price at which the output is available in the market). Internal transfer at profits do not increase company's assets where as sale to outsiders increase the assets like cash, debtors and bills receivable. A division of the company which produces and markets the products may be called as a profit centre. Such a divisional manager determines the selling price, marketing programmes and production policies. As the profit centre manager is allowed to act in his own way, it provides him good opportunity to learn to assume higher responsibility independently. Mangers are more concerned with finding ways to increase the centres revenue buy increasing production or improving distribution methods.

(3) **Investment Centre:-** A responsibility centre is called an investment centre, when its manager is responsible for costs and revenues as well as for the investment in assets used by his centre. In investment center the manager has overall responsibility of managing inputs outputs and investment.

In the investment centre, performance is assessed not by profit alone, rather profit is related to investment employed. Thus Return on Investment (ROI) is used in the performance of evaluation criterion in an investment centre.

Questions

1. Explain the concept of responsibility accounting and discuss the various steps in the installation of responsibility accounting system in an organisation.
2. Explain the meaning of responsibility accounting and discuss the types of responsibility centres.