FINANCIAL ACCOUNTING, COST ACCOUNTING AND MANAGEMENT ACCOUNTING

Learning Objectives

After reading this chapter, you should be able to:

1. understand financial accounting, its scope, nature and limitations;
2. describe cost accounting, its objectives, advantages, its importances in management;
3. discuss management accounting, its inter-relationships and dissimilarities with cost accounting and financial accounting;
4. explain costing, its types, methods and techniques;
5. understand the role of cost accounting department in a manufacturing concern;
6. define throughput and backflush costing, cost centres, cost units;
7. explain cost accounting system, its features, difficulties in its installation, factors influencing it, arguments against it; and
8. understand the role of management accountant.

Modern business needs frequent information regarding costs of business activities to plan accurately for the future, to control business results, and to make a proper appraisal of the performances of persons working in an organisation. The fulfilment of these goals requires details about the costs incurred and benefits (revenues) obtained which are provided by what are known as "cost accounting", and "management accounting". In comparison, financial accounting does not provide management with detailed cost and revenue information relevant to its needs. Before examining the nature and contribution of cost accounting it would be appropriate to discuss the nature of financial accounting and its limitations in greater detail.

FINANCIAL ACCOUNTING

Financial accounting is concerned with providing information to external users such as shareholders (existing and potential), creditors, financial analysts, labour unions, government authorities, and the likes. Financial accounting is oriented towards the preparation of financial statements which summarise the results of operations for selected periods of time and show the financial position of the business at particular dates. The following points are important to understand the scope and nature of financial accounting:

Objectives

The basic objective of financial accounting is to provide useful information, through preparing general purpose reports, to investors, creditors and other users in making sound investment and economic decisions. These general purpose reports provide information on management performance to judge its effectiveness in utilising the resources and running the enterprise.

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The end product of the financial accounting process are the financial statements that communicate useful information to decision-makers such as profit and loss account, balance sheet, statement of changes in financial position (SCFP) etc.

Accounting System

Journals, ledgers and other accounting techniques used in financial accounting depend upon the concept of the double-entry system. Financial accounting also uses generally accepted accounting principles (GAAP)[1] to record, classify and summarise business transactions and to prepare financial statements.

Measurement Unit

Financial accounting measures business transactions, economic resources and economic obligations and changes in them in terms of monetary units of a society in which it operates. For example, the common denominator or yardstick used for accounting measurement is the Rupee in India and dollar in the U.S.A.

Users of Financial Accounting Information

As stated earlier, financial accounting information is intended primarily to serve external users. Examples of such users are owners, creditors, potential owners, suppliers, management, tax authorities, employees, customers, financial analysts and advisers, stock exchanges, financial press and reporting agencies, trade associations, labour unions, general public.

LIMITATION OF FINANCIAL ACCOUNTING

Financial accounting is significant for managements as it helps them to direct and control the firm's activities and functions and to determine appropriate managerial policies in different areas, such as production, sales, administration and finance. However, financial accounting suffers from the following limitations which have been responsible for the emergence of cost accounting:

1. Financial accounting does not provide detailed cost information for different departments, processes, products, jobs, different services and functions.
2. Financial accounting does not set up a proper system of controlling materials and supplies which leads to losses on account of misappropriation, misutilisation, scrap, defectives, etc.
3. The recording and accounting for wages and labour is not done for different jobs, processes, products, departments. This creates problems in analysing the cost associated with different activities and rewarding workers and employees for the above-average performance.

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1. Generally Accepted Accounting Principles (GAAP) encompass the conventions, rules and procedures necessary to define accepted accounting practice at a particular time.

4. It is difficult to know the behaviour of costs in financial accounting as expenses are not classified into fixed and variable, direct and indirect costs.
5. Financial accounting does not possess an adequate system of standards to evaluate the performance of departments and employees working in the departments.
6. Financial accounting contains historical cost information which is accumulated at the end of the accounting period. The historical cost is not a reliable basis for predicting future earnings, solvency, or overall managerial effectiveness.
7. Financial accounting does not provide necessary information to management in taking important decisions about expansion of business, dropping of a product line, starting a new product, alternative methods of production, improvement in product etc.
8. Financial accounting does not provide cost data to determine the price of the product being manufactured or the service being rendered to the consumers.

In spite of the above limitations, financial accounting has utility and will continue to serve management in the future also. Because of growing business requirements, the scope of financial accounting is changing and can be expected to continue to change.

COST ACCOUNTING

Cost accounting, as a tool of management, provides management with detailed records of the costs relating to products, operations or functions. Cost accounting refers to the process of determining and accumulating the cost of some particular product or activity. It also covers classification, analysis and interpretation of costs. The costs so determined and accumulated may be the estimated future costs for planning purposes, or actual (historical) costs for evaluating performance. The Institute of Cost and Management Accountants (ICMA), 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 centres 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".

COST ACCOUNTANCY

Cost accounting has been differentiated from cost accountancy. The Institute of Cost and Management Accountants, London has defined cost accountancy as the "application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and ascertainment of profitability as well as presentation of information for the purpose of managerial decision-making". According to this definition the term "cost accountancy" includes costing, cost accounting, budgetary control, cost control and cost audit. Although literature in the U.K. in the area of cost accounting tends to differentiate between cost accounting and cost accountancy, U.S. literature does not appear to point out any basic difference between these two terms.

COSTING

Cost Accounting and Costing have distinctly different meanings. The Institute of Cost and Management Accountants, London has defined costing as the ascertainment of costs. Costing includes the 'techniques' and 'processes' of ascertaining costs. The 'technique' refers to principles and rules which are applied for ascertaining costs of products manufactured and services rendered. There are mainly two methods of costing known as job costing and process costing. The 'process' includes the day to day routine of determining costs

within the method of costing (either job or process) adopted by a business enterprise. Within such a process, there could be historical costing, marginal costing, absorption costing, standard costing etc.

In practice, the three terms cost accounting, cost accountancy, and costing are most often used interchangeably although they are defined differently.

COST ACCOUNTING AND MANAGEMENT

Management requires adequate, systematic and useful cost data and reports to manage a business enterprise and to achieve business objectives. The useful information provided by cost records and reports in cost accounting assists management in performing the following important tasks:

1. Cost accounting helps in determination and analysis of cost of departments, processes, jobs, products, sales territories, sales order etc. This advantage is not available to manufacturing companies alone. In fact, the analysis of cost and income can be made in almost all type of organisation—profit or non-profit.

The example given below points out how cost accounting by products, may reveal facts and data which cannot be developed in financial accounting. Cost statements produced at regular, short intervals, which are not prepared in financial accounting, would have enabled the firm to take prompt action to overcome the problems of producing and selling Product C.

The analysis (based on cost statements) points out that the contribution of firm products to total net profit (15%) vary significantly among products. Product C does not cover its prime costs, and causes a net loss to the firm of Rs. 8,000 in the year; its selling and distribution costs are also particularly more compared to the other products.

The firm may decide to discontinue product C, but before deciding this, an enquiry may be made of the cost structure to find out whether or not more efficient manufacturing, selling and distribution is possible. At the same time attention must be paid to pricing policy. It should be investigated as to whether the selling price of this product can be increased to a profitable level.

Table 1–1 **COST STATEMENTS**

Particulars	*A*	*B*	*C*	*D*	*Total*
Sales	Rs. 60,000	Rs. 60,000	Rs. 40,000	Rs. 40,000	Rs. 2,00,000
Materials	30,000	22,000	26,000	24,000	1,02,000
Wages	12,000	8,000	12,000	8,000	40,000
Direct Exp.	2,000	2,000	3,000	1,000	8,000
Prime Cost	44,000	32,000	41,000	33,000	1,50,000
Work Exp.	1,600	2,000	500	200	
Selling Exp.	400	1,600	2,000	400	
Distribution Exp.	1,000	400	3,500	200	
General Adm. Exp.	1,000	4,000	1,000	200	
Overhead costs	4,000	8,000	7,000	1,000	20,000
Total Cost	48,000	40,000	48,000	34,000	1,70,000
Profit	12,000	20,000	–(8000)	6,000	30,000
Percentage Profit/Loss	20%	$33\frac{1}{3}$ %	(–)20%	15%	15%

2. Cost accounting helps management in controlling cost which is probably the most important objective of every business firm. Cost accounting facilitates this task through accumulation and utilisation of cost data regarding different products, activities or functions. Each cost should be examined in the light of service or benefit obtained so that management can keep the cost at the lowest possible point.
3. One of the important uses (perhaps the most important) of cost information is in helping to make revenue decisions. Revenue decisions can be divided into the following three categories:
   (i) Pricing—Cost data are vital in pricing new products, and to make a decision as to whether to lower or raise a price.
   (ii) Product mix—Management generally has to make short term and long term product mix decisions. For short-term cost data are used to determine which product to push in the market. Similarly, in the long run the questions of increasing and decreasing capacity can be solved with the help of relevant cost information.
   (iii) Profit-volume decisions—The profit is mainly the result of a combination of three factors, namely cost, volume, selling price. Decisions like reducing price and having additional sales, maintaining *status quo* and accepting a lower income, increasing quality of the product and having extra volume of sales, increasing selling price and improving the turnover, are significant.
   Cost data assists managements in making sound decisions in all these important areas.
4. Cost accounting helps in making special cost studies and investigations which are vital to management in formulating policies and plans directed towards profitable operations. Such special studies include pricing of a new product or new services, elimination of seasonal conditions, expansion or contraction programmes, replacement of machinery and equipment, dropping a product, changes in methods of distributing products, changes in production methods.
5. Cost accounting assists and participates in the formulation and execution of budgets and standards. Cost information for managerial decision making and planning is the most important justification of a sound cost accounting system.

OBJECTIVES OF COST ACCOUNTING

There is a direct relationship among information needs of management, cost accounting objectives, and techniques and tools used for analyses in cost accounting. Cost accounting has the following three important objectives:

1. To determine product costs.
2. To facilitate planning and control of regular business activities.
3. To supply information for short- and long-run decisions.

Product Costing

The objective of determining the cost of products is of prime importance in cost accounting. The total product cost and cost per unit of product are important in making inventory valuation, deciding price of the product, and managerial decision-making. Product costing covers the entire cycle of accumulating manufacturing and other costs and subsequently assigning them to work-in-progress and finished goods.

Planning and Control

Another important objective of cost accounting is the creation of useful cost data and information for the purposes of planning and control by management. The different alternative plans are evaluated in terms of respective cost and associated benefits.

The management control over business operations aims to establish balance between actual and budgeted performances. A properly designed cost accounting system includes the following steps in the control process:

1. Comparing actual business performances with budgets and standards.
2. Analysing the variance between budget and standards and actuals by causes, and management responsibility so that corrective action may be taken.
3. Providing managers with data and reports about their individual performances and performance of subordinates.

Information for Decisions

An important purpose of the cost accounting system is to provide data and special analyses for short- and long-run decisions of a non-recurring nature. Appropriate cost information must be accumulated to make a wide variety of short- and long-run decisions.

According to Henke and Spoede[2], the following are the objectives of cost information developed in cost accounting:

1. As a basis for valuing manufactured inventories and cost of goods sold in externally presented financial reports.
2. In controlling operations through the evaluation of operating results and the placement of responsibilities for the uses of organisational resources on the shoulders of specifically identifiable persons within the organisation.
3. In planning operations through the establishment of cost and budgetary goals.
4. In making day-to-day operating decisions (a part of controlling operations).

COST ACCOUNTING Vs. FINANCIAL ACCOUNTING

Financial accounting is that branch of accounting which accumulates and presents data primarily for use by investors, creditors and other external parties. Financial accounting is designed to meet external information needs and to comply with generally accepted accounting principles.

Cost accounting focuses primarily on accounting for the flows of costs and is concerned with the development of systems for relating costs to the products or services produced by an organisation.

Financial accounting and cost accounting differs in the following respects:

1. *Nature* Basically, financial accounting classifies, records, presents and interprets, in terms of money, transactions and events that are of a financial character, and provides management with the facts and figures necessary for the preparation of the periodic financial statements—the balance sheet, the income statement and the statement of changes in financial position. Financial accounting provides information about the business in a general way. In contrast to financial accounting, cost accounting classifies, records, presents and interprets in a significant manner the material, labour and overhead costs involved in manufacturing and selling each product, or each job or rendering a service.
2. *Primary users of information* The users of financial accounting statements are mainly external to the business enterprise such as shareholders, creditors, financial analysts, government authorities, stock exchange, labour unions, etc.

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2. Emerson O. Henke and Charlene W. Spoede, Cost Accounting: Managerial Use of Accounting Data, PWS-KENT Publishing Company, Boston, 1991, p. 5.

The information generated under the cost accounting system is used by members of management at different levels. Thus, different sets of information could be developed under cost accounting and supplied to different persons responsible for activities in the organisation. Cost accounting provides information to the management for proper planning, operation, control and decision making.

3. *Accounting system* Financial accounting strictly follows the double-entry system for recording, classifying and summarising business transactions. Cost accounting may not be based on the double-entry system. The data under cost accounting may be gathered for small or large segments or activities of an organisation and monetary as well as other measures can be used for different activities in the firm.
4. *Accounting principles* Financial accounting data is primarily meant for external users. The "generally accepted accounting principles" are important in financial accounting and are used extensively while recording, classifying, summarising, and reporting business transactions.

   On the contrary, cost accounting is not bound to use "the generally accepted accounting principles". It can use any accounting technique or practice which generates useful information.
5. *Analysis of profit* Financial accounts in financial accounting gives the accounts of the whole business and disclose the net profit or loss of the business as a whole. However, cost accounting discloses profit or loss of each product, job, service or division. In financial accounting, costs are reported in aggregate while costs are broken down on a unit basis in cost accounting.
6. *Scope of transactions* Financial accounting relates to all commercial transactions of a business and include all expenses in preparing financial accounts. However, cost accounting and cost accounts relate to transactions connected with the manufacture of goods and services and include only those expenses which enter into the production.

   Financial accounts are concerned with external transactions that is, transactions between the business concern on one side and third parties on the other. These transactions form the basis for payment or receipt of cash. Cost accounts are concerned with internal transactions which do not form the basis of payment or receipt of cash.
7. *Unit of measurement* All information under financial accounting is in terms of money. That is, transactions measured in terms of money have already occurred. In comparison, cost accounting applies any measurement unit that is useful in a particular situation. Besides the monetary unit, the cost accountant may find it necessary to use such measures as labour hours, machine hours and product units for the purpose of analysis and decision making. Financial accounts deal mainly with historical actual facts and figures whereas cost accounts deal partly with historical facts and figures and partly with future estimates and projections.
8. *Time span* Financial accounting data and statements are developed for a definite period, usually yearly, half yearly, quarterly. It requires that financial statements be developed and presented at regular time intervals. Cost accounting reports and statements are prepared whenever needed. Reports may be prepared on a monthly, weekly or even daily basis. Frequency of reports is determined by particular planning and controlling needs, objectives of cost control and cost determination.

Inspite of the above differences, both financial and cost accounting are in agreement regarding actual cost data and product costing analyses. Closing inventory values and cost of goods manufactured and sold are the main examples. For the preparation of the income statement, financial accountant receives the necessary data from the cost accountant.

MANAGEMENT ACCOUNTING

Management accounting deals with providing information including financial accounting information to managers for their use in planning, decision-making, performance evaluation, control, management of costs

and cost determination for financial reporting. Management Accounting contains reports prepared to fulfil the needs of managements.

The National Association of Accountants (USA), in Statement No. 1A (Statements on Management Accounting, 1982), has defined management accounting as:

"...the process of identification, measurement, accumulation, analysis, preparation and communication of financial information used by management to plan, evaluate, and control within the organisation and to assure appropriate use and accountability for its resources."

The CIMA (UK) defines the term, 'management accounting' in the following manner:

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

1. formulating strategy
2. planning and controlling activities
3. decision taking
4. optimising the use of resources
5. disclosure to shareholders and others external to the entity
6. disclosure to employees
7. safeguarding assets."

Thus management accounting is concerned with data collection from internal and external sources, analysing, processing, interpreting and communicating the information for use within the organisation so that management can more effectively plan, make decisions and control operations.

Management accounting is not only confined to the area of product costing, cost and price data. In management accounting, the objective is to have a data pool which will include any and all information that management may need. For example, if management decides to depend on long-terms debt for expansion of business, it may be investigated as to what effect this decision will have upon the earnings per share? Should debt in the equity structure be too large or small? Similarly, management may be interested in knowing the adequacy of cash flow receipts to pay current obligations or the effect of inflation on business decisions and performances. Thus, this field of accounting helps management in the total situation. In achieving this goal, management accounting makes use of information that is drawn from financial accounting and other disciplines, such as economics, finance, statistics, operational research and the like.

The term 'management' includes the activities and functions of all individuals who are working at different positions in an organisation such as

- executive directions with management responsibilities
- senior managers
- middle-level managers
- lower-level managers
- supervisors/inspectors/foremen and other personnel in a supervisory position.
- employees and workers (who are not in the position of managers) such as operating workers; production line workers; employees, workers and clerks working in different departments; salespersons.

Management accounting, in future, may include many areas of managerial and operating activities to help managers in their tasks and business firms to achieve its objectives and vision. Further, it is likely that management accounting may discard some of its activities currently within its scope and include some new activities as mainstream management accounting activities to cope with changing complex business environment. The following table summarises some of the areas considered to be part of management accounting.

Table 1–2 **SOME AREAS OF ACTIVITY CONSIDERED TO BE PART OF MANAGEMENT ACCOUNTING**

- Budgeting, planning and forecasting
- Calculating the profitability of products, services and operations
- Measuring organisational, divisional and departmental performance
- Comparing results and performance within and between organisations
- Assisting in the performance of increasing effectiveness and efficiency
- Assessing the performance of past and future capital investments
- Advising on decisions about product mix, markets to be served and selling prices
- Advising on decisions on whether to outsource products, components, activities and services
- Advising on decisions involving the investment of scarce funds between a range of possible alternatives
- Assisting in the making of a wide range of strategic decisions.

Source: Hugh Coombs, David Hobbs and Ellis Jenkins, Management Accounting, Sage Publications, New Delhi, 2007, p.7.

COST ACCOUNTING AND MANAGEMENT ACCOUNTING

Although over the years, the subject matter of cost accounting has broadened, it is concerned mainly with the techniques of product costing and deals with only cost and price data. It is limited to product costing procedures and related information processing. It helps management in planning and controlling costs relating to both production and distribution activities.

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. Management accounting is not confined to the area of product costing, cost and price data. In management accounting, the objective is to have an information system which may provide all information that management may need for planning, control and decision making. For example, if management decides to depend on equity capital for expansion of business, it may be investigated as to what effect this decision will have upon the company's share prices. Should debt in the capital structure be too large or small? Similarly, management may be interested in knowing the adequacy of cash inflows to pay liabilities on the due date or the effect of growing competition and use of latest technology on business decisions and performances. Thus, management accounting helps management in the total situation and in accomplishing all managerial functions.

Inspite of the differing parameters of cost accounting and management accounting, cost accounting is generally indistinguishable from what is known as management or managerial accounting. Both these accounting systems are closely linked as they use common basic data and reports to a significant degree. Much of the information used to prepare accounting statements and reports in cost accounting is also used in management accounting reports. Management accounting utilises the same (and also additional) data to prepare budgets, performance reports, control reports, data analyses for decision-making, planning and control purposes.

DIFFERENCES BETWEEN MANAGEMENT ACCOUNTING AND FINANCIAL ACCOUNTING

The differences between cost accounting and financial accounting, are also the points of difference between management accounting and financial accounting. As stated earlier, financial accounting implies the preparation of a set of financial statements, for each accounting period, in accordance with laws, rules, regulations and accounting standards and is concerned with shareholders, governmental authorities and other parties outside the business enterprise. Management accounting is not governed by any statute and is an internal function which aims to provide information to management.

Financial accounting takes an overall view of a business enterprise by totalling the results of its divisions and departments into a single summarised financial statement. Management accounting focuses attention at the lowest levels of production or any other activity in the organisation for providing help in planning, control and decision making.

Financial accounting records past, historical information. However, management accounting primarily uses present and future information. The past information in management accounting acts only as a guide in predicting the future.

COST ACCOUNTING, FINANCIAL ACCOUNTING AND MANAGEMENT ACCOUNTING

The discussion in the preceding paragraphs has tried to bring out differences as well as interdependency between cost accounting, financial accounting and management accounting. It is significant to note that all accounting information tends to rely on the same basic data system and set of accounts. Although an organisation can have different accounting systems designed for different purposes, some companies still depend on a single system to provide the basic accounting information. The single system typically focuses on providing information for financial accounting purposes, but its informational output can be adopted to meet most internal management requirements.

Barfield, Raiborn and Kinney[3] observe:

Cost accounting creates an overlap between financial accounting and management accounting. Cost accounting integrates with financial accounting by providing product costing information for financial statements and with management accounting by providing some of the quantitative, cost-based information managers need to perform their tasks.

The cost accounting overlaps causes the financial and management accounting systems to articulate or be joined together to form an informational network. As these two systems articulate, accountants must understand how cost accounting provides cost information for financial statements and supports management information needs. Organisations that do not manufacture products may not require elaborate cost accounting systems. However, even service companies need to understand how much their services cost so that they can determine whether it is cost-effective to be engaged in particular business activities or not.

There is no realistic dividing line between cost accounting and management accounting particularly with regard to the provision of information for planning and control. Cost accounting is at a more basic level than management accounting and in many organisations is primarily concerned with the ascertainment of product costs. But the cost accounting system is also an important source of data for management accounting purposes[4].

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3. Jesset T. Barfield, Cecily A. Raiborn and Michael R. Kinney, Cost Accounting, Traditions and Innovations, 5th Edition, Thomson South Western, 2003, p. 7.

4. T. Lucey, Management Accounting, ELBS, London, 1996, p. 2.

ROLE OF MANAGEMENT ACCOUNTANT

A Management accountant is an accountant who participates in all accounting work within the organisation, including maintaining the accounting records, preparing financial statements, preparing many specialised managerial reports and statements, generating information for different levels of management, coordinating budgeting, accounting and reporting functions. Management accountant plays a vital role in helping managers in performing management functions such as planning, organising, coordination, control, decision making etc. However, the management accountant is a part of the management and not just a service arm to management. He acts as a manager and decisionmaker and exercises managerial influence and, of course, is responsible for the management of the entire accounting, reporting and budgeting functions.

ADVANTAGES OF COST ACCOUNTING

Business enterprises can derive many advantages from the cost accounting system. Some advantages are listed below:

1. The cost accounting system provides data about profitable and unprofitable products and activities. After investigating the causes of low profitability and unprofitability, management can take suitable corrective measures which may lead to higher profit.
2. All items of costs can be analysed to minimise the losses and wastage emerging from the manufacturing process and reduce the costs associated with different activities.
3. Production/manufacturing methods may be improved or changed so that costs can be controlled and profit increased.
4. Cost data can be obtained and compared with standard cost within the firm or industry.
5. Cost accounting helps management in avoiding losses arising due to many factors, such as low demand, competitive conditions, change in technology, seasonal demand for the product and the like.
6. Cost accounting also provides cost data and information to determine the price of the product. The cost of the product is perhaps the most important determinant of product pricing.
7. Negotiations with government and labour unions can easily be made with the information provided by the cost accounting system.
8. Cost accounting helps management in knowing the costs of different alternatives and selecting the most advantageous course of action. Decisions like make or buy, continue or drop a product, buy or lease, sell or process further, operate or shut down and other short-term decisions are easily solved with the help of cost accounting data.
9. More accurate and reliable financial accounts can be prepared promptly for use of management.
10. An adequate cost accounting system ensures maximum utilisation of physical and human resources, checks fraud and manipulations, and helps employees as well as the employers in their basic goals of getting higher earnings and maximising the profit of the concern.

METHODS OF COSTING

As stated earlier, the term "costing" refers to the techniques and processes of determining costs of a product manufactured or a service rendered. Different methods are applied in business enterprises to ascertain costs depending upon the nature of the product, production method and specific business conditions. For example, in a textile or steel company, raw material passes through different stages (processes) and production is done continuously. In some other industries, production is done at different customers' specific orders and each job is obviously different from the other job. In service industries like transport, hospital, banks etc.,

all activities and costs incurred relate mainly to performing certain services (or activities). There are two methods of costing:

(A) Job Costing
(B) Process Costing

All other methods of costing are only variants of the above two methods of costing. All possible variations of job and process costing are as follows:

(A) Job Costing
(i) Batch Costing
(ii) Contract or Terminal Costing
(iii) Multiple or Composite Costing

(B) Process Costing
(i) Unit or Single Output Costing
(ii) Operating (Service) Costing
(iii) Operation Costing

Job Costing

Job costing is used in those business concerns where production is carried out as per specific order and customers specifications. Each job (or product) is separate and distinct from the other jobs or products. The method is popular in enterprises engaged in house-building, ship-building, machinery production and repair. Job costing has the following variants:

(i) Batch Costing

Batch costing is based on the concept of contract costing. This method is used to determine the cost of a group of identical or similar products. The batch consisting of similar products is the unit and not the single item within the batch. This method can be usefully applied for the production of nuts and bolts, medicines, components and other items which are manufactured in distinct batches.

(ii) Contract or Terminal Costing

This method of costing, based on the principle of job costing is used by house builders and civil contractors. The contract becomes the cost unit for which relevant costs are accumulated.

(iii) Multiple or Composite Costing

This costing method is used in those industries where the nature of the product is complex, such as motor cars, aeroplanes, etc. In such cases costs are accumulated for different components making the final product and then totalled to ascertain the total cost of the product.

Process Costing

This costing method is used in those industries where production is done continuously, such as chemicals, oil, gas, paper, etc. It is difficult to trace the costs to specific units and the total cost is averaged for the number of units manufactured. Sometimes, total cost and per unit cost is calculated at each stage of production for control purposes. Process costing has the following variants:

(i) Unit or Single Output Costing

This method is used where a single item is produced and the final production is composed of homogeneous units. The per unit cost is obtained by dividing the total cost by the total number of units manufactured.

(ii) Operating (Service) Costing

Operating costing method is used by those organisations which render services and do not manufacture any physical item, such as transport, power house, hospital. The cost units differ among these service organisations

depending upon the nature of service being rendered. But usually the units are passenger-mile, tonne-mile, a bed in hospital, per student in a college.

(iii) Operation Costing

This costing method aims at ascertaining the costs of each operation in place of each process. In this method the assumption is that output is achieved through a number of different operations.

Besides the above variations of job costing and process costing, the different techniques or types of costing (discussed below) can be found in these two methods of costing and can be used to determine costs therein.

TECHNIQUES (TYPES) OF COSTING

The terms 'techniques' or 'types' refer to the manner of ascertaining costs of a product, job or activity. But these terms (techniques or types) also necessarily indicate what types of costs are being ascertained such as historical cost, standard cost, absorption (full) cost, marginal cost etc. It is clear that the term 'Methods of Costing' itself signifies only the method(s), job costing or process costing, that is being used to determine costs without indicating the types of costs (historical, standard, full or marginal) which are ascertained under the two methods of costing (Job or Process Costing). The following are generally the techniques of costing:

(1) Historical Costing

Historical costing is system of costing under which costs are determined after they have been incurred.

(2) Standard Costing

Under standard costing, standard costs are determined and used, and then compared with the actual costs to determine the extent of variances so that remedial action can be taken. Standard costs are the predetermined costs in conformity with the most efficient operation and use of the resources within the film.

(3) Absorption or Full Costing

Under this costing method, all manufacturing costs, fixed and variable, are charged to products, jobs, processes, etc. and are included in total cost.

(4) Variable or Marginal Costing

Variable costing method charges only variable production costs to products or jobs, and thus the cost of the products or jobs consists of only variable production and not fixed production costs. The fixed production, administration, selling and distribution costs are written off against profits in the periods in which they arise.

(5) Uniform Costing

Truly speaking, uniform costing is not a technique of costing, but is an attempt by several undertakings and organisations to use similar costing principles and/or practices.

COSTING SYSTEM

The term 'costing system' refers to an accounting system followed to accumulate costs, to ascertain costs of products or jobs, to prepare cost information using some procedures and principles for recording of cost data. Since there are two basic methods of costing—Job Costing and Process Costing, to ascertain costs, the costing system followed by business enterprises are also divided into two categories:

1. Job Order Costing System
2. Process Costing System

It should be understood that within these two costing systems, further, business enterprises may follow different techniques of costing such as historical cost, standard cost, full cost, marginal cost etc., which have been discussed earlier.

THROUGHPUT COSTING

Throughput Costing is also known as super-variable costing. This costing technique considers only direct materials as true variable cost and other remaining costs as period costs to be charged in the period in which they are incurred. Thus, in throughput costing, inventory is valued in terms of only direct material costs. In this costing, contribution is equal to revenue minus all variable direct materials cost of goods sold. GAAP in India and in other countries of the world do not permit use of this method for valuation of inventories. This costing is not used for external reporting because it gives significant different net income figures than those revealed by absorption costing. In this costing inventory figures are very low. Throughput costing has not achieved widespread use even for internal reporting purposes.

In throughput accounting, return is defined as sales less material costs in contrast to contribution which is sales less all variable costs (material, labour and variable overheads). The assumption is that all costs, except materials, are fixed in relation to throughput in the short run.

Throughput accounting is beneficial in a Just-In-Time (JIT) situation. It helps to direct attention to bottlenecks and forces management to concentrate on the key elements in making profits namely, inventory reduction and reducing the response time to customer demand[5].

BACKFLUSH COSTING

CIMA (UK) defines backflush costing as:

"A cost accounting system which focuses on the output of the organisation and then works backwards to allocate costs between cost of goods sold and inventory."

Backflush is a simple and clear book-keeping system created to reflect key aspects of JIT systems which implies little or no work-in-progress and demand pull. There are many variants of backflush accounting, a more popular among them is creating a single account 'Raw and In Process Account' in place of separate Raw Materials and Work-In-Process (WIP) accounts. When goods are sold, the standard cost of the materials in the finished goods would be credited, that is, backflushed to Raw and In Process Account. All conversion costs that is, labour and material is transferred to the cost of finished goods production and not to WIP account.

The following example illustrates the applications of backflush accounting.

Example: A firm has the following transactions for the month of January 2008.

	(Rs.)
Raw materials purchase	8,50,000
Conversion costs	6,86,000
	Units
Production	4,900
Sales	4,850

5. T. Lucy, Management Accounting, Ibid, p. 483.

There are no opening inventory of raw materials, WIP and finished goods. The standard cost per unit is Rs. 310 (Rs. 170 for materials + Rs. 140 conversion cost). There was no closing WIP at the end of the period.

Required: Make journal entries for a backflush accounting system using a Raw Materials and In Progress account.

Solution:

	Rs.	Rs.
Raw materials and In Porgress A/c Dr.	8,50,000	
To creditors		8,50,000
(Purchase of raw materials on credit)		
Finished goods A/c Dr.	15,19,000	
Raw materials and In Progress A/c		8,33,000
Conversion cost control A/c		6,86,000
(Cost of goods produced 4,900 units)		
Cost of sales A/c Dr.	15,03,500	
To finished goods stock		15,03,500
(Cost of goods sold, 4,850 units × Rs. 310)		

At the end of January 2008, there will be two separate stock balances:

Raw materials and In Progress A/c = Rs. 8,50,000 – 8,33,000
= Rs. 1,70,000

Finished goods (50 units @ Rs 310) = Rs. 15,500

Notes: 1. Raw materials and In Progress A/c amount is calculated as follows:
4900 units × Rs. 170 = Rs. 8,33,000
2. All the entries shown above are at standard cost.
3. Figures have been chosen as such to avoid variances.

Backflush is an easy method. There is no separate account for WIP. Materials are not tracked through the production process as is found in traditional cost accounting. Accounting entries are very few; supporting vouchers and work flow documents are less required. Backflush accounting does not provide any incentives to managers for producing for stock.

INSTALLATION OF A COST ACCOUNTING SYSTEM

A cost accounting system is a system that accumulates costs, assigns them to cost objects, that is, products, jobs, processes, etc. and reports cost information. In addition to this, a proper cost accounting system assists management in the planning and control of business operations, in analysing product profitability, and in accomplishing business objectives through optimum utilisation of available resources. The underlying principles, procedures and objects of all costing system are the same, but the application of these principles and methods may vary with the circumstances. Basically, two main questions are involved in installing a cost accounting system: (i) factors influencing cost accounting system, and (ii) features of cost accounting systems.

Factors Influencing the Cost Accounting System

The following factors should be considered before designing the cost accounting system:

1. *Size of the firm* The complexity and outline of the cost accounting system depends on the size of the business enterprise and management requirements. As the size of the firm and business grows, management requirements for cost data and information increase. A large firm has to develop a large volume of cost data regarding the activities of various departments of the business enterprise.
2. *Manufacturing process or methods* The manufacturing process includes production layout and arrangement, production scheduling, production control methods, plant and equipment capacities, inspection and testing of materials, degree of complexity in the production procedure and factory layout of the particular business firm for which it is designed. Methods of wage payment (piece-rate, time-rate, incentive schemes), methods of collecting hours worked, inventory system, overhead recovery, and other problems related with the factory are the factors vital in designing a cost accounting system.
3. *Nature and number of products* If a single product is manufactured, all costs of direct material, direct labour and other factory expenses can be directly allocated to that product. But in the case of more than one product being produced, some costs of production relating to two or more products are to be equitably apportioned among them. In this situation, the process of developing cost data is more complex, which, in turn, influences the designing of the cost system.
4. *Management control needs* The designing of the cost accounting system in a business firm is guided by the management control requirement. The costing system should supply data to persons at different levels in the organisation to take suitable action in their respective areas.
5. *Raw materials* The nature of raw materials and the degree of waste therein influences the designing of the cost accounting system in a manufacturing concern. There are some materials which have a high degree of spoilage. The issuing of materials, methods of pricing and control over spoilage are accordingly adopted as to suit the specific type of materials.
6. *Staff efficiency* The working and formulation of the cost accounting system depends, to a great extent, on the efficiency of personnel and staff engaged in it.
7. *Comparability* A business enterprise follows cost accounting systems prevailing in other business firms within the same industry. This is necessary to facilitate comparison of its own cost data with data produced for the industry.
8. *Organisational structure* The cost accounting system must correspond to the organisational division or authority so that individual foremen, supervisors, department heads, or executives can be held accountable for the costs incurred in their respective departments.
9. *External factors* The adoption of a costing system depends mainly on internal factors and situations within the firm. However, external factors may influence scope of the costing system to be applied by a business firm. For example, Cost Accounting Rules are applicable to manufacturing companies in India which require certain cost information to be developed and submitted to government authorities.

Features of Cost Accounting System

The cost accounting system may be used by all types of business organisations—manufacturing and non-manufacturing. The cost accounting system should be practical, that is, it must be helpful to the business. There must be no attempt to make the business suit the system. The following are the essential features of a cost accounting system:

1. *Basis for accumulating costs* A fundamental feature of any system is the method of accumulating manufacturing costs. Costs may be accumulated by individual jobs (job order cost system) or by manufacturing departments or processes (process cost system).

A job order cost system has the unique feature of accumulating manufacturing costs separately for each batch or job. Within a process cost system, costs are accumulated by process or department. Cost of production reports are prepared for each process in the factory. A process cost system is best suited for standard products that are manufactured continuously for mass production.

2. *Relationship with financial accounting* Most cost accounting systems are complementary/ supplemental in their relation to financial accounting. In this role, cost accounting systems imply physical inventory counts to determine quantities of materials, work-in-process and finished goods. Inventory quantities must be counted and unit costs determined before periodic financial statements can be prepared. An integrated system removes the need of coordination between financial accounting and cost accounting. Integrated systems are comparatively more sophisticated, more costly and more conducive to cost control than supplemental system.
3. *Basis of product costs* In many cost accounting systems, cost estimates are desirable in addition to actual or historical costs. Actual costs incurred for a period are used to compute product costs. A system using actual material cost, actual labour cost and estimated overhead rate is called a normal cost system. In contrast, standard costs may be developed for the purpose of product costing. Standard costs are carefully predetermined estimates of what material, labour and overhead costs should be on a per unit basis, given product specifications and desired operating efficiency.
4. *Full (absorption) costing or marginal (variable) costing* Another important question relating to the cost accounting system is whether all manufacturing costs are to be accumulated and attached to products. The traditional opinion is that all manufacturing costs—variable and fixed—should be charged to products. This method is known as full costing or absorption costing, because fixed manufacturing costs are absorbed by units produced. An alternative viewpoint is that only variable manufacturing costs should be attached to products. In this method, fixed manufacturing costs are recorded as expenses of the accounting period.

Difficulties in Installation of a Costing System

The installation of costing system in business organisations is not an easy task. There are many difficulties, as listed below, which are faced by organisations while setting up costing system.

(1) Opposition from the Existing Staff

The existing staff is likely to oppose the introduction of costing system, may resent the additional work and may not provide cooperation which is necessary for the success of cost accounting system.

(2) Shortage of Trained Manpower

Installation of cost accounting system requires trained staff to operate the system effectively which organisations may not have, thus affecting adversely the better application of the system.

(3) Error in Measuring Requirements

The organisations, big and small, have varying requirements as to the costing system. Organisations may not know their specific requirements accurately. Consequently, the installation of costing system will either not meet their requirements or will provide unnecessary sophistication and dose of accounting procedures.

(4) Non-cooperation from Management

Resistance is noticed not only from the lower and middle staff but also from the members of top management. Managers may not support the Managing Director in his efforts to minimise costs and control activities as these might be looked upon as an interference in their managerial authorities.

ARGUMENTS AGAINST COST ACCOUNTING

Cost accounting undoubtedly helps managements in managing the affairs of business efficiently and in accomplishing business goals. However, some organisations do not look with favour the installation of cost accounting system. Some arguments which are advanced against adopting cost accounting are as follows:

(1) The system of cost accounting may prove costly and small organisations may not find it profitable. The collection, analysis, allocation and maintenance of cost data is a time-consuming and difficult task which requires efficient manpower.
(2) All business organisations are required to prepare financial accounts to determine profit and financial position. Installation of cost accounting system along with financial accounting system increases work load.
(3) Cost accounting system itself is not an end but only a means to achieve certain objectives. The system itself will not improve efficiency, control costs and avoid wastage. Sometimes management personnel become inactive with the mere installation of the cost accounting system.

However, all the above arguments are not valid. Keeping in view the advantages and contributions of cost accounting to management, as explained earlier, it can be rightly said that cost accounting is a necessity for all business organisations. For manufacturing firms, cost accounting is vital necessity to reduce cost, to avoid waste, to improve efficiency and to provide cost data to management for planning, control and decision making.

COST CENTRES

The ICMA, London defines cost centres as "a location, person, or item of equipment (or a group of these) for which costs may be ascertained and used for the purposes of cost control." A cost centre is an organisational segment or area of activity considered to accumulate costs. The following are the types of cost centres usually found in a manufacturing company.

Impersonal Cost Centre

A cost centre which consists of a location or item of equipment (or a group of these).

Personal Cost Centre

A cost centre which consists of a person or group of persons.

Operation Cost Centre

A cost centre which consists of the machines and/or persons carrying out similar operations.

Process Cost Centre

A cost centre which consists of a specific process or a continuous sequence of operations.

COST UNITS

The ICMA, London has defined a cost unit as follows: "A unit of quantity of product, service or time (or a combination of these), in relation to which cost may be ascertained or expressed."

In the job costing method, cost unit is a single specific order; in batch costing it consists of a group of similar articles; and in contract costing, it consists of a single product (contract). The cost units used in different industries cannot be uniform. The cost units and centres should be those which suit the business and which are readily understood and accepted by all concerned.

The Table 1.3 gives examples of cost units (that is, unit of cost activity) and method of costing used in different industries.

Table 1–3 COST UNIT AND METHOD OF COSTING

Industry/ Enterprise	*Cost unit*	*Method of costing*
1. Building	House or square foot of area	Job Costing
2. Chemical	Tonne, pound or kilogram	Process Costing
3. Cement	Tonne	Process Costing
4. Automobile	Number	Process Costing
5. Steel	Tonne	Process Costing
6. Transport	Tonne kilometre, Passenger kilometre	Operating Costing
7. Cable	Metre	Process Costing
8. Gas	Cubic foot or cubic metre	Process Costing
9. Nuts and bolts	Gross or some measure of standard weight	Job Costing
10. Power	Kilowatt hour	Process Costing
11. Paper	Ream	Process Costing
12. Timber	Cubic foot	Process Costing
13. Brewery	Per dozen bottles or per gallon of draught brew	Process Costing
14. Biscuits	Per (WT)	Process Costing
15. Hospital	Per bed occupied/out-patient visit	Operating Costing
16. Case-making	Per case	Job Costing
17. Road contractors	Per mile	Job Costing
18. Ice cream	Per gallon	Process Costing
19. Knitted textiles	Per pound/kg of fabric	Process Costing
20. Canned fruit	Per dozen cans or per gross cans	Process Costing
21. Soft drinks	Cases of 24 bottles each	Process Costing
22. Oil extraction, petrochemicals	Gallons, litres, tonnes	Process Costing
23. Pharmaceuticals	1000 nos. tablets, ampulses	Process Costing
24. Machine building	Numbers	Job Costing
25. Readymade garments	Numbers	Batch Costing
26. Aircraft	Numbers	Job Costing
27. Sugar	Tonnes, kilograms	Process Costing
28. Furnishing	Each article by numbers	Job Costing
29. Confectionary	Per kg	Process Costing
30. Clothing (automatic process)	Per dozen articles	Process Costing
31. Bicycle manufacturing	Number	Multiple Costing
32. Textiles	Metres, yards	Process Costing
33. Flour	Tonnes	Process Costing
34. Parts manufacturing	Nos. of articles in tens, hundreds, thousands	Job Costing

COST ACCOUNTING DEPARTMENT

The organisation of business enterprises differ widely in their nature and structure. Also, the accounting information is required to be provided to various persons within the organisation for decision-making. These factors greatly influence the designing of an organisational structure and the cost accounting department. In a typical manufacturing company, the Chief Accounting Officer is the controller or head of the accounting division (Fig. 1.1). The controller performs other functions besides determining the cost of product, such as budgeting, general (financial) accounting, systems and procedures, data processing, taxes and reports, internal auditing. Figure 1.2 depicts the different functions of the accounting department within the purview of the Chief Accounting Officer.

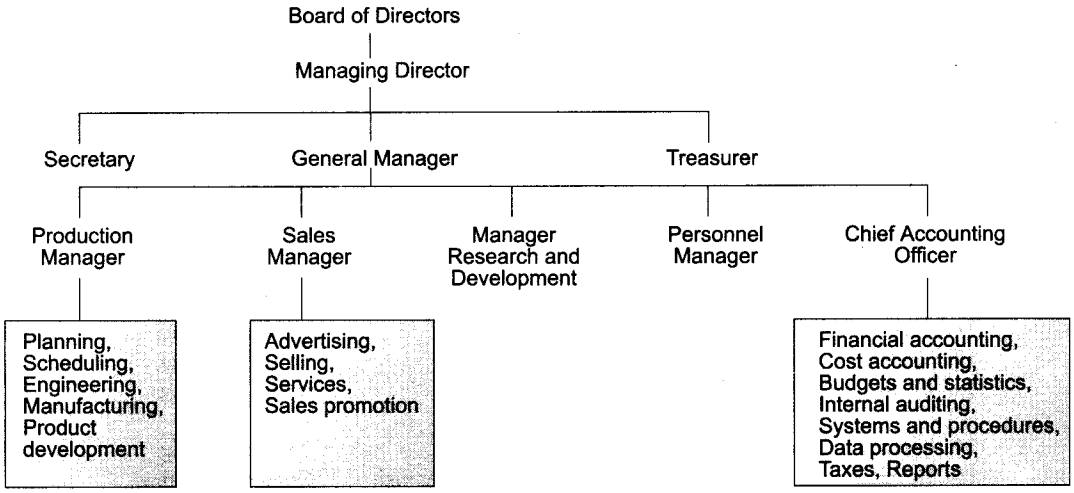

Fig. 1.1 Organisation Chart of a Manufacturing Company

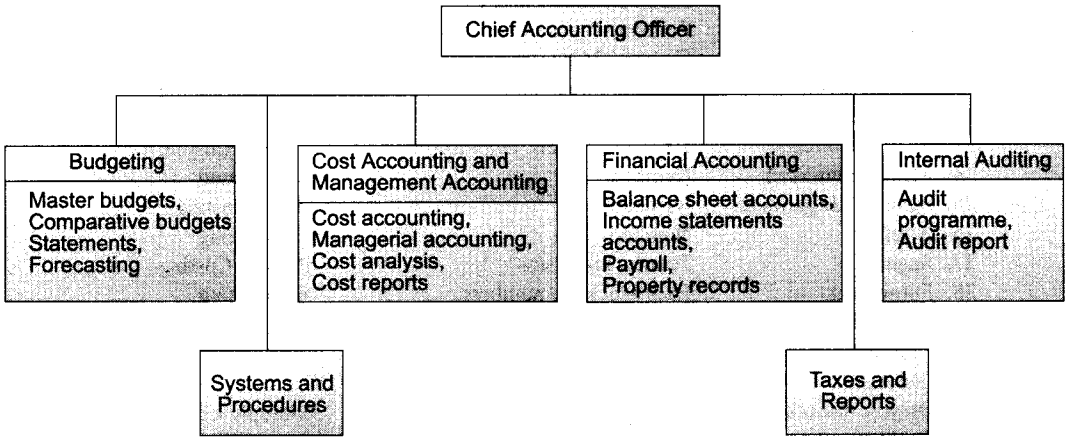

Fig. 1.2 Organisation of the Department of the Chief Accounting Officer

The cost accounting department discharges many important functions in a manufacturing concern. It keeps full records about material, labour and overhead. After accumulating all different costs, it analyses them so that they can be used by management for planning, control and decision-making.

The cost accounting department, further, divides its responsibilities into different components to get prompt and timely reports. Coordination is needed among these functions (or departments) within the cost accounting department. Generally, these functional units are under the supervision of the Chief Accounts Officer (Fig. 1.2).

The cost accounting department and its activities are closely connected with other departments and their activities in the organisation. For example, the production department is responsible for designing, planning and producing products upto the finished product stage. The research and development department develops cost estimates for each element of cost, that is, material, labour and overhead. Costs are measured at different stages of production and activities to evaluate the efficiency of the department or persons associated with the specific activity. The personnel department is mainly engaged in keeping efficient employees, establishing wage rates and methods or remuneration which are beneficial to employees as well as to the firm. The marketing department requires a good product at a competitive price for dealing with customers. The sales department determines sales policies in terms of product cost data which helps the department to know which are profitable and unprofitable products. The finance department, which is responsible for arrangement of funds is greatly assisted by the cost accounting department which gives vital information on accounting, budgeting and cash flow. The cost accounting department helps the law department in working as per the legal requirements. Wages laws, bonus laws, labour agreements, taxes are some of the important areas where cost accounting and the law department both have to cooperate.

THEORY QUESTIONS

1. "Financial accounting procedures are generally designed to ascertain the periodic profit or loss, but there are important limitations and deficiencies in the system." Discuss. *(B Com (Hons), Delhi)*
2. Examine critically the drawbacks of conventional financial accounting. Do you think that these limitations have been overcome by the introduction of cost accounting in business? *(CA Inter)*
3. What is cost accounting? What are its objectives? How do cost accounting records help in the planning and control of operations of a business enterprise? *(B Com (Hons), Delhi, 2006)*
4. What is meant by cost accounting? In what essential respects does cost accounting differ from financial accounting? *(B Com (Hons), Delhi)*
5. Explain fully the concept of cost. How does cost accounting contribute to the effective and efficient management of an industrial establishment? *(B Com (Hons), Delhi)*
6. What is the function of a costing department in a manufacturing concern? How is the costing department useful to other departments in a manufacturing concern?
7. SV Ltd. is a manufacturing company which has a sound system of financial accounting. The management of the company, therefore, feels that there is no need for the installation of a cost accounting system. Prepare a report for management, bringing out the distinction between cost and financial accounting systems and the need for the introduction of a sound cost accounting system. *(CA Inter, MFC, Delhi)*
8. "A cost keeping system that simply records costs for the purpose of fixing sale prices has accomplished only a small part of its mission." What are the other functions of costing? *(ICWA, Inter)*
9. "Cost accounting is an unnecessary luxury for business establishments." Do you agree with the statement? Discuss. *(B Com (Hons), Delhi)*
10. Explain the important objectives of cost accounting. *(B Com (Hons), Delhi 1997, 2004)*
11. What is cost accounting? Discuss briefly its important functions in a business firm. *(B Com (Hons), Delhi 1998)*

12. Cost accounting has come to be an essential tool of the management." Comment. *(B. Com (Hons), Delhi, 2000, 2007)*
13. "Cost accounting is a system of foresight and not a postmortem examination, it turns losses into profits, speedsup activities and eliminates waste." Discuss. *(ICWA; B. Com (Hons), Delhi)*
14. State the primary objectives of installation of a costing system. Apart from technical costing problems, what practical difficulties would you meet and how would you overcome them? *(B. Com (Hons), Delhi)*
15. (a) State and explain the main differences between financial accounting and cost accounting.
    (b) What is a cost centre and how does it differ from a department of a factory? *(B. Com (Hons), Delhi)*
16. How far is cost information helpful for the following purposes:
    (a) Fixation of selling prices
    (b) Control of costs
    (c) Management decisions
17. "Limitations of financial accounting have made the management to realise the importance of cost accounting". Comment. *(B. Com (Hons), Delhi, 2003, 2006, B.Com. 2006)*
18. What are the advantages of introduction of costing system in an industrial organisation? *(I.C.W.A. Inter, Stage I, Dec. 2006, B.Com (Hons), Delhi, 2004)*
19. Mention the factors which should be considered in installing a costing system in an organisation. *(B. Com (Hons), Delhi, 2004, 2007)*
20. What is meant by cost accounting? Explain the difference between financial accounting and cost accounting. *(B. Com, Delhi, 2002)*
21. What purposes do cost centres serve? Are cost centres and cost units related to each other? *(B. Com (Hons), Delhi, 2002, B. Com, Delhi, 2005, 2006)*
22. "Cost accounting is becoming more and more relevant in the emerging economic scenario in India". Comment. *(B.Com (Hons), Delhi, 2007)*
23. Discuss the essentials of good cost accounting system. *(CA, P.E. Exam II, Group II, May 2004)*
24. You have been asked to install a costing system in a manufacturing company. What practical difficulties will you expect and how will you propose to overcome the same? *(C.A, P.E., Exam II, Group II, May 2004)*
25. What is meant by management accounting? Discuss its objectives. *(B. Com (Hons), Delhi, 2007)*

SELF EVALUATION QUESTIONS

1. List *A* gives you different methods of costing which can be used in one or more industries or organisations given in List *B*. Mention the correct costing method of the industries in List *B*.

List A Process, operating, single output, job, contract, multiple

List B

(i) Chemical works	(ii) Road transport company
(iii) Coal	(iv) Nursing home
(v) Paint	(vi) Construction industries
(vii) Cement manufacturing	(viii) Soap manufacturing
(ix) Railways	(x) Ship builders
(xi) Bicycle manufacturing	(xii) Readymade garments
(xiii) Telephone	(xiv) Cotton textiles
(xv) Aluminum	(xvi) Paper mill
(xvii) Furniture manufacture	(xviii) Meat packing
(xix) Sugar	(xx) Steel
(xxi) Paper boxes	(xxii) Air conditioners
(xxiii) Locomotive	(xxiv) Tyres and tubes
(xxv) Leather	(xxvi) Pianos
(xxvii) Toys and novelties	(xxviii) Oil refinery
(xxix) Baby food	(xxx) Radio receivers

Ans. (i) Process (ii) Operating (iii) Single (iv) Operating (v) Process (vi) Contract (vii) Process (viii) Process (ix) Operating (x) Contract (xi) Multiple (xii) Batch (xiii) Operating (xiv) Process (xv) Process (xvi) Process (xvii) Job (xviii) Process (xix) Process (xx) Process (xxi) Process (xxii) Multiple (xxiii) Multiple (xxiv) Process (xxv) Process (xxvi) Batch (xxvii) Batch (xxviii) Process (xxix) Batch (xxx) Multiple

2. Indicate whether the following statements are True or False:

(i) The rental of a car which includes a fixed daily rate plus an extra fee for each kilometre driven is an example of a step cost.

(ii) Assuming inflation, if a company wants to maximise net income, it would select FIFO as the method of pricing raw materials.

(iii) Overtime premium paid to all factory workers is usually considered direct labour.

(iv) Period costs are invariable and are expensed out as and when the inventory is sold.

(v) Idle facility and idle time are the same. *(B. Com (Hons), Delhi 1999)*

Ans: (i) False (ii) True (iii) False (iv) True (v) False

COST: CONCEPTS AND CLASSIFICATIONS

Learning Objectives

After reading this chapter, you should be able to:

1. explain costs and its different classification, natural classification of costs, different costs for decision-making and planning;
2. explain expenses, loss, fixed cost, variable cost, mixed cost, direct and indirect cost, capital and revenue cost;
3. explain cost control, cost reduction, cost management and difference between cost control and cost reduction;
4. identify costs for control – controllable and uncontrollable costs, standard costs;
5. understand cost reduction techniques and cost reduction areas; and
6. define cost sheet, and explain its preparation.

The three important areas in cost accounting are cost ascertainment, cost analysis and cost control. For cost accounting to be useful in these areas, costs must be accumulated, classified and grouped in such a manner that (i) total costs and units costs can be determined; (ii) trends in costs behaviour can be observed; (iii) cost can be controlled; and (iv) useful analysis can be made based on past as well as future costs for planning, control and decision-making. These requirements call for an understanding of the concept of cost and of its appropriate classifications. The purpose of this chapter is to explain the concept of cost and different cost classifications.

COST

Cost is the amount of expenditure, actual (incurred) or notional (attributable), relating to a specific thing or activity. The specific thing or activity may be a product, job, service, process or any other activity.

Cost is the amount of resources given up in exchange for some goods or services. The resources given up are generally in terms of money or, if not in terms of money, they are always expressed in monetary terms. The term 'cost' itself is without any significant meaning and, therefore, it is always advisable to use it with an adjective or phrase that will convey the meaning intended, such as prime, direct, indirect, fixed, variable, controllable, opportunity, imputed, sunk, differential, marginal, replacement and the like. Each such adjective

or description implies a certain attribute or characteristic which is important in computing, measuring and analyzing the cost.

Basically, when a cost is incurred, it could be in the form of deferred cost (asset) or expired cost (expense). Deferred costs are unexpired costs, capitalised costs, which provide benefits in the future periods and known as assets and hence appear on the balance sheet. Examples of deferred or unexpired costs are plant, equipment, building, inventory, prepaid rent and insurance. When these deferred costs (assets) are used up, to the extent used, they become expenses and appear on the income statement and are deducted from revenues. Expired costs are costs which have been used up totally in generating revenue. They are not capitalised but only shown as expenses on income statement.

EXPENSES

Expenses are expired costs, incurred and totally used up in generation of revenue. Examples of expired costs are costs of goods sold expense, selling and administrative expenses. Expenses need not necessarily have to be paid in cash immediately, even a promise to pay could be made for the benefits obtained. The manufacturing costs are capitalised in the form of finished goods inventory and when a sale is made, they expire (becoming expenses). The cost of unsold inventory which was an asset earlier, now becomes expenses (costs of goods sold) as it has contributed to the generation of revenue.

Factory (or manufacturing) overhead is treated as cost (an asset) because this is included in the cost of finished goods inventory which is an asset unless sale is made. Selling and administrative expenses, when not included in the cost of finished goods inventory, are treated only as expenses and not cost (asset). Factory overheads are assets because they are supposed to add utility to the goods manufactured. For example, depreciation of a factory machine increases the utility of the goods manufactured which are therefore included in work-in-progress and finished goods inventory. But selling and distribution overheads do not add to the utility of goods manufactured and are treated merely as expenses and are deducted from revenues whenever incurred. Similarly, depreciation of a factory building is a cost, but depreciation of an office building is an expense.

LOSS

Loss is lost cost. The term 'loss' is used to describe mainly two accounting events. In traditional financial accounting it is used to denote a situation where expenses exceed revenues for an accounting period, that is, the opposite of net income (earnings) for the accounting period. Secondly, a loss arises due to the cost of an asset being more than the sale proceeds when the asset is sold. This unfavourable event does not arise from a normal business activity but from non-operating transactions or events. This definition of loss is used to identify the opposite of gain. That is, if no benefit is received from the cost incurred or it becomes definite that no benefit will accrue, the cost becomes a lost cost, that is, loss.

Loss is unrelated to revenue generation and is only offset against revenue of the period in which the loss occurred. Examples of loss are, loss on sale of fixed asset, loss of a stock due to fire.

CLASSIFICATION OF COSTS

The achievement of the objectives of cost accounting requires that cost should be ascertained, classified and grouped. Cost classification may be defined as the process of grouping costs according to their common characteristics. There are many objectives of cost classifications depending on the requirements of management. However, the following objectives are considered very useful and significant:

(i) Determining product costs for stock valuation and profit measurement
(ii) Planning
(iii) Decision Making
(iv) Control

The different cost classifications are as follows:

1. Natural classifications of costs
   (i) Direct material
   (ii) Direct labour
   (iii) Direct expenses
   (iv) Factory overhead
   (v) Selling and distribution and administrative overheads
2. Cost behaviour (In relation to changes in output, activity or volume)
   (i) Fixed cost
   (ii) Variable cost
   (iii) Mixed cost (Semi-variable and Semi-fixed cost)
3. Degree of Traceability to the Product
   (i) Direct cost
   (ii) Indirect cost
4. Degree of Association with the Product
   (i) Product cost
   (ii) Period cost
5. Functional Classification of Costs
   (i) Manufacturing cost
   (ii) Selling and distribution cost
   (iii) Administrative cost
6. Relationship with the Accounting Period
   (i) Capital cost
   (ii) Revenue cost
7. Costs for Decision Making and Planning
   (i) Opportunity cost
   (ii) Sunk cost
   (iii) Relevant cost
   (iv) Differential cost
   (v) Imputed cost
   (vi) Out-of-pocket cost
   (vii) Fixed, variable and mixed cost
   (viii) Shutdown cost
8. Costs for Control
   (i) Controllable and uncontrollable cost
   (ii) Standard cost
   (iii) Fixed, variable and mixed cost
9. Other Costs
   (i) Joint cost
   (ii) Common cost

NATURAL CLASSIFICATION OF COSTS

The term "natural classification" refers to the basic physical characteristics of the cost. In a manufacturing concern, generally, the following costs are incurred:

1. *Direct material* Direct materials refers to the cost of materials which are conveniently and economically traceable to specific units of output. The term "direct materials" is denoted by certain other names also, such as process material, prime cost material, production material, stores material, construction materials. Some examples of direct materials are: raw cotton in textiles, crude oil to make diesel, steel to make automobile bodies. The following group of materials fall within the definition of direct materials:

(a) All materials specially purchased for a particular job, order, process or product.
(b) All materials (including primary materials and raw materials) acquired and subsequently requisitioned from the stores for production.
(c) Components or parts purchased or produced and requisitioned from the storeroom.
(d) Material passing from one process to another process.
(e) Primary packing materials, for example, wrappings, cardboard boxes, etc.

Items, such as import duties, dock charges, transport cost of materials, storing of materials, cost of purchasing and receiving materials are properly added to their invoiced price and thus, the materials are charged out at this increased cost.

Chapters 3 and 4 discuss in detail direct materials and materials cost.

2. *Direct labour* Direct labour is defined as the labour of those workers who are engaged in the production process. It is the labour expended directly upon the materials comprising the finished product. Other terms for the direct labour are: process labour, productive labour, operating labour. Examples are the labour of machine operators and assemblers. However, a worker may be performing direct labour for a certain number of hours but be an indirect worker for the balance of the day. For example, manufacturing concerns frequently have workers who may be working on an assembly line or operating a machine as direct workers for three or four hours but later in the day may help in repairing machinery or in doing other work as indirect workers.

Chapter 5 explains direct labour and accounting and control of direct labour cost in detail.

3. *Direct expenses (Chargeable expenses)* These include any expenditure other than direct material and direct labour directly incurred on a specific product or job. Such special necessary expenses can be identified with product or job and are charged directly to the product as part of the prime cost. Examples of direct expenses are:

(a) Cost of hiring special machinery or plant.
(b) Cost of special moulds, designs and patterns.
(c) Experimental costs and expenditure on model and pilot schemes.
(d) Fees paid to architects, surveyors and other consultants.
(e) Cost of transport and conveyance to the site of job or operations.
(f) Inward carriage and freight charges on special materials.
(g) Cost of patents and royalties.
(h) Cost of defective work, for example, where several trials are necessary before an appropriate one is obtained. The cost of such trials is taken as direct expense.
(i) Licence fees.
(j) Hire charges for plants and equipments for a specific product or job.
(k) Components and parts processed for a special job.
(l) Insurance charges on special materials chargeable to a job.

Other things remaining the same, the term 'direct expenses' (chargeable expenses), whenever used in costing, refers to a specific product or job. That is, whether some expenses are direct or not, is decided in terms of specific job or product as product or job is considered the cost unit. However, some expenses which cannot be directly identified with product or job (and hence are not direct expenses), can sometimes be identified with a department, function, territory, customer, division etc. For example, salary of branch office manager, depreciation of plant, rent and rates, heating and lighting, insurance expenses etc. are direct in relation to some department or activity but become indirect with regard to a product or job because these expenses are incurred for more than one product or job.

The total of the above three elements of costs (i) direct materials, (ii) direct labour and (iii) direct expenses, are prime cost. According to Official Terminology of Chartered Institute of Management Accountants (CIMA) (London), prime cost is the total cost of direct material and direct labour. Thus, direct expenses is not included in prime cost as per CIMA Terminology. The CIMA defines direct cost as the expenditure which can be economically identified with a specific saleable cost unit.

4. *Factory overhead* Factory overhead, also called manufacturing overhead or factory burden, may be defined as the cost of indirect materials, indirect labour and indirect expenses. The term "indirect materials" refers to materials that are needed for the completion of the product but whose consumption with regard to the product is either so small or so complex that it would not be appropriate to treat it as a direct materials item. They are production supplies and other materials that cannot conveniently or economically be charged to a specific unit of output. Examples of such items are lubricants, cotton waste, handtools, works stationery etc.

The term "indirect labour" is the labour cost of production-related activities that cannot be associated with or conveniently and economically traced to specific products via physical observation. Some examples of indirect labour are: foremen, shop clerks, general helpers, cleaners, material handlers, plant guards, employees engaged in maintenance work or other service work.

The term "indirect expenses" covers all indirect expenditure incurred by the manufacturing enterprise from the time production has started to its completion and its transfer to the finished goods store. Any expenses not classified as direct expenses are known as indirect expenses. The Institute of Cost and Management Accountants (UK) defines indirect expenses as the "expenses which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units." They are incurred for the benefit of more than one product, job or activity and must be apportioned by appropriate bases to the various functions. Expenses of this type include items such as heat, light, maintenance, factory managers's salary etc.

The total of (i) prime cost, and (ii) factory overheads is known as 'Factory cost'. Direct labour and factory overhead together are known as Conversion Costs because they are the costs of converting raw materials into finished products.

Chapter 6 explains in detail the nature and accounting of overhead costs.

5. *Selling, distribution and administrative overheads* Selling and distribution overheads usually begin when the factory costs end. Such expenses are generally incurred when the product is in saleable condition. It covers the cost of making sales and delivering/despatching products. These costs include advertising, salesmen salaries and commissions, packing, storage, transportation, and sales administrative costs.

Administrative overhead includes costs of planning and controlling the general policies and operations of a business enterprise. Usually, all costs which cannot be charged either to the production or sales division are considered as administrative costs. Typical of such items are fees of the board of directors, the chairman's salary, the rent for general offices and costs of the general accounting and other departments. Sometimes, some such expenses such as manager's salary are often allocated to manufacturing and included in factory overhead.

The sum of (i) Prime cost, (ii) Factory overhead and (iii) Selling and distribution and Administrative Overhead is the total cost, that is, the cost "to make and sell."

Chapter 7 discusses selling and distribution and administrative overhead costs.
Figure 2.1 presents the natural classification of costs as discussed above.

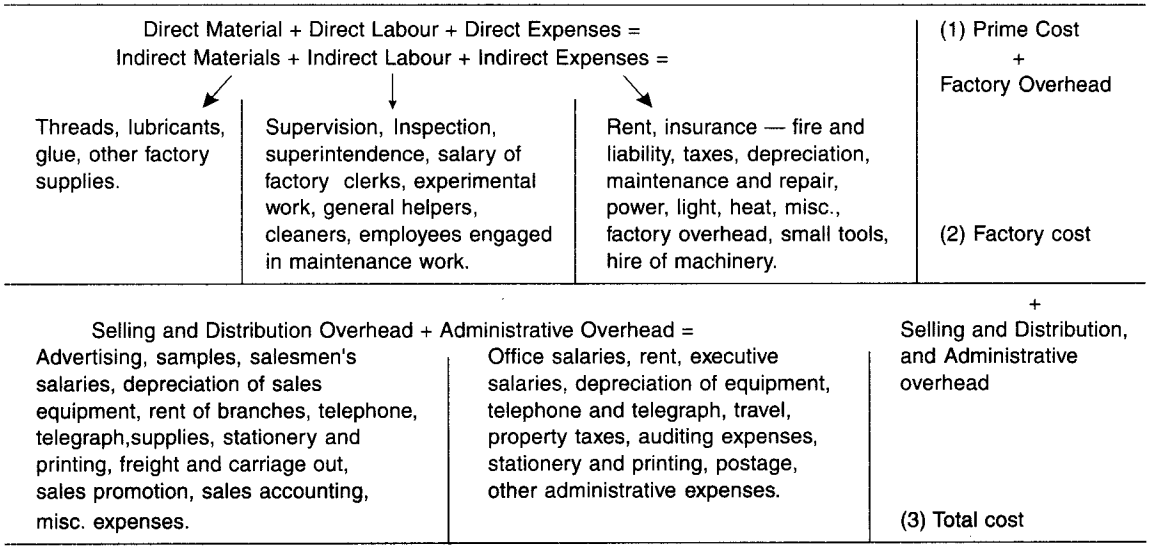

Fig. 2.1 Natural classification of costs in a manufacturing concern

COST BEHAVIOUR (IN RELATION TO CHANGES IN OUTPUT OR ACTIVITY OR VOLUME)

Costs can be classified into (i) fixed, (ii) variable and (iii) mixed costs, in terms of their variability or changes in cost behaviour in relation to change in output, or activity or volume. Activity may be indicated in any forms such as units of output, hours worked, sales, etc.

Fixed Cost

Fixed cost is a cost which does not change in total for a given time period despite wide fluctuations in output or volume of activity. These costs are also known as standby costs, capacity costs or period costs. Examples of fixed costs are rent, property taxes, supervising salaries, depreciation on office facilities, advertising, insurance, etc. They accrue or are incurred with the passage of time and not with the production of the product or the job. This is the reason why fixed costs are expressed in terms of time, such as per day, per month or per year and not in terms of unit. It is totally illogical to say that a supervisor's salary is so much per unit. But it can be said that supervisor's salary is so much per month.

Any fixed cost can be represented by a constant (See Fig. 2.2).

However it should be improper to say that fixed costs never change in amount. The basic concept is that the term "fixed" refers to fixity (non-variability) related to specific volume (or relevant range); the term does not imply that there will be no changes in fixed cost. This characteristic of fixed cost has been shown in Fig. 2.3. According to Fig. 2.3, the following are the fixed costs at different levels of production:

1. Rs. 50,000 fixed cost between 20,000 and 80,000 units of production.

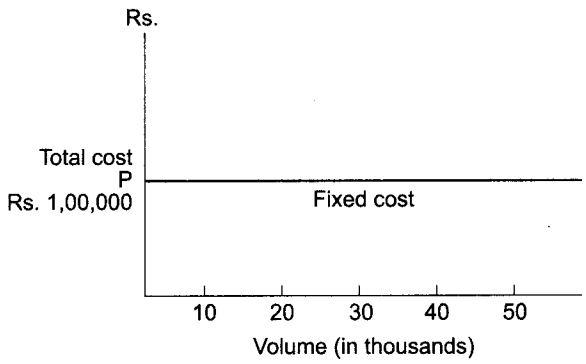

Fig. 2.2 Fixed Cost

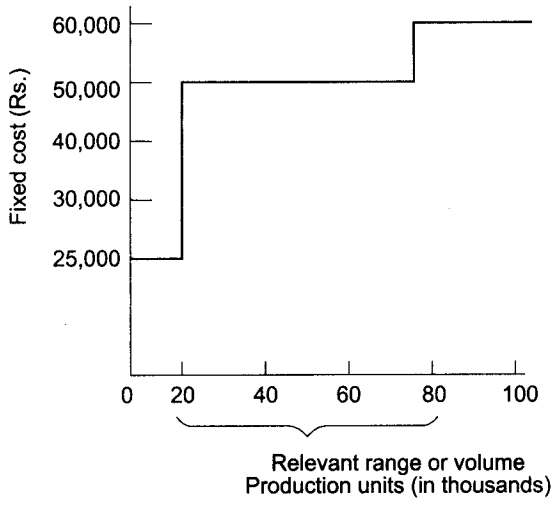

Fig. 2.3 Total Fixed Cost at Different Levels of Production

2. Rs. 60,000 fixed cost in excess of 80,000 units. This assumes that increase in production after a certain level (80,000 units) requires increase in fixed expenses which have been fixed earlier, for example, additional supervision, increase in quality control costs.

3. Rs. 25,000 fixed cost from zero units (shut down) to 20,000 units. This explains that if the level of activity comes to less than 20,000 units, some fixed costs may not be incurred. For example, if the plant is shut down or production is reduced, many of the fixed costs, such as costs on accounting functions, supplies, staff, will not be incurred.

However, if laying off of staff and personnel, etc. is not possible, then the fixed cost will remain at Rs. 50,000.

Fixed costs can be classified in the following categories for the purpose of analysis:

1. *Committed costs* Such costs are primarily incurred to maintain the company's facilities and physical existence, and over which management has little or no discretion. Plant and equipment depreciation, taxes, insurance premium rate and rent charges are examples of committed costs.

2. *Managed costs* Managed costs are related to current operations which must continue to be paid to ensure the continued operating existence of the company, for example, management and staff salaries.

3. *Discretionary costs* They are also known as programmed costs. Discretionary costs result from special policy decisions, management programmes, new researches, etc. Some examples of such costs are research and development costs, marketing programmes, new system development costs.

The difference between committed and discretionary costs lies in the fact that it is difficult to eliminate or avoid committed costs in times of low production or decline in business activity, whereas discretionary costs such as research and development could be eliminated or reduced to a desirable level.

4. *Step costs* A step cost is constant for a given amount of output and then increases in a fixed amount at a higher output level. For example, in a manufacturing company, one supervisor is required at a salary of Rs. 10,000 p.m. for every 50 workers. So long as 50 workers or less than that are working, the supervision costs will be Rs. 10,000 p.m. But as soon as the 51st worker is employed, the cost of supervision increases by Rs. 10,000 p.m. and will be Rs. 20,000. The cost of supervision remains fixed at Rs. 20,000 if not more than 100 workers are working. But it will go up if more than 100 workers have been employed. Figure 2.4 exhibits the behaviour pattern of step costs.

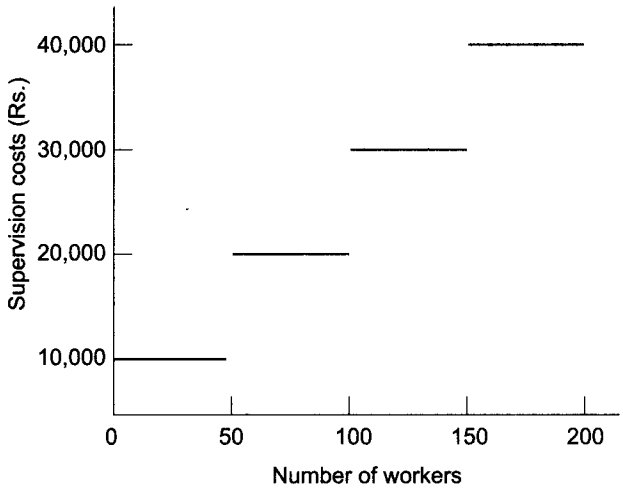

Fig. 2.4 Step Costs

Variable Cost

Variable costs are those costs that vary directly and proportionately with the output. There is a constant ratio between the change in the cost and change in the level of output. Direct materials cost and direct labour cost are the costs which are generally variable costs. For example, if direct material cost is Rs. 50 per unit, then for producing each additional unit, a direct material cost of Rs. 50 per unit will be incurred. That is, the total direct material cost increases in direct proportion to increase in units manufactured. However, it should be noted that it is only the total variable costs that change as more units are produced; the per unit variable cost remains constant.

Variable overheads like factory supplies, indirect materials, sales commission, office supplies are some other examples of variable costs. If the factory is shut down, variable costs are eliminated. Variable cost is always expressed in terms of units or percentage of volume; it cannot be stated in terms of time. Variable cost

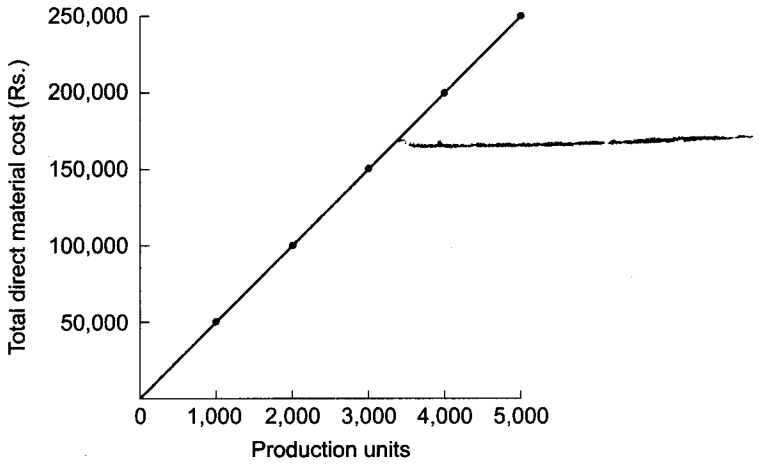

Fig. 2.5 Behaviour of Variable Costs (Direct materials cost)

is depicted in Fig. 2.5. The figure shows graphically the behaviour pattern of direct material cost. For every increase in the units produced there is a proportionate increase in the cost. When production increases to 3,000 units from a level of 2,000 units, the cost of direct materials increases in direct proportion at the constant rate of Rs. 50 per unit. The variable cost line in Fig. 2.5 has been shown as linear rather than curvilinear. That is, on a graph paper this variable cost line appears as an unbroken straight line in place of a curve.

However, the above pattern of variable cost line is the simplest possible and represents only those costs which vary in direct proportion to the level of activity. A completely linear variable costs over all levels of production or activity levels, as shown in Fig. 2.5 is very unlikely. In reality, a variable cost may be linear only over the normal range of activity levels and beyond the normal range of activity, variable cost per unit may show non-linear or curvi-linear line as displayed in Fig. 2.6. It implies that variable costs as displayed in this Fig. 2.6 are not varying in direct proportion to output or activity changes.

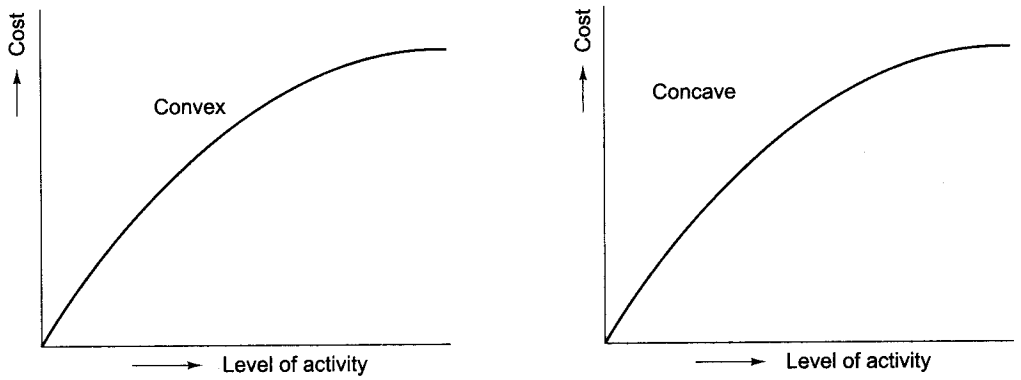

Fig. 2.6 Curvi-Linear Variable Costs

Convex — where each extra unit of output causes a less than proportionate increase in cost that is economies of scale operate.

Concave — where each extra unit of output causes a more than proportionate increase in cost that is diminishing returns operate.

There are some variable costs which may appear as curvi-linear. For example, in some production process the amount of waste materials remains more or less constant. Therefore, when production increases, the unit variable cost for material decreases due to economies of scale. On the other hand, when it becomes necessary to pay increasing differential piece rates to increase production, diminishing returns will operate and as a result of it, some form of concave curvi-linear relationship will emerge. That is, unit variable cost for labour will increase due to diminishing returns operating in this situation.

It can be concluded, therefore, that the classification of fixed and variable costs made in relation to one factor, that is, production volume is simplistic and is, at best, only a crude approximation of reality. In other words, it is known that the underlying variable cost relationship and function is curvi-linear, yet a linear approximation is assumed frequently.

Mixed Cost

Mixed costs are costs made up of fixed and variable elements. They are a combination of semi-variable costs and semi-fixed costs. Because of the variable component, they fluctuate with volume; because of the fixed

component, they do not change in direct proportion to output. Semi-fixed costs are those costs which remain constant upto a certain level of output after which they become variable as shown in Fig. 2.7. Semi-variable cost is the cost which is basically variable but whose slope may change abruptly when a certain output level is reached as shown in Fig. 2.8.

An example of a mixed cost is the earnings of a worker who is paid a salary of Rs. 1500 per week (Fixed) plus a bonus of Re 1 for each unit completed (variable). If he increases his weekly putput from 1,000 units to 1,500 units, his earnings increase from Rs. 2,500 to Rs. 3,000.

Earnings	*Units produced*	
	1,000	1,500
Fixed component	Rs. 1,500	Rs. 1,500
Variable component	1000	1,500
Total	Rs. 2,500	Rs. 3,000

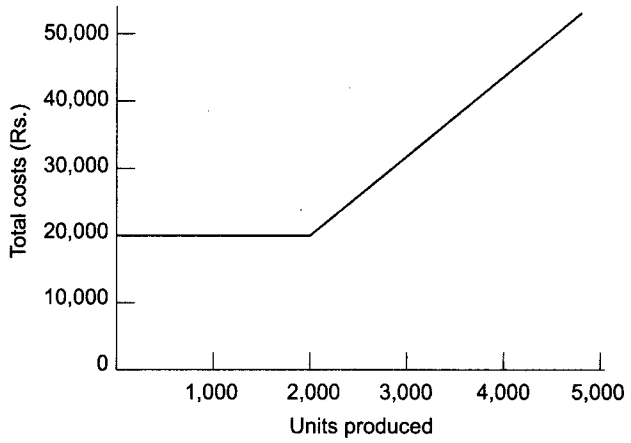

Fig. 2.7 Semi-fixed Cost

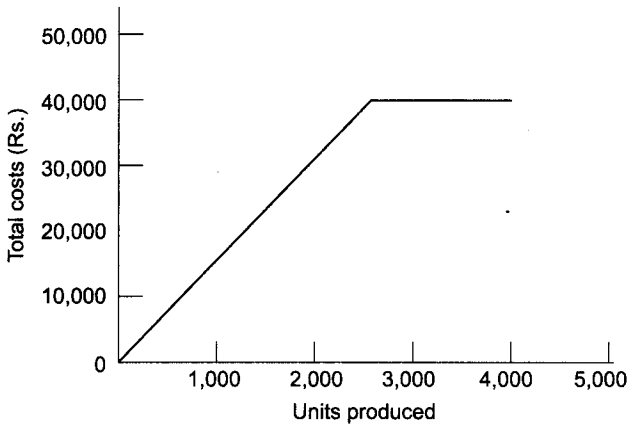

Fig. 2.8 Semi-variable Cost

An increase of 50% in output brings only a 20% increase in his earnings. Mathematically, mixed costs can be expressed as follows:

Total mixed cost = Total fixed cost + (Units × Variable cost per unit)

DEGREE OF TRACEABILITY TO THE PRODUCT

Cost is divided into direct and indirect cost in terms of degree of traceability to the product.

Direct Cost

Costs which are easily traceable or identifiable with a product are called direct costs. If output units are the objects of costing, then direct costs represent costs and resources that can be traced to or identified with the finished product.

Direct materails, direct labour and direct expenses are examples of direct costs.

Indirect Cost

Indirect costs are those costs which cannot be identified with, or traced to a single product because they are incurred for several products. The examples of indirect costs are: indirect materials (lubricants and scrap materials), salary of factory supervisors (indirect labour), rent, rates and depreciation (indirect expenses). Indirect costs, often referred to as overheads, have to be apportioned to different products.

Costs also may be direct or indirect with respect to particular company segments or divisions. That is some cost which are indirect for a product, may be traced to a segment or department and thus, will be direct costs for that department. A segment may mean any one of a number of things, namely department, division, specific activity, sales territory and the like.

Before dividing the cost into direct and indirect, it is necessary to know whether it is being associated with a product, sales area, department or some other activity. For example, if a salesman simultaneously handles several products, his salary is an indirect cost for each product, but a direct cost to his sales area or department.

ASSOCIATION WITH THE PRODUCT

Cost is classified into product costs and period costs in terms of association with the product.

Product Cost

Product costs are those costs which are identified with the product and included in inventory values. In other words, the costs that are included in the cost of manufacturing a product are called product costs. In a manufacturing concern, it is composed of four elements: (i) direct materials, (ii) direct labour (iii) direct expenses and (iv) manufacturing overhead. That is, product cost is a full factory cost. Prior to sale, product costs are deferred as inventories and until the goods are sold, are shown on the balance sheet as assets. As finished inventory goods is sold, product costs are transferred from the inventory accounts to the cost of goods sold account, thus becoming expenses and part of the period costs at the time revenue is realised.

Period Cost

Period costs are the costs which are not identified with product or job and are deducted as expenses during the period in which they are incurred. They are not carried forward as a part of value of inventory to the next accounting period.

These costs are necessary to genetate revenues but they cannot be directly associated with units of product. Difference of opinion exists regarding whether certain costs should be considered as product or period costs. It is generally accepted that selling and administrative expenses should be treated as period costs for the following reasons:

(i) It is difficult to select equitable bases to apportion these costs to products. On the other hand, product costs can be assigned to specific products through objective and direct measurements and some by allocation.
(ii) The majority of these expenses are fixed regardless of the change in production or activity.
(iii) It is difficult, if not impossible, to determine the relationship between the incurrence of these costs and the production of individual units of output.
(iv) It is difficult to get evidence as to any future benefits that would be obtained from these expenses at the end of the accounting period. Such is the case with clerical salaries, used postage, office supplies, rent, advertising, sales promotion, consulting fees which may be expected to provide future benefits, but they are usually expensed when incurred. Even if it is argued that there will be future benefits, it is difficult to make accurate measurements of such benefits.

Effect of Product Costs and Period Costs

The net income of a business enterprise is influenced by the amount of product costs and period costs. Therefore, the manner in which some costs are divided as product or period will have a bearing on the reported net income of a business firm. Product costs, in the first instance, influence the value of inventory as such costs by nature should be included in the cost of product. Product costs affect net income in the period in which products representing the product costs have been sold. This event of influencing net income may take place in the current accounting period or subsequent accounting period. In other words, products costs do not reach the income statement and will not influence net income of a business enterprise until the product is sold. However, period costs appear directly on the income statement in the month or the period in which they are incurred.

FUNCTIONAL CLASSIFICATION OF COSTS

Functional classification of costs refers to how the cost was used (manufacturing, administration or selling). A functional classification implies that the business performs many functions for which costs are incurred. In measuring net income, expenses are usually classified by function and grouped under the headings of manufacturing, selling and administrative costs. Manufacturing costs are all production costs incurred to manufacture the products and to bring them to a saleable condition, including direct materials, direct labour and indirect manufacturing (or factory overhead) costs. Selling and administrative charges may be treated as expenses when incurred or charged to prepaid expense accounts such as prepaid insurance. Functional classification is also important because it provides an opportunity to the management to evaluate the efficiency of departments performing different functions in the organisation.

RELATIONSHIP WITH ACCOUNTING PERIOD

Capital Cost and Revenue Cost

Costs can also be divided into two broad classes on the basis of the accounting period to which they relate: (i) capital expenditures and (ii) revenue expenditures. A capital expenditure provides benefit to future periods and is classified as an asset; a revenue expenditure is assumed to benefit the current period and is classified

as an expense. A capital expenditure will flow into the cost stream as an expense when the asset is used up or written off.

The distinction between capital and revenue expenditures is vital to the proper matching of costs and revenue and to the accurate measurement of periodic net income.

COSTS FOR DECISION MAKING AND PLANNING

Opportunity Cost

Opportunity cost is the cost of opportunity lost. It is the cost of selecting one course of action in terms of the opportunities which are given up to carry out that course of action. Opportunity cost is the benefit lost by rejecting the best competing alternative to the one chosen. The benefit lost is usually the net earnings or profits that might have been earned from the rejected alternative. For example, assume that a manufacturer can sell a semi-finished product to a customer for Rs. 5,00,000. He decides, however, to keep it and finish it. The opportunity cost of the semi-finished product is Rs. 5,00,000 because this is the amount of economic resources foregone by the manufacturer to complete the product. Similarly, capital which is invested in plant and inventories cannot now be invested in shares and debentures that will earn interest and dividends. The loss of interest and dividend that would be earned is the opportunity cost. Other examples of opportunity cost are when the owner of a business foregoes the opportunity to employ himself elsewhere; or a machine used to make Product A is said to have an opportunity cost if the machine can be sold or if it can also make Product B.

Opportunity costs are important in decision-making and evaluating alternatives. Decision making is selecting the best alternative which is facilitated by the help of opportunity costs. But opportunity costs are not recorded in an accounting system as they relate to opportunities lost.

Sunk Cost

A sunk cost is the cost that has already been incurred. Generally known as unavoidable cost, it refers to all past costs since these amounts cannot be changed once the cost is incurred. They are the costs which have been created by a decision in the past and cannot be changed or avoided by any decision that is made in the future. Examples of sunk costs are the book values of existing assets, such as plant and equipment, inventory, investment in securities, etc. Except the possible gains or losses on sales of any of such assets, the book value is not relevant for decisions regarding whether to use them or dispose them off.

Some argue that the total cost of a fixed asset is not the sunk cost, but sunk cost is the difference between the purchase price of a fixed asset and the net amount that could be realised from its sale. For example, if a plant has a book value of Rs. 10,00,000 and a scrap value of Rs. 50,000 then the sunk cost is Rs. 9,50,000 (Rs. 10,00,000–50000) and not Rs. 10,00,000. That is, the sunk cost is the difference between book value and scrap value.

Relevant Cost

Relevant costs are those future costs which differ between alternatives. Relevant costs may also be defined as the cost which are affected and changed by a decision. On the contrary, irrelevant costs are those costs which remain the same and not affected by the decision whatever alternative is chosen. Relevant costs have the following two features:

(i) Relevant costs are only future costs, that is, those costs which are expected to be incurred in future. Relevant costs therefore, are not historic (sunk) costs which have already been incurred and cannot be changed by a decision.

(ii) Relevant costs are only incremental (additional) or avoidable costs. Incremental costs refer to an increase in cost between two alternatives. Avoidable costs are those which are not incurred from one alternative to another.

To take an example, assume a business firm purchased a plant for Rs. 10,00,000 and has now a book value of Rs. 1,00,000. The plant had become obsolete and cannot be sold in its present condition. However, the plant can be sold for Rs. 1,50,000 if some modification is done on it which will cost Rs. 60,000. In this example, Rs. 60,000 (modification cost) and Rs. 1,50,000 (sales value) both are relevant as they reflect future, incremental costs and future revenues respectively. The firm will have incremental benefit of Rs. 90,000 (Rs. 1,50,000–Rs. 60,000) on sale of the plant.

Rs. 10,00,000 has already been incurred and being a sunk cost is not relevant to the decision, that is, whether modification should be done. Similary, the book value of Rs. 1,00,000 which has to be written off, whatever alternative future action is chosen is also not relevant because it cannot be changed by any future decision.

Differential Cost

Differential cost is the difference in total costs between any two alternatives. Differential costs are equal to the additional variable expenses incurred in respect of the additional output, plus the increase in fixed costs, if any. This cost may be calculated by taking the total cost of production without the additional contemplated output and comparing it with the total costs incurred if the extra output is undertaken.

Differential costs are also known as incremental costs, although technically an incremental cost should refer only to an increase in cost from one alternative to another; decrease in cost should be referred to as decremental cost. Differential cost is a broader term, encompassing both cost increases (incremental costs) and cost decreases (decremental costs) between alternatives.

For example, assume that a company has normal capacity to manufacture 50,000 units of a product; production beyond that point would require the installation of additional plant and equipment that would increase the amount of fixed costs. Normal utilisation of available capacity ranges between 40,000 and 50,000 units. Fixed costs for the range of output and expanded capacity have been estimated as follows:

	Normal capacity	*Expanded capacity*
Number of units	40,000 to 50,000	50,000 to 60,000
Fixed costs	Rs. 2,00,000	Rs. 2,50,000

Now assume that the variable cost is Rs. 4 per unit. A statement comparing manufacturing costs at three different production levels would be as follows:

	Number of units		
	40,000	*50,000*	*60,000*
Variable costs	Rs. 1,60,000	Rs. 2,00,000	Rs. 2,40,000
Fixed costs	Rs. 2,00,000	2,00,000	2,50,000
Total manufacturing cost	3,60,000	4,00,000	4,90,000
Average per unit	Rs. 9.0	Rs. 8	Rs. 8.17
Incremental costs	—	40,000	90,000
Additional output (units)	—	10,000	10,000
Incremental cost per unit	—	Rs. 4.00	Rs. 9.00

The additional capacity which would be required to expand operations to 60,000 units would increase the fixed costs by Rs. 50,000. The incremental cost of an additional 10,000 units would total Rs. 90,000 or Rs. 9.00 per unit. The average cost of the 60,000 units would be Rs. 8.17 per unit.

The concept of differential costing is vital in planning and decision making. It is an important tool in evaluating the profitability of alternative choice decisions and helping management in choosing the best alternative. The diffferential cost analysis can assist management in knowing the additional profit that would be earned if idle or unused capacity is used for extra production or if some additional investments are made by the firm.

Imputed Cost

Imputed costs are costs not actually incurred in some transaction but which are relevant to the decision as they pertain to a particular situation. These costs do not enter into traditional accounting system. Interests on internally generated funds, rental value of company-owned property and salaries of owners of a single proprietorship or partnership are some examples of imputed costs. Costs paid or incurred are not imputed costs. For example, if Rs. 5,00,000 is paid for purchase of raw materials, it is an outlay cost but not an imputed cost, because it would enter into ordinary accounting systems. When a company uses internally generated funds, no actual interest payment is required. But if the internally generated funds are invested in some projects, interest would have been earned. The revenue foregone (loss of interest) represents an opportunity cost, and thus, imputed costs are opportunity costs.

Out-of-Pocket Cost

While imputed costs do not involve cash outlays, out-of-pocket costs signify the cash cost incurred on an activity. Non-cash costs such as depreciation are not included in out-of-pocket costs. This cost concept is significant for management in deciding whether or not a particular project will at least return the cash expenditures associated with the project selected by management. Similary acceptance of a special order for production may necessitate the consideration of out-of-pocket costs that need not be incurred if the special order proposal is not accepted. Depreciation on plant and equipment is not relevant in decision-making because no cash goes outside the business.

Fixed, Variable and Mixed Costs

Fixed, variable and mixed costs have been explained in the preceding sections.

Shut Down Cost

Shut down costs are those costs which have to be incurred under all situations in the case of stopping manufacture of a product or closing down a department or a division. Shoutdown costs are always fixed costs. If the manufacture of a product is stopped, variable costs like direct materials, direct labour, direct expenses, variable factory overhead will not be incurred. However, a part of fixed costs (if not total fixed costs) associated with the product will be incurred such as rent, watchman's salary, property taxes etc. Such fixed costs are unavoidable. Some fixed costs associated with the product become avoidable and need not be incurred in case production is stopped such as supervisor's salary, factory manager's salary, lighting, etc. Shutdown costs, thus refer to minimum fixed costs which are incurred in the event of closure of a department or division.

COSTS FOR CONTROL

Controllable and Uncontrollable Cost

The concept of controllable cost is very important in cost accounting and contributes to the achievement of the objectives of cost control and responsibility accounting. The ICMA (UK) defines controllable cost as "a

cost which can be influenced by the action of a specified member of an undertaking" and a non-controllable cost as "a cost which cannot be influenced by the action of a specified member of an undertaking." Basically, a controllable cost is the cost over which a manager has direct and complete decision authority. That is, controllable costs can be controlled (reduced) by a manager at a given organisational level. Some examples of controllable costs are indirect labour, lubricants, cutting tools, and power costs incurred in the machining department.

Controllable costs do not imply that they are 100% controllable. Some costs are partly controllable by a responsibility centre manager. For example, the cost of raw materials is controlled by the production managers as well as purchase managers. The production manager controls at quantity level, and the purchase manager at the price level. Such costs are reported to both of them, but one responsible manager should be held accountable for those costs which he can control.

The term "controllable cost" should not be confused with the terms "variable cost" "direct cost". These terms are not synonymous. Variable costs vary with the output but are not necessarily controllable. For example, factory supplies used for servicing plant and equipment may vary with the output in the production department, but the production manager cannot control them.

It is contended that two factors: (i) the time period factor, and (ii) the decision-making authority, can make a cost controllable or uncontrollable. If the time period is long enough, all costs can be controllable and curtailed. Similarly, the decision-making authority influences the cost. If a responsibility center manager has been delegated the authority to spend the cost, he can control it. But all costs can be said to be controllable by somebody in the organisation. The managing director of a company is responsible for all costs. But practically, the responsibility and authority of controlling costs is delegated to different levels in the organisation.

Standard Cost

Standard costs are those costs which are planned or predetermined cost estimates for a unit of output in order to provide a basis for comparison with actual costs. Standard costs are used to prepare budgets. Standard cost is a unit concept and indicates standard cost per unit of output, per labour hour etc. On the contrary, the term 'Budgeted Cost' is a total concept and indicates total budgeted cost of an item at some activity level or output level such as budgeted cost of material is Rs. 8,00,000 if 8000 units are manufactured.

Fixed, Variable and Mixed Costs

Fixed, variable and mixed costs have been discussed earlier in this chapter.

OTHER COSTS

Joint Cost

Joint costs arise where the processing of a single raw material or production resources results in two or more different products simultaneously. Joint costs relate to two or more products produced from a common production process or element-material, labour, or overhead or any combination thereof, or so locked together that one cannot be produced without producing the other(s).

Thus, joint cost is the cost of two or more products that are not identifiable as individual types of products until a certain stage of production known as the split-off point (point of separation) is reached. For example, kerosene, fuel oil, gasolene and other oil products are derived from crude oil. Joint costs are total costs incurred upto the point of separation. Joint costs can be apportioned to different products only by means of some suitable bases of apportionment.

Common Cost

Common costs are those which are incurred for more than one product, job, territory or any other specific costing object. Common costs are not easily identifiable with individual products and, therefore, are generally apportioned.

Common costs are not only common to products, but they may be common to processes, functions, responsibilities, customers, sales territories, periods of time and similar costing units. For example, the salary of a manager of a production department which is manufacturing three products is an example of common cost with respect to the products. But his salary is direct cost to the departments located in the factory. The basic point is that a particular (common) cost may be direct to one object and common as far as other objects are concerned.

Although both the terms, "common costs" and "joint costs" are sometime used interchangeably, they differ from each other. Joint costs emerge when multiple products are manufactured in a common process and when common inputs are used. The multiple products have a definite quantitative relationship to each other and the production of one product influences the output of the other product, though in a lesser proportion. Common costs are not the result of any manufacturing compulsion or the use of any single raw material. Besides common costs can be apportioned to costing objects like products, job, department, etc. without much difficulty. But the apportionment of joint cost involves many difficulties in cost accounting.

COST CONTROL, COST REDUCTION, COST MANAGEMENT

Cost Control

Cost control refers to management actions to keep the costs within standards and/or budget. Cost control can be defined as the comparative analysis of actual costs with appropriate standards or budgets to facilitate performance evaluation and formulation of corrective measures. It aims at accomplishing conformity between actual result and standards or budgets, keeping expenditures within prescribed limits. Cost control has the following features:

1. Creation of responsibility centres with defined authority and responsibility for cost incurrence.
2. Formulation of standards and budgets that incorporate objectives and goals to be achieved.
3. Timely cost control reports (responsibility reporting) describing the variances between budgets and standards and actual performance.
4. Formulation of corrective measures to eliminate and reduce unfavourable variances.
5. A systematic and fair plan of motivation to encourage workers to accomplish budgetary goals.
6. Follow-up to ensure that corrective measures are being effectively applied.

Cost control does not necessarily mean reducing the cost but its aim is to have the maximum utility of the cost incurred. In other words, the objective of cost control is the performance of the same job at a lower cost or a better performance for the same cost.

Cost Reduction

Meaning

Cost reduction may be defined as a planned, positive approach to bring costs down. It implies real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their (product or goods) quality or suitability for the use intended that is, without reducing their value in terms of utility or satisfaction to the customers. The goal of cost reduction is achieved in two ways: (i) by reducing the

cost per unit and (ii) by increasing productivity. The steps for cost reduction include elimination of waste, improving operations, increasing productivity, search for cheaper materials, improved standards of quality, finding other means to reduce unit costs.

Cost reduction has to be achieved using internal factors within the organisation. Reduction of costs due to external factors such as reduction in taxes, government subsidies, grant etc. do not come under the concept of cost reduction. It should not be the result of wind falls.

With the globalisation of the Indian economy, it is necessary to reduce costs so that prices of our goods are really competitive in the world markets. This requires a massive effort on cost reduction in Indian industries.

Thus, cost reduction techniques occupy a prominent position in any organisation aiming to maximise profits.

Management should always attempt to remove difficulties generally found in cost reduction programmes. Some such difficulties are as follows:

(i) Workers and employees may not welcome cost reduction programmes and may resist their implementation.
(ii) Cost reduction programmes are generally carried out on an ad hoc basis.
(iii) The schemes may be applied in some areas but it should cover all activities.
(iv) Cost reduction programmes may be implemented hurriedly, whereas, they should be carried out after careful thought and in a planned manner.

Difference between Cost Control and Cost Reduction

Cost reduction is a much wider concept than cost control. As stated earlier, cost control aims at controlling costs within prescribed limits with the help of budgets and standards. The following are the differences between the two:

Cost Control	*Cost Reduction*
1. Cost control process involves: (a) setting targets and standards (b) ascertaining actual performance, (c) comparing actual performance with targets (d) investigating the variances and (e) taking corrective action. In cost control, standards form benchmarks for evaluating actual performance.	1. Cost reduction is not concerned with setting targets and standards and maintaining performance according to standards. It involves critical examination of the various products, processes, methods etc. with a view to reduce costs and improve efficiency and effectiveness.
2. It aims at adherence to and achieving standards, that is, cost targets. It assumes existence of standards and these standards are not challenged over the period.	2. It aims at real and permanent reduction in costs. Thus it aims at improving the standards. It challanges standards and assumes existence of concealed potential savings in the standards.
3. It lacks a dynamic approach as the only objective is not to exceed the standards.	3. It is continuous, dynamic and innovative in nature, looking always for measures and alternative to reduce costs.
4. It is a preventive function.	4. It is a never ending corrective function.
5. In cost control, costs are optimised before they are incurred. Being a routine exercise it is operation-oriented.	5. In cost reduction, there is always assumed a scope for reducing the incurred costs under controlled conditions. It is research oriented, always trying to reduce costs through planned research.

(*Contd.*)

Cost Control	*Cost Reduction*
6. It is generally applicable to items which have standards.	6. This is applicable to every activity of the business.
7. It contains guidelines and directive of management as to how to do a thing.	7. It adds thinking and analysis to action at all levels of management.
8. It requires close monitoring and timely corrective actions.	8. It demands creativity.
9. Budgetary control and standard costing are important tools of cost control.	9. It uses techniques like value engineering, value analysis, work study, operation research, ABC analysis, simplification and standardisation etc.

Both cost control and cost reduction are continuous processes in an enterprise. In all organisations, there should be planned, dynamic programme for cost reduction so that cost standards required for cost control may be improved continuously. However, cost reduction programme is neither a substitute nor it can replace a cost control system which emphasizes prompt investigation into variances and taking immediate corrective actions.

Techniques of Cost Reduction

Generally speaking, the following tools and techniques are used for the purpose of cost reduction:

1. Value analysis or value engineering
2. Work study
3. Job evaluation and merit rating
4. Production planning and control
5. Organisation and method study
6. Operations and method study, work study
7. Rationalisation
8. Quality control
9. Economic order quantity
10. Use of better technology
11. Mechanisation and automation
12. Standardisation
13. Simplification
14. ABC Analysis
15. Budgetary control and standard costing
16. Programme Evaluation and Review Technique (PERT) analysis
17. Cost-Benefit analysis
18. Improvement in the design of a product, design analysis
19. Market research
20. Inventory management and control

Cost Reduction Areas

Some of the important cost reduction areas are as follows:

1. *Product improvement* Product improvement and the level of efficiency determine the costs incurred. Important factors in product improvement are:

(a) Quality of the product.
(b) Unnecessary weight, materials content, machine or labour operations.

(c) Waste and losses to be eliminated.
(d) Proper designing of the product.

2. *Production planning and control* The area of production methods and organisation is important for the purpose of cost reduction. There are many vital activities relating to production and production planning where a cost reduction programme may be applied, for example, materials control, labour control, production layout, system analysis, time and motion study, work measurements, standardisation of methods, designing of tools, equipment and machinery, modernisation of plant and equipment, use of incentive schemes, etc.

3. *Marketing areas* In marketing, the following are the cost reduction areas: channels of distribution, sales promotion schemes, marketing research plan, territorial responsibilities, methods of remunerating salesmen, advertising methods, after-sales service costs, packaging methods, materials handling, transport arrangement, etc.

4. *Administrative areas* Administrative functions include personnel, purchase and general administration.

The goal of cost reduction requires efficiency administration, effective purchasing procedure and a fair personnel policy and schemes. Some of the important areas are investment planning, cash discount policy, mechanised system of accounting, labour relations, labour welfare measure, availability of servicing facilities.

5. *Factory organisation and methods* A considerable cost reduction can be effected by studying factory organisation and various methods being used in the factory.

(i) Factory management must ensure correct assignment of authority and responsibility.
(ii) There should be well defined channels of communication to avoid ambiguity, misunderstanding and differences of opinion.
(iii) Overlapping of responsibility should be clearly avoided.
(iv) Delegation of responsibility should be encouraged.
(v) Cooperation and close relationship between the various executives should be encouraged.

6. *Utility services* Utility services include power, water, steam, repair and maintenance, transport and clerical services, etc.

The following points should be considered:

(i) Supply of utilities at economic costs or scope for any further increase in utilisation.
(ii) Proper system for preventive and curative maintenance.
(iii) Wastage and other losses in distribution to be kept to minimum.
(iv) Use of up-to-date equipment and the mechanisation of the routine as far as possible.
(v) Due attention to work flow and loading factor.

7. *Finance* Following points are important in this connection:

(i) Methods of funding capital expenditure to be cost effective.
(ii) Procuring capital at economical cost.
(iii) Employing capital in a manner so as to give the maximum return.

Cost Management

Cost management is a wider term than cost control and cost reduction. It considers both cost control and cost reduction in its perspective. In cost management, the objective is to increase productivity of resources and factors of production and to relate them to enhance profitability. It continuously looks for and identifies opportunities to have higher return on investment by studying customer needs, bringing improvement in the existing products or services, smoothening process and layout of manufacturing goods or services with a view to supply them to the customers and to ensure customer satisfaction so as to maximise margins and earn

higher profits. In this way, cost management achieves its goals by creating and sustaining linkages among revenue, cost, products manufactured or services rendered and the use of resources and infrastructure of an organisation.

Cost management identifies, collects, measures, classifies and reports information that is useful to managers and other internal users in cost ascertainment, planning, controlling and decision making.

Horngreen, Datar and Foster[1] are of the opinion that the term cost management has no uniform definition. Therefore, these authors use cost management to describe the approaches and activities of managers in short-run and long-run planning and control decisions that increase value for customers and lower the costs of products and services. For example, managers make decisions regarding the amounts and kinds of materials being used, changes in plant processes and changes in product designs. Information from accounting systems helps managers to manage costs but the information and the accounting systems themselves are not cost management.

Developing information within cost management requires that one should be aware about the cost structure of a business enterprise. Managers should know how to ascertain costs of different activities, processes, customers, goods, services and any other costing objects. Financial accounting does not deal with these costs and these costs are not found on the financial statements. However, knowledge about these costs is essential to help managers in productivity enhancement, strategic planning and management, total quality management, management control. By nature cost management includes both management accounting information system as well as cost accounting.

Example 2.1

A company manufactures and retails clothing. You are required to group the costs which are listed below and numbered 1 to 20 into the following classification: (Each cost is intended to belong to only one classification).

(a) Direct Materials
(b) Direct Labour
(c) Direct Expenses
(d) Indirect Production Overhead
(e) Selling and Distribution Costs
(f) Research and Development Costs
(g) Finance Cost
(h) Administration Costs

1. Telephone rental plus metered calls
2. Wages of security guards for factory
3. Parcels sent to customers
4. Wages of operatives in cutting department
5. Developing a new product in the laboratory
6. Wage of fork lift truck drivers who handle raw materials
7. Wages of storekeepers in materials store
8. Chief accountant's salary
9. Cost of painting advertising slogans in delivery vans
10. Auditor's fee
11. Cost of advertising on television
12. Lubricants for sewing machines

[1]Charles T. Horngree, Srikant M. Datar and George Foster, Cost Accounting, A Managerial Emphasis, Pearson Education, 2008, p. 3.

13. Floppy disks for general office computer
14. Maintenance contract for office photo copying machine
15. Interest on bank overdraft
16. Market research undertaken prior to new product launch
17. Carriage on purchase of raw materials
18. Royalty paid on number of units of a particular product produced
19. Road licences for delivery vehicles
20. Amount payable to a company for broadcasting music throughout the factory *(ICWA Inter)*

Solution:

Cost element	*Numbers*
Direct materials	17
Direct labour	4
Direct expenses	18
Finance cost	15
Research and development expenses	5
Selling and distribution cost	3, 9, 11, 16, 19
Administration cost	1, 8, 10, 13, 14
Indirect production costs	2, 6, 7, 12, 20

COST STATEMENT OR COST SHEET

Cost Statement is a statement which is prepared usually to present the detailed costs of total production during the period in question. It provides information relating to cost per unit at different stages of the total cost of production or at different stages of completion of the product. Sometimes standard cost data are also provided to facilitate comparison with the actual cost incurred. The preparation of the cost sheet requires understanding of the treatment of the following items:

1. *Stock of raw materials* The cost statement requires the determination of the value of raw materials consumed for the output produced. If the opening stock of raw materials, purchase of raw materials during the period and closing stock of raw materials are given, then the value of raw materials consumed is computed as follows:

	Rs.
Opening stock of raw materials	—
Add: Purchase of raw materials	—
Total	—
Less: Closing stock of raw materials	—
Value of raw materials consumed	—

2. *Stock of work-in-progress* Work-in-progress represents the accumulated costs on goods that have not yet been completed. As such these goods are not yet available for sale. The degree of completion of work-in-progress is usually expressed as a fraction or as a percentage, such as 2/5 complete for materials or 50% complete for labour.

Work-in-progress is valued on a prime cost or factory cost basis. In case it is to be valued on a factory cost basis, the following procedure would be followed:

	Rs.
Prime Cost	—
Add: Factory overhead	—
Add: Work-in-progress (beginning)	—
Total	—
Less: Work-in-progress (closing)	—
Factory Cost	—

3. *Stock of finished goods* Finished goods inventory covers the products on which all factory work has been completed. It carries the cost of completed production. Nothing more is to be done to finished goods at the factory and no further costs are added to finished goods. If opening and closing stock of finished goods are given, then they would be adjusted as under:

	Rs.
Cost of production	—
Add: Finished goods (beginning)	—
Total	—
Less: Finished goods (closing)	—
Cost of goods sold	—

As stated earlier, cost sheet gives details about the cost of manufacturing a product or completing an activity. A cost sheet discloses:

(1) Prime Cost
(2) Factory Cost (also known as works cost)
(3) Cost of Production
(4) Total Cost (or cost of sales)

A cost sheet shows total cost and cost per unit. Cost per unit is obtained by dividing total cost by the number of units produced. A cost sheet will have separate columns for the total and the unit cost of each element of cost. Cost sheet can be prepared on weekly, monthly or other time period basis as desired by management. Specimen of a cost sheet is given below:

Specimen of Cost Sheet
Cost Sheet for the Period _____
Production _____ Units

	Total cost (Rs.)	*Cost per unit (Rs.)*
Direct Materials:		
Opening stock...		
Purchases...		
Carriage inwards...		
Less: Closing stock...		
Less: Scrap		
Direct materials consumed		
Direct wages		
Direct expenses		

(*Contd.*)

	Total cost (Rs.)	*Cost per unit (Rs.)*
I. *Prime Cost*		
Add: Factory Overheads:		
Indirect materials		
Loose tools		
Indirect wages		
Rent and rates (factory)		
Lighting and heating (factory)		
Power and fuel		
Repairs and maintenance		
Cleaning		
Drawing office expenses		
Cost of research and experiments		
Depreciation of factory plant		
Works stationery		
Welfare service expenses		
Insurance—Fixed assets etc.		
—Stock and finished goods		
Works manager's salaries		
II. *Factory or Works Cost*		
Add: Office and Administrative Overheads:		
Rent and rates (office)		
Salaries (office)		
Lighting and heating		
Insurance of office building and equipments etc.		
Telephone and postages		
Printing and stationery		
Depreciation of furniture and office equipments and buildings.		
Legal expenses		
Audit fees		
Bank charges		
III. *Cost of Production*		
Add: Selling and Distribution Overheads:		
Showroom rent and rates		
Lighting and heating		
Salesmen's salaries		
Commissions		
Travelling expenses of salesmen		
Sales printing and stationery		
Advertising		
Bad debts		
Postage		
Depreciation and expenses of delivery van		
Debt collection expenses		
Carriage freight outwards		
Samples and other free gifts		
IV. *Cost of Sales*		
Net profit (or loss)		
Sales		

Note: Items of expenses which are an appropriation of profit should not form a part of the costs of a product. Examples of such expenses are: (i) Income Tax; (ii) Dividends to shareholders; (iii) Commission (out of profit) to Managing Directors or Partners; (iv) Capital loss, that is, loss arising out of sale of assets; (v) Interest on loan; (vi) Donations; (vii) Capital expenditure; (viii) Discount on shares and debentures; (ix) Underwriting commission; (x) Writing off goodwill.

Example 2.2

Vijay Industries manufactures a product X. On 1st January 2007, there were 5000 units of finished product in stock. Other stocks on 1st January 2007 were as follows:

Works-in-progress	Rs. 57,400
Raw materials	Rs. 1,16,200

The information available from cost records for the year ended 31st December 2007 was as follows:

	Rs.
Direct materials	9,06,900
Direct labour	3,26,400
Freight on raw materials purchased	55,700
Indirect labour	1,21,600
Other factory overheads	3,17,300
Stock of raw materials on 31.12.2007	96,400
Work in progress on 31.12.2007	78,207
Sales (150000 units)	30,00,000
Indirect materials	2,13,900

There are 15000 units of finished stock in hand on 31st December 2007. You are required to prepare:

A statement of cost and profit assuming that opening stock of finished goods is to be valued at the same cost per unit as the finished stock at the end of the period.

Solution:

Statement of Cost and Profit of Product X

Particulars		*Amount (Rs.)*	*Amount (Rs.)*
Opening Stock of Raw Materials		1,16,200	
Add:	Direct materials	9,06,900	
Add:	Freight on raw materials purchased	55,700	
		10,78,800	
Less:	Closing stock of raw materials	96,400	
	Value of Raw Materials Consumed		9,82,400
Add:	Direct wages		3,26,400
	Prime Cost		13,08,800
Add:	Factory overheads:		
	Indirect materials	2,13,900	
	Indirect labour	1,21,600	
	Other factory overheads	3,17,300	
		6,52,800	
Add:	Opening work-in-progress	57,400	
		7,10,200	

(Contd.)

Contd.

Particulars	*Amount (Rs.)*	*Amount (Rs.)*
Less: Closing work-in-progress	78,200	6,32,000
Works Cost of Goods Manufactured		19,40,800
Add: Opening stock of finished goods 5000 units @ Rs 12.13		60,650
		20,01,450
Less: Closing stock of finished goods 15000 units @ Rs 12.13		1,81,950
Cost of Goods Sold		18,19,500
Profit		11,80,500
Sales		30,00,000

Working Notes:

Units produced during the year are not given and therefore have been computed as follows:

$$\text{Sales} = \text{Opening stock} + \text{Units produced} - \text{Closing stock}$$

$$150000 = 5000 + X - 15000$$

$$-X = 5000 - 15,000 - 1,50,000$$

Hence $X = 1,60,000$ units

$$\text{Value of closing stock} = \frac{\text{Total cost}}{\text{Units produced}} = \frac{\text{Rs. } 19,40,800}{1,60,000} = \text{Rs. } 12.13 \text{ per unit}$$

$$= 15000 \text{ units} \times \text{Rs. } 12.13 = \text{Rs. } 1,81,950$$

Value of opening stock of 5000 units × Rs. 12.13 = Rs. 60,650

Example 2.3

The following particulars relating to the year 2007 have been taken from the books of a chemical works manufacturing and selling a chemical mixture:

Stock on January 1, 2007	*kg*	*Rs.*
Raw materials	2000	2,000
Finished mixture	500	1,750
Factory stores		7,250
Purchases:		
Raw materials	1,60,000	1,80,000
Factory stores		24,250
Sales:		
Finished mixture	1,53,050	9,18,000
Factory scrap		8,170
Factory wages		1,78,650
Power		30,400
Depreciation of machinery		18,000

(Contd.)

Contd.

Stock on January 1, 2007	*kg*	*Rs.*
Salaries:		
Factory		72,220
Office		37,220
Selling		41,500
Expenses:		
Direct		18,500
Office		18,200
Selling		18,000
Stock on December 31, 2007		
Raw materials	1200	
Finished mixture	450	
Factory stores		5,550

The stock of finished mixture at the end of 2007 is to be valued at the factory cost of the mixture for that year. The purchase of raw materials remained unchanged throughout 2007.

Prepare a statement giving the maximum possible information about cost and its break-up for the year 2007.

Solution:

Statement of Cost for the Year 2007

		Quantity (kg)	*Amount (Rs.)*
Raw materials consumed:			
Opening stock		2,000	2,000
Add: Purchases		1,60,000	1,80,000
		1,62,000	1,82,000
Less: Closing stock of raw materials at current prices		1,200	1,350
Cost of raw materials consumed		1,60,800	1,80,650
Factory wages			1,78,650
Direct expenses			18,500
Prime Cost		1,60,800	3,77,800
Add: Factory overheads (Factory stores)			
Opening stock	7,250		
Add: Purchases	24,250		
	31,500		
Less: Closing stock	5,550		
Factory stores consumed	25,950		
Power	30,400		
Depreciation	18,000		
Salaries	72,220		1,46,570
			5,24,370

(Contd.)

Contd.

			Quantity (kg)	*Amount (Rs.)*
Less:	Sale of scrap		7,800	8,170
	Factory Cost		1,53,000	5,16,200
Add:	Opening stock of finished mixture		500	1,750
			1,53,500	5,17,950
Less:	Closing stock of finished mixute (valued at		450	1,518
	factory cost of current year production)		1,53,050	5,16,432
Add:	Office overheads:			
	Salaries	37,220		
	Expenses	18,200		55,420
Cost of production of finished mixture sold				5,71,852
Add:	Selling and distribution overhead:			
	Salaries	41,500		
	Expenses	18,000		59,500
Cost of goods sold or cost of sales:				6,31,352
	Profit			2,86,648
	Sales		1,53,050 kg	9,18,000

Working Notes:

1. Value of closing stock of raw materials $\left(\frac{\text{Rs. } 1,80,000}{\text{Rs. } 1,60,000} \times 1,200 \text{ kg}\right) = \text{Rs. } 1,350$

2. Value of factory scrap given in the question is Rs. 8,170. Hence quantity of factory scrap will be:

		(kg)
	Sales	1,53,050
Add:	Closing stock	450
		1,53,500
Less:	Opening stock	500
Produced during the year		1,53,000
Inputs introduced		1,60,800
	Scrap	7,800

Example 2.4

The following figures are extracted from the trial balance of Gogetter Co. on 30th September, 2007:

	Rs.	*Rs.*
Inventories:		
Finished Stock	80,000	
Raw Materials	1,40,000	
Work-in-Process	2,00,000	
Office appliances	17,400	
Plant and machinery	4,60,500	
Buildings	2,00,000	

(Contd.)

	Rs.	*Rs.*
Sales		7,68,000
Sales return and rebates	14,000	
Materials purchases	3,20,000	
Freight incurred on materials	16,000	
Purchases returns		4,800
Direct labour	1,60,000	
Indirect labour	18,000	
Factory supervision	10,000	
Repairs and upkeep factory	14,000	
Heat, light and power	65,000	
Rates and taxes	6,300	
Miscellaneous factory expenses	18,700	
Sales commission	33,600	
Sales travelling	11,000	
Sales promotion	22,500	
Distribution deptt. sales and expenses	18,000	
Office salaries and expenses	8,600	
Interest on borrowed funds	2,000	

Further details are abailable as follows:

(i) Closing Inventories:

Finished goods	1,15,000
Raw materials	1,80,000
Work-in-process	1,92,000

(ii) Accrued Expenses on:

Direct labour	8,000
Indirect labour	1,200
Interest on borrowed funds	2,000

(iii) Depreciation to be provided on:

Office appliance	5%
Plant and machinery	10%
Buildings	4%

(iv) Distribution of the Following Costs:

Heat, light and power to factory, office and selling in the ratio 8:1:1.

Rates and taxes two-thirds to factory and one-third to office. Depreciation on buildings to factory, office and selling in the ratio 8:1:1.

With the help of the above information, you are required to prepare a condensed profit and loss statement of Gogetter Co. for the year ended 30th September, 2007 along with supporting schedules:

(a) Cost of sales.
(b) Selling and distribution expenses.
(c) Administration expense.

Solution:

Gogetter Company Profit and Loss Statement
For the Year Ended 30th September, 2007

	Rs.	Rs.
Gross Sales	Rs. 7,68,000	
Less: Returns	14,000	7,54,000
Less: Cost of sales (Schedule 1)		7,14,020
Net Operating Profit		39,980
Less: Interest on borrowed funds		4,000
Net Profit		35,980

(i) Schedule 1: Cost of Sales

	Rs.	Rs.
Raw Material:		
Opening Balance		1,40,000
Add: Material purchased	3,20,000	
Add: Freight on material	16,000	
Less: Purchased returns	(4,800)	3,31,200
Cost of materials available		4,71,200
Less: Closing stock		1,80,000
Raw materials consumed		2,91,200
Direct labour		1,68,000
Prime Cost		4,59,200
Factory Overheads:		
Indirect labour	19,200	
Factory supervision	10,000	
Repairs and factory upkeep	14,000	
Heat, light and power	52,000	
Rates and taxes	4,200	
Miscellaneous factory expenses	18,700	
Depreciation of plant	46,050	
Depreciation of buildings	6,400	1,70,550
Gross Works Cost		6,29,750
Add: Opening work-in-process		2,00,000
		8,29,750
Less: Closing work-in-process		1,92,000
Works Cost		6,37,750
Add: Administration expenses (Schedule 3)		18,870
Cost of Production		6,56,620
Add: Opening stock of finished goods		80,000
		7,36,620
Less: Closing stock of finished goods		1,15,000
Cost of Production of Goods Sold		6,21,620
Add: Selling and distribution overheads (Schedule 2)		92,400
Cost of sales		7,14,020

(ii) Schedule 2: Selling and Distribution Overheads (Expenses)	
	Rs.
Sales commission	33,600
Sales travelling	11,000
Sales promotion	22,500
Distribution deptt: Salaries and expenses	18,000
Heat, light and power	6,500
Depreciation of buildings	800
	92,400

(iii) Schedule 3: Adiministrative Overheads (Expenses)	
Office salaries and expenses	8,600
Depreciation of office appliances	870
Depreciation of buildings	800
Heat, light and power	6,500
Rates and taxes	2,100
	18,870

Example 2.5

The following inventory data relates to XYZ Ltd:

	Inventories	
	Beginning	*Ending*
Finished goods	Rs. 1,10,000	95,000
Work-in-progress	Rs. 70,000	80,000
Raw materials	Rs. 90,000	95,000
Additional information:		
Cost of goods available for sale		Rs. 6,84,000
Total goods processed during the period		Rs. 6,54,000
Factory overheads		Rs. 1,67,000
Direct materials used		Rs. 1,93,000

Requirements:

(i) Determine raw materials purchases.
(ii) Determine the direct labour cost incurred.
(iii) Determine the cost of goods sold *(B. Com. (Hons.) Delhi 1999)*

Solution:

		Rs.
(i)	*Raw Materials purchases*	
	Direct Materials used	1,93,000
Add:	Closing Stock	95,000
		2,88,000
Less:	Opening Stock	90,000
		1,98,000
(ii)	*Direct Labour cost incurred*	
	Goods processed during the period	6,54,000
Add:	Closing Work-in-process	80,000
		7,34,000

(Contd.)

Contd.

		Rs.
Less:	Opening Work-in-process	70,000
	Cost of goods introduced during the period for processing	6,64,000
Less:	Factory overheads	1,67,000
	Prime Cost	4,97,000
Less:	Direct Materials used	1,93,000
	Direct Labour cost incurred	3,04,000
(iii)	*Cost of goods sold*	
	Cost of goods available for sale	6,84,000
Add:	Opening Stock of Finished Goods	1,10,000
		7,94,000
Less:	Closing Stock of Finished Goods	95,000
	Cost of goods sold	6,99,000

Example 2.6

X Ltd. manufactures four brands of toys —*A*, *B*, *C* and *D*. If the company limits the manufacture to just one brand, the monthly production will be:

A—50000 units
B—100000 units
C—150000 units
D—300000 units

You are given the following set of information from which you are requested to find out the profit or loss made on each brand showing clearly the following elements—

(a) Direct Cost
(b) Works Cost
(c) Total Cost

	A	*B*	*C*	*D*
Actual production (units)	6750	18000	40500	94500
Direct wages (Rs.)	15000	27500	37500	105000
Direct materials cost (Rs.)	50000	92500	127500	380000
Selling price per unit (Rs.)	20	15	10	8

Factory overhead expenditure for the month was Rs. 162000. Selling and distribution cost should be assumed @ 20% of works cost. Factory overhead expenses should be allocated to each brand on the basis of units which could have been produced in a month when single brand production was in operation.

(ICWA Inter.)

Solution:

The relative ratios of each brand of products are as follows:

1 Unit of $A = 2$ units of $B = 3$ units of $C = 6$ units of D. Therefore, the overhead ratio in the inverse order should be 1 : 2: 3: 6. In case of *D*, the overhead expense rate will be

$$\frac{\text{Rs. } 1,62,000}{6750 \times 6 + 18000 \times 3 + 40500 \times 2 + 94500}$$

$$= \text{Rs. } \frac{162000}{270000}$$

$$= \text{Re } 0.60$$

The overhead expense rate for the various brands are :

A — Rs. 6×0.60 = Rs. 3.60

B — Rs. 3×0.60 = Rs. 1.80

C — Rs. 2×0.60 = Rs. 1.20

D — Re. 1×0.60 = Re 0.60

This follows the logic that the rate should be highest in case of brand which will be produced in least number when single brand production is in operation.

Statement of Profitability Brands

	A Rs.	*B* Rs.	*C* Rs.	*D* Rs.	*Total* Rs.
Direct materials	50000	92500	127500	380000	650000
Direct wages	15000	27500	37500	105000	185000
Prime cost	65000	120000	165000	485000	835000
Factory overhead	24300	32400	48600	56700	162000
Works cost	89300	152400	213600	541700	997000
Selling and distribution cost (20% of works cost)	17860	30480	42720	108340	199400
Total Cost	107160	182880	256320	650040	1196400
Sales	135000	270000	405000	756000	1566000
Profit	27840	87120	148680	105960	369600

Example 2.7

On June 30, 2008, a flash flood damaged the warehouse and factory of ABC Corporation completely destroying the work-in-progress inventory. There was no damage to either the raw materials or finished goods inventories. A physical verification taken after the flood revealed the following valuations:

Raw Materials	Rs.	62,000
Work-in-progress		0
Finished Goods	Rs.	1,19,000
The inventory on Jan. 1, 2008, consisted of the following:		
Raw Materials	Rs.	30,000
Work-in-progress	Rs.	1,00,000
Finished Goods	Rs.	1,40,000
		2,70,000

A review of the books and records disclosed that the gross profit margin historically approximated 25% of sales. The sales for the first six months of 2008 were Rs. 3,40,000. Raw Material purchases were Rs. 1,15,000, Direct Labour costs for this period were Rs. 80,000 and manufacturing overhead has historically been 50% of direct labour. Compute the cost of work-in-progress inventory lost at June 30, 2008 by preparing a statement of cost and profit. *(B. Com. (Hons.) Delhi 1998 Adapted)*

Solution

Computation of Work-in-Progress Inventory Lost on June 30, 2008

	Rs.	Rs.
Sales		3,40,000
Less: Gross Profit @ 25%		85,000
Cost of Goods sold		2,55,000
Add: Closing Stock of Finished Goods		1,19,000
		3,74,000
Less: Opening Stock of Finished Goods		1,40.000
Cost of Finished Goods Produced (1)		2,34,000
Less: Raw Materials Consumed:		
Purchases	1,15,000	
Add: Opening Stock	30,000	
	1,45,000	
Less: Closing Stock	62,000	
	83,000	
Add: Wages	80,000	
Manufacturing Overhead	40,000	
Opening Stock of Work-in-progress	1,00,000	
		3,03,000
Closing stock of work-in-progress		69,000

This can be verified as follows:	Rs.
Raw Materials Consumed	83,000
Direct Wages	80,000
Manufacturing Overhead	40,000
Work-in-progress	1,00,000
	3,03,000
Less: Closing stock of work-in-progress	69,000
Work Costs	2,34,000
Add: Opening stock of Finished Goods	1,40,000
	3,74,000
Less: Closing Stock of Finished goods	1,19,000
Cost of Goods sold	2,55,000
Add: Gross profit @ 25%	85,000
Sales	3,40,000

Example 2.8

The Vardhman Ltd. manufactures one product. A summary of its activities for the year 2008 is given below:

	Units	Rs.
Sales	80,000	8,00,000
Material inventory 1-1-08		40,000
Material inventory 31-12-08		32,000
W.I.P. 1-1-08		55,000
W.I.P. 31-12-08		72,000
Finished goods 1-1-08	16,000	64,000
Finished goods 31-12-08	34,000	1,51,265
Material Purchases		1,52,000
Direct Labour		1,45,000
Manufacturing overhead		1,08,000
Selling expenses		50,000
General expenses		40,000

Prepare a cost sheet. *(B.Com(Hons), Delhi, 2003)*

Solution:

Cost Sheet for 2008

	Rs.	Rs.
Opening stock of raw material	40,000	
Add: Purchase of raw material	1,52,000	
	1,92,000	
Less: Closing stock of raw material	32,000	
Raw material consumed		1,60,000
Direct Labour		1,45,000
Prime Cost		3,05,000
Manufacturing overhead	1,08,000	
Add: W.I.P. (1-1-08)	55,000	
	1,63,000	
Less: W.I.P. (31-12-08)	72,000	91,000
Factory Cost		3,96,000
General Expenses		40,000
Cost of Production **(Units 98,000)**		4,36,000
Add: Opening stock of Finished Goods (Units 16,000)		64,000
		5,00,000
Less: Closing stock of Finished Goods (Units 34,000) (Rs. 4.489 per unit)		1,51,265
Cost of Good Sold		3,48,735
Add: Selling Expense		50,000
Cost of Sales		3,98,735
Profit (Rs. 5.0125 per unit)		4,01,265
Sales (80,000 Units)		8,00,000

Example 2.9

The particulars obtained from the records of M/s Jain Industries for the year 2007 are given below, from which you are required to prepare a cost sheet and a statement showing estimated cost of 1000 units in future:

	Rs.
Opening Stock:	
Raw materials	1,40,000
Finished products	20,000
Purchases	2,10,000
Factory wages	3,80,000
Factory overheads	70,000
Office overheads	40,000
Closing Stock:	
Raw materials	19,600
Finished goods	1,60,000
Sales	7,56,000

At the end of the year, the number of units produced including the closing stock and the number of units sold was 4,000.

On the basis of the above the industry wanted to supply 1000 units in future. It is estimated that the prices of raw materials and labour may rise by 15% and 10% respectively. Assume that the same percentage of profit on sales will be made. *(B.Com.(Hons), Delhi 2004)*

Solution: Cost sheet for the year 2007 Output: 4000 units

Particulars	*Rs.*	*Amount Total Rs.*	*Amount per unit Rs.*
Opening stock of Raw Materials	140000		
Purchase of Raw Materials	210000		
	350000		
Less: Closing stock or Raw Material	19600		
Cost of Materials consumed		330400	82.60
Factory wages		380000	95.00
	Prime cost	710400	177.60
Factory overhead		70000	17.50
	Work cost	780400	195.10
Office Overhead		40000	10.00
	Total cost of production	820400	205.10
Opening completed stock		20000	
Total cost of Production during the period		840400	
Less: Closing stock of completed goods		160000	
	Cost of sales	680400	
	Profit	75600	
	Sales	756000	

Estimated cost of 1000 units

Particulars	*Rs.*	*Amount Total Rs.*	*Amount per unit Rs.*
Material consumed (1000 × Rs. 82.60)	82600		
+ 15% increase	12,390	94990	94.99
Factory wages 1000 × Rs. 95 =	95000		
+ 10% increase	9500	104500	104.50
Prime cost		199490	199.49
Factory overhead Rs. 17.50 × 1000		17500	17.50
	Work cost	216990	216.99
Office overheads Rs. 10 × 1000 =		10000	10.00
	Total cost	226990	226.99
Profit 10% on selling price		25221	25.22
	Selling Price	252211	252.21

$$\% \text{ of Profit on sales} = \frac{75600}{756000} \times 100 = 10\%$$

Example 2.10

The cost structure of an article, the selling price of which is Rs. 45,000 is as follows:

Direct material	50%
Direct labour	20%
Overheads	30%

An increase of 15% in the cost of materials and 25% in the cost of labour is anticipated. These increased costs in relation to the present selling price would cause a 25% decrease in the amount of present profit per article. You are required:

(i) To prepare a statement of profit per article at present.
(ii) The revised selling price to produce the same percentage of profit to sales as before.

(B.Com. (Hons), Delhi, 2002, 2006)

Solution:

Let the total cost = x

Profit = y

When Total cost = x, Material cost 50% that is, $0.5x$, Labour cost 20% that is, $0.2x$, Overheads 30% = $0.3x$; So,

$$0.5x + 0.2x + 0.3x + y = 45{,}000$$

$$\boxed{x + y = 45{,}000} \quad (1)$$

When material cost increased by 15%, then raw material cost = $0.575x$

Labour cost increased by 25%, then new labour cost = $0.25x$

Profit will decrease by 25%, so new profit = $0.75y$

So new Equation

$$0.575x + 0.25x + 0.3x + 0.75y = 45{,}000$$

$$\boxed{1.125x + 0.75y = 45{,}000} \quad (2)$$

By comparing equations 1 and 2

$$x + y = 45{,}000 \quad (1)$$

$$1.125x + 0.75y = 45{,}000 \quad (2)$$

By solving the equation

$$x = 30{,}000$$

$$y = 15{,}000$$

(i) Statement of Profit per article

Material cost	= 15,000
Direct labour	= 6,000
Overhead	= 9,000
Cost	30,000
Profit	15,000
Sales	45,000

$$\text{Percentage of profit on cost} = \frac{15{,}000}{30{,}000} \times 100 = 50\%$$

(ii) After increase in Cost

	Rs.
New Material cost =	17,250
Direct Labour =	7,500
Overhead =	9,000
New cost	33,750
To maintain same rate of Profit	
Profit is 50% of cost	16,875
New Selling Price	50,625

Example 2.11

A company is considering a contract which requires among other things, 50 kg of material M. 80 kg of material M are in stock which were purchased for Rs. 2 per kg. The replacement price is Rs. 2.15 per kg. The material is in stock as a result of buying error and the company has no other use for it. If not used on this contract, it could be sold for Rs. 1.80 per kg. What is the relevant cost of the material to be used in this contract? *(B.Com; Delhi, 2004)*

Solution:

Relevant costs by nature are those costs which influence a particular decision. Relevant costs are always future costs and are only incremental (avoidable) costs. Avoidable costs are those costs which are not incurred from one alternative to another.

In this context, relevant cost of the material to be used is Rs. 1.80 per kg. The company has no other use for the material. If this material is not used in this contract, it could be sold for Rs. 1.80 per kg. If sold in the market, the company will get Rs. 1.80 per kg. If used on the contract, the company would be getting Rs. 1.80 per kg and thereby can earn some profit also on the contract. Therefore, relevant cost of the material is Rs. 1.80 per kg.

Example 2.12

From the understated particulars, you are required to prepare a monthly cost sheet of Soap Manufacturers Ltd. showing therein:

(i) Prime cost;
(ii) Works cost;
(iii) Cost of production;
(iv) Cost of sales; and
(v) Profit per unit.

Opening Inventory (1-1-2008):	Rs.
Raw materials	6,000
Work-in-progress	9,620
Finished goods (1,000 units)	13,680
Closing Inventory (31-1-2008):	
Raw materials	7,000
Work-in-progress	8,020
Finished goods	?
Donations to home for destitutes	2,100
Raw-materials purchased	72,000
Import duty on raw materials purchased	14,400
Productive wages	18,000
Machine hours worked	21,600 hours
Machine hour rate	Rs. 1.50
Chargeable expenses	Rs. 2,000
Office and Administration expenses	Re. 1 per unit
Selling expenses	Re. 0.90 per unit
Units sold	8,000 units
Units produced	8,200 units
Profit on sale	10%

(B. Com. Delhi, 2005)

Solution:

Cost Sheet

Particulars		*Total (Rs).*	*Per unit (Rs.)*
Material consumed–	Rs.		
Opening stock	6000		
Purchases	72000		
Import Duty	14400		
	92400		
Less: Closing stock of raw material	7000	85400	10.41
Productive wages		18000	2.20
Chargeable expenses		2000	0.24
(i) Prime Cost		105400	12.85

(Contd.)

Particulars		*Total (Rs).*	*Per unit (Rs.)*
Add: Factory overheads—			
21600 Machine hrs @ Rs. 1.50	32400		
+ opening W.I.P.	9620		
	42020		
– closing W.I.P.	8020	34000	4.15
(ii) Work Cost		139400	17.00
Office and Adm. Overheads @ Re. 1 per unit		8200	1.00
(iii) Cost of Production		147600	18.00
Add: Opening stock of finished goods (1000 units)		13680	
		161280	
Less: Closing stock of finished goods [1000 (opening units) + 8200 (produced) – 8000 (sold) = 1200 units] [1200 units × Rs. 18 (per unit)]		21600	
		139680	17.46
Add: Selling overheads @ Re. 0.90 per unit(8000 × 0.90)		7200	0.90
Cost of Sales		146880	18.36
Profit (1/9 × 146880) which is 10% of sales		16320	2.04
Sales (8000 units)		163200	20.40

Example 2.13

Popeye Company is a metal and wood cutting manufacture, selling products to the home construction market. Consider the following data for the month of October, 2004.

	Rs.
Sandpaper	5,000
Material-handling costs	1,75,000
Lubricants and Coolants	12,500
Miscellaneous indirect manufacturing labour	1,00,000
Direct manufacturing labour	7,50,000
Direct materials, October 1, 2004	1,00,000
Direct materials, October 31, 2004	1,25,000
Finished goods, October 1, 2004	2,50,000
Finished goods, October 31, 2004	3,75,000
Work-in-process, October 1, 2004	25,000
Work-in-process, October 31, 2004	35,000
Plant-leasing costs	1,35,000

	Rs.
Depreciation-plant equipment	90,000
Property taxes on plant equipment	10,000
Fire insurance on plant equipment	7,500
Direct materials purchased	11,50,000
Sales revenues	34,00,000
Marketing promotions	1,50,000
Marketing salaries	2,50,000
Distribution costs	1,75,000
Customer-service costs	2,50,000

Required

(i) Prepare an income statement with a separate supporting schedule of cost of goods manufactured.

(ii) For all manufacturing items, indicate by *V* or *F* whether each is basically a variable cost or a fixed cost (where the cost object is a product unit). *(CA, PE, Exam II, Group II, Nov. 2004)*

Solution:

Popeye Company 'Schedule for cost of goods manufactured' for the month ending Oct 2004

	Rs.	*Rs.*
Direct materials		
Beginning Inventory	1,00,000	
Purchase of Direct Materials	11,50,000	
Cost of direct materials available for use	12,50,000	
Ending inventory	1,25,000	
Direct materials used		11,25,000(V)
Direct manufacturing labour		7,50,000(V)
Indirect manufacturing costs		
Sand Paper	5,000(V)	
Material-handling cost	1,75,000(V)	
Lubricants and coolants	12,500(V)	
Misc. indirect manufacturing labour	1,00,000(V)	
Plant leasing cost	1,35,000(F)	
Depreciation-plant and equipment	90,000(F)	
Property tax-plant and equipment	10,000(F)	
Fire insurance-plant and equipment	7,500(F)	5,35,000
Manufacturing cost incurred during the month of October, 2004		24,10,000
Add: Op. work-in-progress		25,000
		24,35,000
Less: Cl. Work-in-progress		35,000
Cost of goods manufactured (to income statement)		24,00,000

Popeye Company: Income Statement for the month ending Oct 31, 2004

	Rs.	Rs.
Revenues		*34,00,000*
Cost of goods sold:		
Beginning finished goods	2,50,000	
Cost of goods manufactured	24,00,000	
Cost of goods available for sale	26,50,000	
Ending finished goods	3,75,000	22,75,000
Gross Margin		11,25,000
Marketing, Distribution and Customer Service Costs:		
Marketing promotions	1,50,000	
Marketing salaries	2,50,000	
Distribution costs	1,75,000	
Customer service cost	2,50,000	8,25,000
Operating Income		3,00,000

Example 2.14

A fire occurred in the factory premises on October 31, 2003. The accounting records have been destroyed. Certain accounting records were kept in another building. They reveal the following for the period September 1, 2003 to October 31, 2003.

(i)	Direct materials purchased	Rs. 2,50,000
(ii)	Work-in-process inventory, 1.9.2003	Rs. 40,000
(iii)	Direct materials inventory, 1.9.2003	Rs. 20,000
(iv)	Finished goods inventory, 1.9.2003	Rs. 37,750
(v)	Indirect manufacturing costs	40% of conversion cost
(vi)	Sales revenues	Rs. 7,50,000
(vii)	Direct manufacturing labour	Rs. 2,22,250
(viii)	Prime costs	Rs. 3,97,750
(ix)	Gross margin percentage based on revenues	30%
(x)	Cost of goods available for sale	Rs. 5,55,775

The loss is fully covered by insurance company. The insurance company wants to know the historical cost of the inventories as a basis for negotiating a settlement, although the settlement is actually to be based on replacement cost, not historical cost.

Required

(i) Finished goods inventory, 31.10.2003
(ii) Work-in-process inventory, 31.10.2003
(iii) Direct materials inventory, 31.10.2003

(CA, PE, Exam II, Group II, Nov. 2003)

Solution:

Working Notes

1. *Direct material inventory cost (used during the month):*
   = Prime cost – Direct manufacturing labour cost
   = Rs. 3,97,750 – Rs. 2,22,250 = Rs. 1,75,500
2. *Conversion and indirect manufacturing cost:*

Conversion cost = (Direct manufacturing cost + Indirect manufacturing cost)
But indirect manufacturing cost = 40% of conversion cost
or Conversion cost = Direct manufacturing cost + 40% of conversion cost
or 0.60 conversion cost = Direct manufacturing cost

$$\text{or Conversion cost} = \frac{\text{Direct manufacturing cost}}{0.60}$$

$$= \frac{\text{Rs. } 2,22,250}{0.60}$$

= Rs. 3,70,417
or Indirect manufacturing cost = 40% × Rs. 3,70,417
= Rs. 1,48,167

3. *Cost of goods manufactured*

	Rs.
Cost of goods available for sale	5,55,775
Less: Finished goods 1.9.2003	37,750
Cost of goods manufactured	5,18,025

(i) Finished goods inventory, 31.10.2003

	Rs.
Sales revenue	7,50,000
Less: Gross margin (30% of revenue)	2,25,000
Cost of goods sold: (a)	5,25,000
Cost of goods available for sale: (b)	5,55,775
Finished good inventory, 31.10.2003: {(b) – (a)}	30,775

(ii) Work-in-process inventory, 31.10.2003:

	Rs.
Prime cost	3,97,750
Add: Indirect manufacturing cost (*Refer to working note 2*)	1,48,167
Add: Opening work-in-process, 1.9.2003	40,000
Manufacturing cost to account for	5,85,917
Less: Cost of goods manufactured	5,18,025
Work-in-process inventory, 31.10.2003	67,892

(iii) Direct material inventory, 31.10.2003

	Rs.
Direct materials inventory, 1.9.2003	20,000
Add: Direct material purchased	2,50,000
	2,70,000
Less: Direct material inventory (used during the month)	1,75,500
(Refer to working note 1)	
Direct material inventory, 31.10.2003	94,500

Example 2.15

A company manufactures radios, which are sold at Rs. 1,600 per unit. The total cost is composed of 30% for direct materials, 40% for direct wages and 30% for overheads. An increase in material price by 30% and in wage rates by 10% is expected in the forthcoming year, as a result of which the profit at current selling price may decrease by 40% of the present profit per unit. You are required to prepare a statement showing current and future profits at present selling price.

How much selling price should be increased to maintain the present rate of profit?

(CA, PE, Exam II, Group II, May 2001)

Solution:

Let X be the cost, Y be the profit and Rs. 1,600 selling price per unit of radio manufactured by a company. Hence

$$X + Y = 1,600 \quad \text{(i)}$$

Statement of present and future costs of a radio

Particulars	*Present cost* Rs. *(a)*	*Increase in cost (Rs.) (b)*	*Anticipated future cost (Rs.) (c) = (a) + (b)*
Direct material	0.3 X	0.09 X	0.39 X
Direct labour	0.4 X	0.04 X	0.44 X
Overheads	0.3 X		0.30 X
Total	X	0.13 X	1.13 X

An increase in material price and wage rates resulted into a decrease in current profit by 40 percent at present selling price; therefore we have:

$$1.13\,X + 0.6\,Y = 1,600 \quad \text{(ii)}$$

On solving (i) and (ii) we get:

$$X = \text{Rs. } 1,207.55$$

$$Y = \text{Rs. } 392.45$$

Current profit Rs. 392.45 or 32.5% of cost
Future profit Rs. 235.47

Statement of revised selling price to maintain the present rate of profit

	Rs.
Direct material cost (*0.39 × Rs. 1,207.55*)	470.94
Direct labour cost (*0.44 × Rs. 1207.55*)	531.32
Overheads (*0.30 × Rs. 1,207.55*)	362.27
Total cost	1,364.53
Profit (*32.5% of total cost*)	443.47
Revised selling price	1,808.00

THEORY QUESTIONS

1. Define the term 'cost'. How is it different from expense?
2. What is meant by 'differential cost'?
3. What is the meaning of the term incremental cost? Does incremental cost mean the same thing as variable cost?
4. Explain the nature of product and period cost. How do they affect net income of a business enterprise? *(B. Com. (Hons), Delhi 1997, 2006)*
5. "Product cost is a general term that denotes different costs allocated to products for different purposes." Describe three purposes. Explain the composition of 'product cost' for the purpose of external financial reporting along with its rationale. *(B.Com.(Hons), Delhi 1998)*
6. Distinguish between
   (a) Expired cost and unexpired cost
   (b) Direct and indirect costs *(B.Com. (Hons), Delhi, 1998, 2000)*
7. (a) Distinguish between fixed cost and variable costs.
   (b) Explain the significance of 'dicision-making cost.'
   (c) Elucidate the meaning and formulation of 'Product cost' for the purpose of income measurement and determination of financial position. *(B.Com. (Hons) Delhi 1999, 2001)*
8. Distinguish between
   (a) Prime cost and conversion cost.
   (b) Controllable and uncontrollable cost. *(B. Com. (Hons) Delhi 1999)*
9. Bring out clearly the significance of the following costs for management:
   (a) Opportunity cost
   (b) Sunk cost
   (c) Imputed costs
   (d) Out-of-pocket costs
10. Discuss the various costs used in decision-making and explain their characteristics. *(B. Com. (Hons), Delhi)*
11. Distinguish between period costs and product costs. Why is this distinction considered important? *(B. Com. (Hons), Delhi)*

12. Distinguish between the following:
(i) Controllable cost and Non-controllable cost, and
(ii) Direct material and indirect material. *(B. Com. (Hons), Delhi)*

13. (a) Distinguish between out-of-pocket cost and opportunity cost.
(b) Explain and illustrate the distinction between 'direct cost' and 'indirect cost' specially from the point of view of decision making. *(B. Com. (Hons), Delhi, 1990)*

14. Explain whether you agree with each of the following statements:
(a) "All direct costs are variable."
(b) "Variable costs are controllable and fixed costs are not."
(c) "Sunk costs are irrelevant when providing decision-making information."

15. Lists two costs which are used in decision making but not entered in the accounting system under that designation.

16. Name a cost which is reflected in the accounting system but not used in decision making?

17. Explain briefly the following concepts:
(a) Sunk cost
(b) Differential cost
(c) Variance analysis
(d) Key factor
(e) Cost reduction *(B.Com. (Hons), Delhi, 2002)*

18. Enumerate the basic principles of cost control. *(B.Com. (Hons), Delhi, 2002)*

19. Explain the meaning of relevant costs in managerial decisions. Give examples.
(B.Com (Hons), Delhi, 2003, 2004)

20. What do you mean by cost reduction? How is it different from cost control?
(B.Com (Hons), Delhi, 2005, I.C.W.A. Inter, Stage 1, Dec. 2005)

21. "The term cost must be qualified according to its context". Comment.
(B.Com. (Hons), Delhi, 2002)

22. "Direct costs and variable costs are not necessarily the same". Comment.
(B.Com. (Hons), Delhi, 2006)

23. Explain the following with the suitable examples:
(a) Imputed cost
(b) Sunk cost *(B.Com. (Hons), Delhi, 2007)*

24. Distinguish between:
(a) Controllable cost and Non-controllable cost
(b) Variable cost and fixed cost
(c) Bin Card and Stores Ledger
(d) Costing and cost accounting
(e) Explicit and Implicit cost. *(B.Com. (Hons), Delhi, 2006)*

25. Explain the significance of cost reduction in the present global economy. Mention some important techniques used for cost reduction. Also, mention the important areas in a manufacturing company to be subjected to cost reduction drives.
(I.C.W.A. Inter, Stage 1, June 2004)

26. Answer the following
(i) Explicit and implicit costs
(ii) Period costs and discretionary costs
(CA, P.E., Exam II, Group II, May 2007)

27. Discuss cost classifications based on variability and controllability.
(CA, P.E., Exam II, Group II, Nov. 2004)

28. Distinguish between cost reduction and cost control.
(CA, PE, Exam II, Group II, Nov. 2002, May 2003, 2004, Nov. 2004, I.C.W.A., Inter, Stage I, Dec. 2006)

29. Explain the nature and scope of cost control and 'cost reduction'. Which of the two is superior?
(B.Com. (Hons), Delhi, 2007)

30. Explain 'cost management'. *(B.Com. (Hons), Delhi, 2007)*

31. Distinguish between

(i) Cost control and cost reduction
(ii) Cost allocation and cost absorption
(iii) Controllable cost and uncontrollable cost
(iv) Direct and indirect labour costs *(CA. Inter, Nov. 2001)*

SELF EVALUATION QUESTIONS

1. Match the items in Column 1 with the best choice in Column 2

Column 1	*Column 2*
1. Total fixed costs	A Costs incurred during a period
2. Incurred costs	B Total amount remains constant
3. Cost of goods manufactured	C Expired costs
4. Total manufacturing costs	D Direct materials and direct labour
5. Unit variable cost	E Costs of completed production after adjustment for work in progress inventory
6. Prime costs	F Direct labour and factory overhead
7. Expenses that are matched against revenue	G Added cost of a new product
8. Materials, labour and factory overhead	H Remains constant per unit
9. Conversion costs	I Direct materials, direct labour and factory overhead.
10. Cost of goods sold	J Cost of goods manufactured, adjusted for changes in finished goods stock

2. Classify each of the following costs using the following classifications:

(a) Direct materials
(b) Direct labour
(c) Manufacturing overhead
(d) Non-manufacturing expense

(i) Managing Director's salary
(ii) Oil for a milling machine
(iii) Salary of the milling machine operator
(iv) Salary of the supervisor of assembly department for products A, B and C
(v) Depreciation on the factory building
(vi) Income tax expense
(vii) Depreciation on direct materials warehouse
(viii) Depreciation on the administrative office building
(ix) Rent on the finished goods warehouse
(x) Rent on the sales office
(xi) Insurance on the truck used for delivery of finished goods sold
(vii) Gasoline for the truck used for transfer of work in process from one department to another
(xiii) Contribution to Earthquake Relief Fund paid
(xiv) Interest on borrowed money

3. Classify each of the following manufacturing costs using the following classifications:

   (a) Fixed
   (b) Variable
   (c) Mixed

   (i) Rent on the factory building
   (ii) Salary of the supervisor of the casting department
   (iii) Wages of machine operators
   (iv) Overtime premium for machine operators
   (v) Fire insurance on the factory equipment
   (vi) Cost of water used to cool production machinery
   (vii) Depreciation on production machinery
   (viii) Cost of paint used on products
   (ix) Cost of electricity used to operate production machinery
   (x) Lubricants used for production machinery.

4. Classify each of the following costs of a manufacturing company using the following classifications:

   A – Production overhead
   B – Selling and distribution overhead
   C – Administration overhead
   D – Research and development overhead

   (i) Depreciation of factory plant and equipment
   (ii) Trade discount given to customers
   (iii) Cost of oils used to lubricate production machinery
   (iv) Motor vehicles licenses for lorries
   (v) Cost of chemicals used in laboratory
   (vi) Commission paid to sales representative
   (vii) Salary of the secretary to the Finance Director
   (viii) Holiday pay of machine operators
   (ix) Salary of the security guard in raw materials warehouse
   (x) Fees to advertising agency
   (xi) Rent of finished goods warehouse
   (xii) Insurance of the company's premises
   (xiii) Salary of scientist in laboratory
   (xiv) Salary of supervisor working in the factory
   (xv) Cost of typewriter ribbons in the general office
   (xvi) Protective clothing for machine operatives.

5. Choose the correct answer for the following multiple-choice questions:

   (i) For a manufacturing company, which of the following is an example of a period rather than a product cost?

   (a) depreciation on factory equipment
   (b) wages of sales people
   (c) wages of machine operators
   (d) insurance on factory equipment

   (ii) Prime costs and conversion costs share which common element of total cost?

   (a) variable overhead
   (b) fixed overhead
   (c) direct materials
   (d) direct labour

(iii) Indirect materials are
- (a) a prime cost
- (b) a fixed cost
- (c) an irrelevant cost
- (d) a factory overhead cost

(iv) Factory overhead
- (a) is a prime cost
- (b) can be a variable cost or a fixed cost
- (c) can only be a fixed cost
- (d) includes all factory labour

(v) Fixed cost per unit increases when
- (a) Production increases
- (b) Production decreases
- (c) Variable cost per unit decreases
- (d) Prime cost per unit decreases

(vi) Factory supplies for a manufacturing plant are generally
- (a) Prime cost
- (b) Period costs
- (c) Variable costs
- (d) Excluded from product costs

(vii) Costs that increase as the volume of activity decreases within the relevant range are:
- (a) Average cost per unit
- (b) Average variable cost per unit
- (c) Total fixed costs
- (d) Total variable costs

PROBLEMS

1. The following data are related to the manufacture of a standard product during the month of December 2001.

	Rs.
Raw materials consumed	15,000
Direct wages	9,000
Machine hours worked	900
Machine hours rate	5
Administrative overheads	20% on works cost
Selling overheads	Re 0.50 per unit
Units produced	17,100
Units sold	16,000 (at Rs. 4 per unit)

You are required to prepare a cost sheet from the above showing:
(a) The cost per unit.
(b) The profit per unit sold and profit for the period.

(CA, Inter)

Ans: Cost per unit Rs. 2; Profit per unit sold Rs. 1.50; and Profit Rs. 24,000.

2. A factory produces a standard product. The following information is given to you from which you are required to prepare a cost sheet for January 2000.

	Rs
Raw materials consumed	91,000
Direct wages	29,000
Other direct expenses	11,000
Factory overheads 80% of direct wages	
Office overheads 10% of works cost	
Selling and distribution expenses Rs 2 per unit sold	
Units produced and sold during the month 10,000	

Also find the selling price per unit on the basis that profit mark up is uniformly made to yield a profit of 20% of the selling price. There was no stock or work-in-progress either at the beginning or at the end of the period.
Ans: Cost of sales Rs. 1,89,620; profit Rs. 47,405

3. From the following particulars of a manufacturing firm, prepare a statement showing:
   (a) Cost of materials consumed
   (b) Works cost
   (c) Cost of production
   (d) Percentage of works overhead to productive wages
   (e) Percentage of general overhead to works cost

	Rs.
Stock of materials on January 1, 2002	40,000
Purchase of raw materials in January 2002	11,00,000
Stock of finished goods on 1.1. 2002	50,000
Productive wages	5,00,000
Finished goods sold	24,00,000
Works overhead charges	1,50,000
Office and general expenses	1,00,000
Stock of materials on 31.1.2002	1,40,000
Stock of finished goods on 31.1.2002	60,000

Ans. (a) Rs 10,00,000;
(b) 16,50,000;
(c) Rs 17,50,000;
(d) 30%; and
(e) 6.6%.

4. The following data have been extracted from the books of M/s Moonshine Industries for the calendar year 2002.

	(Rs. '000)
Opening stock of raw materials	25,000
Purchase of raw materials	85,000
Closing stock of raw materials	40,000
Carriage inward	5,000
Wages—Direct	75,000
—Indirect	10,000
Other direct charges	15,000
Rent and rates—Factory	5,000
—Office	500
Indirect consumption material	500
Depreciation—Plant etc.	1,500
—Office furniture	100

	Rs. '000
Salary—Office	2,500
—Salesman	2,000
Other factory expenses	5,700
Other office expenses	900
Managing Director's remuneration	12,000
Other selling expenses	1,000
Travelling expenses of salesmen	1,100
Carriage and freight outward	1,000
Sales	2,50,000
Advance income tax paid	15,000
Advertisement	2,000

The Managing Director's remuneration is to be allocated as Rs. 40,00,000 to the factory, Rs. 20,00,000 to the office and Rs. 60,00,000 to the selling departments. From the above information prepare (a) Prime cost (b) Works cost (c) Cost of production (d) Cost of sales and (e) Net profit.

Ans: Prime cost Rs. 16,50,00,000, Factory cost Rs. 19,17,00,000, Cost of production Rs. 19,77,00,000, Cost of sales Rs. 21,08,00,000 Profit Rs. 3,92,00,000. Income tax is not included in costs.

5. From the following particulars, prepare a cost sheet for the year ended 31.12.2002

	Rs.
Stock of finished goods (1.1.2002)	6,000
Stock of raw materials (1.1.2002)	40,000
Work-in-progress (1.1.2002)	15,000
Purchase of raw materials	4,75,000
Carriage inwards	12,500
Factory rent, taxes	7,250
Other production expenses	43,000
Stock of goods (31.12.2002)	15,000
Wages	1,75,000
Work manager's salary	30,000
Factory employees salary	60,000
Power expenses	9,500
General expenses	32,500
Sales for the year	8,60,000
Stock of raw materials	50,000
Work-in-progress (31.12.2002)	10,000

Ans: Prime cost Rs. 6,52,500; Factory cost Rs. 8,07,250;
Total cost Rs. 8,39,750,
Profit Rs. 29,250, Total sales Rs. 8,60,000.

6. A manufacturing company has shown Rs. 32,380 as "Establishment Expenses" which include the following expenses:

	('000) Rs.
1. Warehouse wages	3600
2. Office salaries	2260
3. Office lighting	140
4. Directors remuneration	2800
5. Rent, rates and insurance of warehouses	620
6. Warehouse lighting	540
7. Trade magazine	140

	Rs.
8. Bank charges	200
9. Bad debts	340
10. Agents commission	11500
11. Warehouse repair	1020
12. Travelling expenses	1520
13. Rent, rates and insurance of office	460
14. Printing and stationery	3000
15. Donation	300
16. Discount allowed	3940

From the above information, find out the total of (i) selling expenses (ii) distribution expenses (iii) administration expenses and (iv) expenses which will not be considered in determining total costs. *(CA inter)*

Ans: (i) Selling expenses Rs. 13,360 (ii) Distribution expenses Rs. 5780 (iii) Administrative expenses Rs. 9,000 (iv) Expenses not to be considered Rs. 4,240.

7. The books of Adarsh Manufacturing Company present the following data for the month of April 2007:

Direct labour cost Rs. 17,500 being 175% of works overheads
Cost of goods sold excluding administrative expenses Rs. 56,000.
Inventory accounts showed the following opening and closing balances:

	April 1	*April 30*
Raw materials	Rs. 8,000	Rs. 10,600
Work-in-progress	10,500	14,500
Finished goods	17,600	19,000

Other data are:

Selling expenses	Rs. 3,500
General and administrative expenses	2,500
Sales for the month	75,000

You are required to:
(i) Compute the value of materials purchased
(ii) Prepare a cost statement showing the various elements of cost and also the profit earned.

(CA)

Ans. (i) Value of materials purchased Rs. 36,500
(ii) Cost of production of goods sold Rs. 56,000, Cost of sales Rs. 62,000.
Profit Rs. 13,000.

8. The following particulars relate to a company for a period of three months:

Raw materials 1.1. 2007	55,000
Raw materials 31.3.2007	35,000
Factory wages	80,000
Materials purchased	60,000
Sales	1,54,000
Indirect expenses	10,000
Stock of finished goods (1.1.2007)	Nil
Stock of finished goods (31.3.2007)	30,000
No. of units produced during the period was	2,000

Prepare a statement of cost for the period and compute the price to be quoted for 500 units in order to realise the same % of profit as for the period under review, assuming no alteration in wages and cost of materials.
Ans. Price to be quoted Rs. 46,750

PART

ELEMENTS OF COST

Cost ascertainment is basic prerequisite for cost analysis, cost control and cost management by the management of an organisation. Therefore, knowledge of different elements of costs constituting a product or job is necessary to understand their significance, nature and behaviour in relation to change in output or activity. The different chapters in Part 2 discuss material costs, labour costs, factory overhead, administrative and selling and distribution overheads and issues relating to these costs for proper attention by the managers and accountants. Activity-based costing and some emerging concepts in cost accounting have also been explained in Part 2.

3. MATERIALS CONTROL
4. MATERIALS COSTING
5. LABOUR COSTS : ACCOUNTING AND CONTROL
6. FACTORY OVERHEADS : DISTRIBUTION
7. ADMINISTRATIVE AND SELLING AND DISTRIBUTION OVERHEADS
8. ACTIVITY-BASED COSTING

MATERIALS CONTROL

Learning Objectives

After reading this chapter, you should be able to:

1. explain what material is and the concept and objectives of material control;
2. discuss purchasing and receiving procedure;
3. discuss significant issues in materials procurement;
4. explain stores organisation, storage layout, issue of materials returned to storeroom and supplier;
5. discuss inventory system, its methods, nature of inventory, concept and different techniques of inventory control and
6. identify different material losses and their accounting treatment.

MATERIALS

The term "materials", generally used in manufacturing concerns, refers to raw materials used for production, sub-assemblies and fabricated parts. The terms "materials" and "stores" are sometimes used interchangeably. However, both the terms differ. "Stores" is wider in meaning and comprises many other items besides raw materials, such as tools, equipments, maintenance and repair items, factory supplies, components, jigs, fixtures. Sometimes, finished goods and partly finished goods are also included within the scope of this term.

CONCEPT AND OBJECTIVES OF MATERIALS CONTROL

Materials cost constitutes a prime part of the total cost of production of manufacturing firms. Proper accounting, therefore, for and control over materials purchase, consumptions, and inventories are important for effective management of a business firm. Materials control basically aims at efficient purchasing of materials, their efficient storing and efficient use or consumption.

Materials control consists of controls at two levels: (i) quantity controls, and (ii) financial controls. For instance, the production department in a manufacturing company aims at quantity controls, i.e., lesser and lesser units should be used in the production department. Although lesser units would result in lower investments on purchase of materials, yet the user (production) department normally does not think in terms of expenditure. In contrast, the finance manager is interested in keeping the investments on materials at the

lowest point. In materials control, balance has to be maintained between two opposing needs, that is, (i) maintenance of sufficient inventory for efficient production and (ii) maintenance of investment in inventory at the lowest level. In detail, the following are the objectives in a good system of materials control:

1. Materials of the desired quality will be available when needed for efficient and uninterrupted production.
2. Material will be purchased only when need exists and in economic quantities.
3. The investment in materials will be maintained at the lowest level consistent with operating requirements.
4. Purchase of materials will be made at the most favourable prices under the best possible terms.
5. Materials are protected against loss by fire, theft, handling with the help of proper physical controls.
6. Materials should be stored in such a way that they can provide minimum of handling time and cost.
7. Vouchers will be approved for payment only if the material has been received and is available for issue.
8. Issues of material are properly authorised and properly accounted for.
9. Materials are, at all times, charged as the responsibility of some individual.

PURCHASING AND RECEIVING PROCEDURE

Purchasing procedures vary with different business firms, but all of them follow a general pattern in the purchases and receipt of materials and payment of obligations. The important steps may be listed as follows:

1. Purchase requisition A form known as a purchase requisition is commonly used as a formal request to the purchasing department to order goods or services. The purchase requisition serves three general purposes:

(i) It automatically starts the purchasing process and informs the purchasing department of the need for the purchase of materials.
(ii) It fixes the responsibility of the department/personnel making the purchase requisition.
(iii) It can be used for future reference.

Usually, purchase requisitions are prepared by the storekeepers for regular store items which are below or approaching the minimum level of stock or to replace stock of materials and parts in stores. The production control department can also give requisitions for the purchase of specialised materials. A typical purchase requisition contains details, such as number, date, department, quantity, description, specification, signature of the person initiating the requisition, and signature of one or more officers approving the purchase (see Fig. 3.1). Copies of the purchase requisition are sent to the purchasing department and accounting department.

2. Purchase order After the requisition is received duly approved, the purchasing department places an order with a supplier, offering to buy certain materials at stated prices and terms. The purchase order is a formal contract for the supply of materials. The order should clearly state the materials required and the price; and provide information, such as delivery period and the department for whom the materials are purchased (Fig. 3.2). Copies of the purchase order are sent to the department concerned, the sender of the purchase requisition, and the stores department advising them to expect the materials as specified and where to send them upon receipt. Copies of the purchase requisition and the purchase order are sent to accounting department, to be used in checking the supplier's invoice when a voucher is being prepared for payment.

3. Receiving materials The receiving department performs the function of unloading and unpacking materials which are received by an organisation. This will need an inspection report which is sometimes incorporated in the receiving report, indicating the items accepted and rejected, with reason.

ABC Company Limited
Purchase Requisition

Purchase Requisition No. _____
Purchase Order No. _____
Date _____

Department _____
Delivery Required _____

Item No.	*Quantity*	*Particulars of articles*	*Grade or quality*	*Remarks*

Requested by _____ Checked by _____ Approved by

Fig. 3.1 Purchase Requisition

ABC Company Limited Purchase Order

Date _____
Supplier _____
_____
_____

Purchase Order No. _____
Requisition No. _____
Department No. _____
Date Required _____

Please supply the following items on the terms and conditions mentioned herewith:

Item No.	*Quantity*	*Particulars about items*	*Rate per unit*	*Total cost*	*Remarks*

Purchase Manager

Terms and Conditions:

_____
_____
_____
_____
_____

Fig. 3.2 Purchase Order

Several copies of the receiving report or goods received note (Fig. 3.3) are prepared, one going to each department interested in the arrival of materials, including stores, buying and accounts departments.

ABC Company Limited
Materials Receiving Report

Purchase Order No. _____
Date _____

Received from _____
(Vendor's Name and Address)

_____
_____
_____
_____

Items No.	*Quantity received*	*Particulars*	*Weight, if any*	*Remarks*

Counted by _____ Approved by _____

Inspected by _____

Fig. 3.3 Materials Receiving Report

4. Approval of invoices Invoice approval indicates that goods according to the purchase order have been received and payment can now be made. However, if the goods or equipment received are not of the type ordered, or are not in accordance with specifications, or are damaged, the purchasing department issues a return order indicating that the goods are to be returned to the supplier.

5. Marking payment After the purchase invoice total is approved, the process of making payment begins. Payment depends on the terms agreed upon on any particular order, and any terms which differ from normal practice should be considered individually. When it is found that items written on the invoice qualify for payment, a remittance advice is prepared after providing for deduction on discounts, if any.

Creating a Purchase Department

It is useful to set up a separate purchase department to perform purchasing activities relating to purchase of materials and other stores. The organisation of the purchase department depends on the size of the organisation and the quantum of purchases it is likely to make. A purchase department generally performs the following functions:

(i) Purchasing materials and stores after receiving requisitions from the stores department for regular or routine items or from the departmental head, works manager or planning department for the purchase of special items, if any.
(ii) Purchasing materials of right quality.
(iii) Determining the quantity, quality, items, price, time to buy and the supplier from whom purchases are to be made.

(iv) Possessing knowledge about possible sources of supply, prices of materials and supplies prevailing in the market, terms and conditions relating to purchases, market trends, usual lead time taken by the suppliers.
(v) Having expertise in drafting of purchase agreements and contracts.
(vi) Avoiding the purchase of obsolete, deteriorated and surplus materials.
(vii) Purchasing at the most favourable terms and conditions, at the lowest rates and from the best market and the most reliable suppliers.
(viii) Ensuring timely delivery of purchased items.
(ix) Comparing the invoice received from the suppliers with the purchase order to ensure that materials received are of right quality, in right quantity and at right prices.
(x) Knowing the defaulters suppliers.
(xi) Having information about consumption and usage pattern of materials of production and other departments and stock levels maintained by them and the stores department.
(xii) Preparing a latest list of approved suppliers along with brief particulars about their dealing terms.
(xiii) Possessing details about materials and stores received, on order, and outstanding.

Qualities of Purchase Manager

A purchase manager or a purchaser should possess the following qualities:

(i) Having information and knowledge about all aspects of materials to be purchased such as quantity, specifications, quality, price, purchasing procedures, etc.
(ii) Having knowledge about the sources of supply, market conditions, terms of delivery, qualities and dealings of different suppliers.
(iii) Knowing the policy of management, funds position, requirements of manufacturing units and stores departments.
(iv) Having good information base such as price lists, business journals and periodicals, catalogues, industrial directories to enable him to find the best market for the purchase of materials.
(v) Having knowledge about government policies, taxes on purchase of such materials, import and export restrictions thereon.
(vi) Having fair knowledge about the legal provisions and rules relating to making of agreement and contract.
(vii) Having expertise and skill to organise and manage his department efficiently and in coordination and cooperation with other departments of the organisation.

SOME ISSUES IN MATERIALS PROCUREMENT

It is generally accepted that quantities be bought in economic size so that there may not be over-stocking. If a company purchases in large quantities, the cost of carrying the inventory would be high because of the high investment involved. Working capital which could have been used for other productive purposes has to be diverted. Over-stocking requires more storage space which, in turn, means increase in insurance expenses, storage costs and deterioration in quality and depreciation in quantity. In contrast, if purchases are made in small quantities (under-stocking), frequent orders would have to be placed for the purchase of materials. There will be danger of "stock outs" also. Because of under-stocking, production is likely to suffer; materials have to be purchased immediately at high prices; low output would increase cost and decrease profit; the other department's work may be adversely affected.

Economic Order Quantity (*EOQ*) (Reorder Quantity)

The *EOQ* is the optimum or the most favourable quantity which should be purchased each time the purchases are to be made. The *EOQ* is one where the costs of carrying inventory is equal or almost equal to the cost of not carrying inventory (cost of placing orders). Also at *EOQ* level, the total of these two costs is minimum.

The cost of carrying the inventory is the real out-of-pocket cost associated with having inventory on hand, such as warehouse charges, insurance, heat, light, and losses due to spoilage, breakage, pilferage. Another opportunity cost, which is not the out-of-pocket cost, is important and should be considered, that is, cost incurred (capital used) in purchasing the inventory. If funds have been borrowed to finance the inventory purchase, interest payments on borrowed funds will be the direct cost. Carrying or holding costs of inventory are explicit as well as implicit. That is, some costs are readily ascertained from accounting records while others require extensive study to estimate them because they are not expressly stated. Insurance on inventory is an explicit cost while the cost of funds invested in inventory are implicit costs. Generally, inventory carrying costs are considered to be proportional to the value of inventory carried.

The costs of not carrying adequate inventory arise because of frequent placing of order at short intervals. This includes costs, such as extra purchasing, handling and transportation costs, higher price due to small order quantities, frequent stock-outs resulting in disruption of production schedules, overtime and extra set up time, loss of sales and customer goodwill, etc.

The costs of carrying the inventory, and ordering costs change in the reverse order. The costs of placing the order decrease as the size of the order increase since with a bigger size of order, the number of the order will be lower. However, simultaneously the costs of carrying the inventory will go up because purchases have been made in large quantities. It may be possible to have a point which provides the lowest total cost and this point (ideal size) is known as the *EOQ*. This equilibrium can be determined mathematically as follows:

$$EOQ = \sqrt{\frac{2 \times U \times O}{IC}}$$

where U = Annual usage in units
O = Cost of placing an order
I = Per cent cost of carrying inventory
C = Cost per unit of material

Assume

Annual usage units	= 6,000
Cost of placing an order	= Rs. 30
Carrying cost as a per cent of inventory	= 20%
Cost per unit of material	= Rs. 5

Then,

$$EOQ = \sqrt{\frac{2 \times 6{,}000 \times 30}{5 \times 20\%}}$$

$$= \sqrt{3{,}60{,}000}$$

$$= 600 \text{ units}$$

In the above example, the *EOQ* is 600 units. That is, ten orders per year are needed. At the level of 600 units, the ordering costs and the carrying costs are equal and also the total cost is at minimum as it is clear from Table 3.1.

Table 3.1 TABLE SHOWING ECONOMIC ORDER QUANTITY

Annual usage	Orders per year	Units per order	Average inventory (units)	Value per order (Rs.)	Average inventory amount (Rs.)	Order cost (Rs.)	Carrying cost (20%)	Total cost (Rs.)
6,000	1	6,000	3,000	30,000	15,000	30	3,000	3030
units	2	3,000	1,500	15,000	7,500	60	1,500	1560
	3	2,000	1,000	10,000	5,000	90	1,000	1090
	4	1,500	750	7,500	3,750	120	750	870
	5	1,200	600	6,000	3,000	150	600	750
	6	1,000	500	5,000	2,500	180	500	680
	7	857	429	4,285	2,142	210	428	638
	8	750	375	3,750	1,875	240	376	616
	9	667	334	3,335	1,668	270	334	604
	10	600	300	3,000	1,500	300	300	600
	11	545	273	2,725	1,363	330	272	602
	12	500	250	2,500	1,250	360	250	610

Table 3.1 shows that quantities of other orders resulting in more or less than ten orders per year are not so economical as they involve higher total costs.

The *EOQ* formula is sometimes expressed in the following manner which is not in any way different from the formula explained earlier.

$$EOQ = \sqrt{\frac{2U \times P}{S}}$$

where U = Annual demand or consumption or purchased quantity (in units)

P = Cost of placing an order

S = Annual cost of carrying inventory per unit (Storage and interest)

Similarly, *EOQ* formula may be expressed in any other manner with the same answer of economic order quantity.

The ordering costs, holding costs, total costs and *EOQ* can be shown graphically also as displayed in Fig. 3.4.

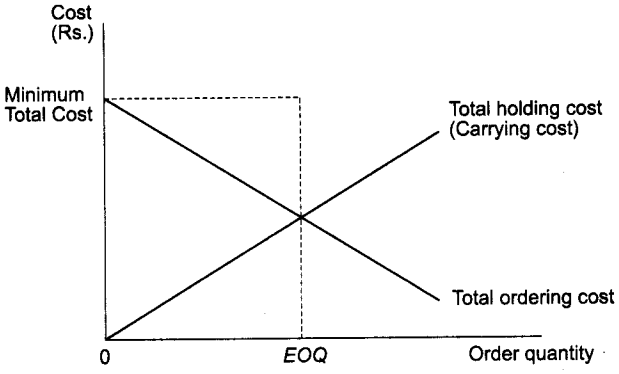

Fig. 3.4 Behaviour of Carrying Costs, Ordering Costs, Minimum Total Costs and Economic Order Quantity

When to Order (Reorder Level)

The *EOQ* determines how much to buy at a particular time. But the question "when to buy" is equally important for business firms. This question is easy to answer only if we know the lead time—the time interval between placing an order and receiving delivery—and know the *EOQ*, and are certain of the consumption pattern during lead time. The order point or re-order level is a point or quantity level at which if materials in stores reach, the order for supply of materials must be placed. This point automatically initiates a new order. The order point is calculated from three factors:

1. The expected usage.
2. The time interval between initiating an order and its receipt, referred to as the lead time.
3. The minimum inventory, or safety stock.

Some business firms fix re-order level taking into account maximum usage and maximum lead time so that the stock will not reach the zero level.

The formula for computing re-order level is:

(1) Re-order level = Safety stock + (Average usage × Average re-order period or lead time)

In terms of maximum usage and maximum lead time, the formula for re-order level is as follows:

(2) Re-order level = Maximum re-order period × Maximum usage

It is advisable to use the first formula given above to calculate re-order level. However, when adequate information is not given about the factors of this formula, the second formula can be used if information is available about the factors of this formula.

For example, if daily usage is 400 units of material which have a lead time of 20 days and the safety (minimum) stock is 500 units, the order point will be calculated as follows:

Daily consumption × lead time = 400 × 20	=	8,000 units
Add safety stock	=	500 units
Order point units		8,500 units

The order point is determined after considering the worst possible expected conditions. This only ensures that the minimum stock will always remain in the inventory and will not be used atleast in the short run. However, situations may arise where there will be stock-out and thus, the order point may not be an absolutely accurate forecasting.

Determination of Safety or Minimum Stock Level

It is advisable to carry a reserve or safety stock to prevent stock-out. The safety stock should be used only in abnormal circumstances, and the working stock in ideal or normal conditions. Therefore, for normal working conditions, the stock should not be allowed to fall below the safety limit, kept only for emergencies. If the usage pattern is known with certainty, and the lead time is also known accurately, then no safety stock would be needed. However, if either usage or lead time is subject to variation then it is necessary for a business firm to maintain safety stock levels equal to the difference between the expected usage over lead time and the maximum usage over lead time that the firm feels is necessary for cost minimisation. The safety stock level can be computed by using the following formula:

Safety or minimum stock level = Ordering level – (Average rate of consumption × Re-order period)

Maximum Stock Level

The maximum level ensures that the stocks will not exceed this limit although there may be low demand for materials or quick delivery from the suppliers. Maximum stock level can be computed as follows:

Maximum stock level = Re-order level + *EOQ* – (Minimum consumption × Minimum re-order period)

Some factors to be considered in deciding the maximum stock level are as follows:

(i) Holding or carrying cost of inventory
(ii) Availability of storage facility
(iii) Seasonal nature of some products such as agricultural products
(iv) Availability of funds
(v) Future price trends of raw materials or components
(vi) Government policies or restrictions
(vii) Properties of some raw materials such as explosive, chemical, inflammable
(viii) Availability of raw materials in the international market.

Danger level

Generally the danger level of stock is indicated below the safety or minimum stock level. Sometimes, depending on the practices of the firm and circumstances prevailing, the danger level is determined between reorder level and minimum level. In the second case (danger level being between reorder level and minimum level), the firm can only take steps to ensure that materials ordered will arrive in time.

Average stock level

Average stock level is computed in the following manner:

$$= \frac{\text{Minimum} + \text{Maximum stock}}{2}$$

or

$$= \frac{\text{Minimum level} + \text{Re-order quantity}}{2}$$

The following example further illustrates the different stock levels.

Maximum usage (units)	650 per day
Minimum usage (units)	300 per day
Normal usage (units)	500 per day
Economic order quantity (units)	75000
Re-order period—lead time	25 to 30 days
Minimum level (units) (10 days at normal usage)	5000

The different stock levels will be as follows:

Re-order level = Normal usage × Normal lead time + Minimum level
= (500 × 30) + 5000
= 20000 units

Maximum level = Re-order level + EOQ – Minimum quantity used in re-order period
= 20,000 + 75000 – (300 × 25)
= 87500 units

$$\text{Average level} = \frac{\text{Maximum} + \text{Minimum}}{2}$$

$$= \frac{87500 + 5000}{2}$$

= 46250 units

After placing an order, if usage goes above average or if the lead time is longer than expected, then the stock will fall below minimum. However, stock will not be exhausted, so long as the maximum usage and maximum re-order periods are not exceeded. In the above example, maximum usage during the lead time would cause an extra 4500 units (30 days × 150 units) to be consumed. Therefore, in this situation, the purchasing officer should try to chase supplies to ensure that delivery promises are kept.

The different stock levels, as found in the above example, are displayed in Fig. 3.5.

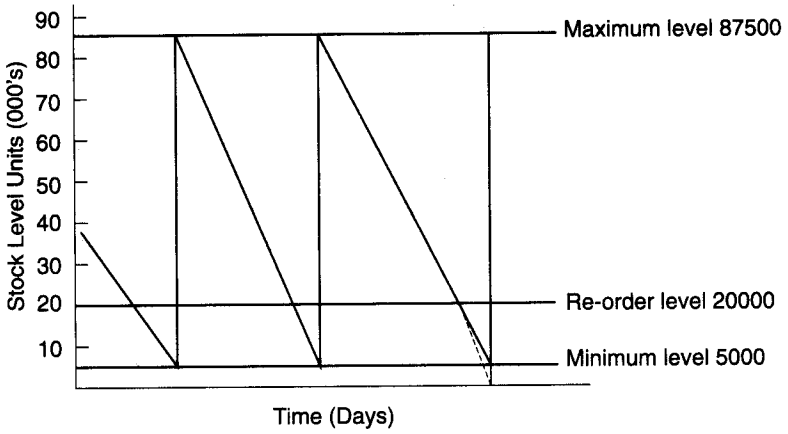

Fig. 3.5 Stock Levels

Example 3.1

Compute the economic batch quantity for a company using batch costing with the following information:

Annual demand for the component	400 units
Setting up and order processing cost	Rs. 50
Cost of manufacturing one unit	Rs. 100
Rate of interest p.a.	10%

(B.Com, Delhi, 2004)

Solution:

$$\text{Economic order quantity or } (EOQ) = \sqrt{\frac{2 \times U \times O}{IC}}$$

where, U = Annual usage (or consumption in units)
O = ordering cost per order
I = Per cent cost of carrying inventory
C = Annual storage cost per unit.

In the given question

U = 400 units
O = Rs. 50
IC = 100 × 10% = Rs. 10

Hence

$$EOQ = \sqrt{\frac{2 \times 400 \times 50}{10}} = \sqrt{4000} = 63.25 \text{ units (app.)}$$

Example 3.2

P. Ltd., is engaged in the manufacture of industrial pumps of a standard description. The company uses about 75,000 valves per year for its production and the usage is fairly constant at 6,250 valves per month. The valves cost Rs. 1.50 per unit when brought in quantities and the carrying cost is estimated to be 20% of average inventory investment on the annual basis. The cost to place an order and process the delivery is Rs. 18. It takes 45 days to receive delivery from the date of an order and a safety stock of 3,200 valves is desired.

You are required to determine:

(i) the most economical order quantity; and
(ii) the reorder point.

(B.Com.(Hons), Delhi, 2002)

Solution:

$$EOQ = \sqrt{\frac{2CO}{1}}$$

EOQ = Economic Order Quantity

C = Annual requirement that is, 75,000 valves

O = Cost of placing an order that is, Rs. 18

I = Annual carrying cost of one unit that is, = Rs. $1.50 \times \frac{20}{100} = 0.30$

$$EOQ = \sqrt{\frac{2 \times 75{,}000 \times 18}{.30}}$$

$$= \sqrt{\frac{2 \times 75{,}000 \times 18 \times 100}{.30}} = \sqrt{90,00,000}$$

= 3,000 units.

Reorder point = Safety stock + Lead time consumption

$$= 3{,}200 + \frac{6{,}250 \times 45}{30 \text{ days}}$$

= 3,200 + 9,375 = 12,575 Units.

Example 3.3

A company manufactures a product having a monthly demand of 2000 units. For one unit of finished product 2 kg of a particular raw material item is needed. The purchase price of the materials is Rs. 20 per kg. The ordering cost is Rs. 120 per order and the holding cost is 10% per annum. Calculate:

(i) Economic order quantity, and
(ii) Annual cost of purchasing and storage of the raw material at that quantity.

(B.Com.(Hons), Delhi, 2004)

Solution:

Monthly demand = 2000 units
Annual demand = 2000 × 12 = 24,000 units
Raw material required for one unit = 2 kg
Annual Requirement of material in units = 24,000 × 2 = 48,000 kg
Purchase price of material = Rs. 20 per kg
Annual requirement of material in Rs: 48,000 × 20 = Rs. 9,60,000
Ordering cost Rs. 120 per order
Holding/carrying cost is 10% per annum.

Formula $EOQ = \sqrt{\frac{2CO}{I}}$

where C = Annual requirement of material in units = 48,000 kg
O = Cost of placing an order that is Rs. 120
I = Holding/Carrying cost = 10%.
(10% of Material Price that is Rs. 20)

$$EOQ \text{ (in kg)} = \sqrt{\frac{2 \times 48,000 \times 120}{20 \times 10\%}}$$

$$= \sqrt{\frac{2 \times 48,000 \times 120}{2}}$$

$$= \sqrt{57,60,000} = 2400 \text{ kg}$$

or

$$EOQ \text{ (in Rs.)} = \sqrt{\frac{2 \times 960,000 \times 120}{\frac{10}{100}}}$$

$$= \sqrt{\frac{2 \times 960,000 \times 120 \times 100}{10}}$$

$$= \sqrt{2,30,40,00,000}$$

= Rs. 48,000

Calculation of Annual Cost of Purchasing and Storage

	Rs.
Purchase price of 48,000 kg @ Rs. Rs. 20 per kg	9,60,000
Add: Carrying cost: 24,00 kg. × Rs. 20 × 10%	4,800
Add: Order cost of 20 order @ Rs. 120 per order	

	Rs.
No. of order $\frac{48,000 \text{ kg}}{2400 \text{ kg}} = 20$	2,400
	9,67,200

Note: Lead time is not given in the question. Hence it is ignored.

Example 3.4

A producer has estimated annual purchase requirement of 30,000 units of a material. Unit price of material is Rs. 50. Annual cost of carrying inventory is 20%. Ordering cost for an order is Rs. 60. Find out Economic Order Quantity (*EOQ*). *(B.Com. (Hons), Delhi, 2004)*

Solution:

Formula for the calculation of economic ordering quantity is;

$$EOQ = \sqrt{\frac{2CO}{I}}$$

where C = Annual usage of material that is 30,000 units.

O = Cost of placing one order that is, Rs. 60

I = Annual carrying cost of one units, that is, Rs. $\frac{50 \times 20}{100}$ = Rs. 10

$$EOQ = \sqrt{\frac{2 \times 30,000 \times 60}{10}}$$

$\sqrt{3,60,000} = 600$ units.

Example 3.5

Annual requirement of a particular item of inventory is 10,000 units. Inventory carrying cost per unit per year is 20% and ordering cost is Rs. 40 per order. The price quoted by the supplier is Rs. 4/unit. However, the supplier is ready to give a discount of 5% for orders of 1,500 units or more. Is it worthwhile to avail of the discount offer? *(B.Com. (Hons), Delhi 2006)*

Solution:

$$EOQ = \sqrt{\frac{2 \times U \times P}{S}}$$

where EOQ = Economic Order Quantity

U = Annual requirement, 10,000 units

P = Cost of placing an order, Rs. 40 per order

S = Annual carrying cost per unit, 20% of Rs. 4 = Re. 0.80

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 40}{0.8}} = \sqrt{10,00,000} = 1000 \text{ units}$$

Discount offer: When order size is 1500 units, the No. of order = 6. If a discount of 5% on the price of the component is available when order size is 1500 units or more, total cost shall be:

		Rs.
Ordering cost 6×40		240
Add: Storage cost $\left(\frac{1500}{2} \times 0.76\right)$		570
	Total cost	810
Saving on account of discount $\left(10,000 \times 4 \times \frac{5}{100}\right)$		2000
	Net saving	1,190

Since the net saving is Rs. 1,190 so this offer should be accepted for making an order of 1500 units and availing a discount of 5%.

Note: Annual carrying cost per unit after 5% discount will be Re. 0.80 – 5% of Re. 0.80 ie Re. 0.76.

Example 3.6

Calculate the maximum stock level from the following:

EOQ—300 units
Usage rate—25 to 75 units per week
Reorder period—4 to 6 weeks.

(B.Com. Delhi, 2002)

Solution:

Maximum Stock Level = Re-order Level + Re-order Quantity (EOQ) –(Minimum Rate of Consumption × Minimum Re-order period)
= 450 units* + 300 units – (25 units × 4 weeks) = **650 units**
* Re-order Level = Maximum usages per period × Maximum Re-order period = 75 units × 6 weeks = 450 units.

Note: The other formula of re-order level that is, Re-order level = Safety stock + (Average usage × Average re-order period) cannot be used in this question as information is not given about factors of the formula.

Example 3.7

From the following information relation to a type of raw material, calculate EOQ:

Monthly demand	200 units
Unit price	Rs. 5
Order cost per order	Rs. 12
Storage cost	2% p.a.
Interest rate	10% p.a.

(B.Com. Delhi, 2007)

Solution:

$$EOQ = \sqrt{\frac{2 \times U \times P}{S}}$$

U = Annual Usage = 200 × 12 = 2400
P = Cost of Placing an order = Rs. 12
S = Cost of storing one unit for a year
= (10% + 2%) of Rs. 5
= 12% of Rs. 5 = 0.60

$$= \sqrt{\frac{2 \times 2400 \times 12}{0.60}}$$

$$= \sqrt{96,000} = 309.83 \text{ or } 310 \text{ unit (approx.)}$$

Example 3.8

If the minimum stock level and average stock level of raw-material *A* are 4,000 and 9,000 units respectively, find out its 'Re-order quantity'. *(CA Inter, May 1997)*

Solution:

Minimum Stock Level of Material *A*	= 4,000 units
Average Stock Level of Material *A*	= 9,000 units
Average Stock Level	= Minimum Stock Level + 1/2 Re-order Quantity
or 1/2 Reorder Quantity	= 9,000 units – 4,000 units
	= 5,000 units
or Re-order quantity	= 10,000 units.

Example 3.9

From the details given below, calculate:

(i) Re-ordering Level
(ii) Maximum Level
(iii) Minimum Level
(iv) Danger Level

Cost of placing a purchase order is Rs. 20
Number of units to be purchased during the year is 5,000.
Purchase price per unit inclusive of transportation cost is Rs. 50.
Annual cost of storage per unit is Rs. 5

Details of lead time:	Average 10 days, Maximum 15 days, Minimum 6 days. For emergency purchases 4 days.
Rate of Consumption	Average : 15 units per day, Maximum : 20 units *(CA Inter, May 1996)*

Solution:

(i) Re-ordering Level (*ROL*)	= Maximum Usage per day × Maximum Re-order period
	= 20 units per day × 15 days
	= 300 units
(ii) Maximum Level (*WN* 1 and 2)	= *ROL* + *ROQ* – (Min. Rate of Consumption × Min. Re-order Period)
	= 300 units + 200 units – (10 units per day × 6 days)
	= 440 units.

(iii) Minimum Level = *ROL* – (Average rate of consumption × Average reorder period)
= 300 units – (15 units per day × 10 days)
= 150 units.

(iv) Danger Level = Average consumption × Lead time for emergency purchases
= 15 units per day × 4 days
= 60 units.

Working Notes:

1. $$ROQ = \sqrt{\frac{2U \times P}{S}} = \sqrt{\frac{2 \times 5000 \text{ units} \times \text{Rs. } 20}{\text{Rs. } 5}}$$

= 200 units

where *ROQ* = Reorder Quantity
U = Annual Consumption
P = Cost per order
S = Storage Cost per unit

2. Average Rate of Consumption

$$= \frac{\text{Minimum Rate of Consumption } (x) + \text{Maximum Rate of Consumption}}{2}$$

$$15 \text{ units per day} = \frac{x + 20 \text{ units per day}}{2}$$

or x = 10 units per day.

Example 3.10

G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component *X* which is purchased at Rs. 20. For every finished product, one unit of component is required. The ordering cost is Rs. 120 per order and the holding cost is 10% p.a.
You are required to calculate:

(i) Economic order quantity.
(ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?
(iii) What is the minimum carrying cost, the company has to incur? *(CA Inter, May 1999)*

Solution:

(i) *Computation of Economic Ordering Quantity*

$$EOQ = \sqrt{\frac{2U \times P}{S}}$$

where *U* = Annual Consumption
P = Cost of Placing an Order
S = Storage Cost per unit per annum

$$= \sqrt{\frac{2 \times 48,000 \text{ units} \times \text{Rs. } 120}{10\% \times \text{Rs. } 20}} = \sqrt{5,76,000}$$

= 24,00 units.

(ii) *Extra cost incurred by the company*

Total cost when order size is 4000 units

= Total Ordering Cost + Total Carrying Cost

= 12 orders × 120 + 4,000 × 1/2 × 20 × 10/100

= Rs. 1,440 + Rs. 4,000 = Rs. 5,440

Total cost when order size is 2400 units

Total Cost = 20 orders × Rs. 120 + 2,400 × 1/2 × 20 × 10/100

= Rs. 2,400 + Rs. 2,400 = Rs. 4,800

Extra Cost incurred by the company = Rs. 5,440 – Rs. 4,800 = Rs. 640

(iii) *Minimum Carrying Cost*

The carrying or storage cost depends upon the size of the order. It will be minimum when the order size is least.

In the question the two order sizes are 2,400 units and 4,000 units. Hence, 2,400 units is the least of the two order sizes. At this order size carrying cost will be minimum.

The minimum carrying cost in this case will be as under:

Minimum Carrying Cost = 1/2 × 2,400 units × 10/100 × Rs. 20 = Rs. 2,400

Example 3.11

M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during 2007:

Average monthly market demand	2,000 tubes
Ordering cost	Rs. 100 per order
Inventory carrying cost	20% per annum
Cost of tubes	Rs. 500 per tube
Normal usage	100 tubes per week
Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	6–8 weeks

Compute from the above:

1. Economic Order Quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting?
2. Maximum level of stock.
3. Minimum level of stock.
4. Reorder level.

(CA Inter, May 1998, May 2000)

Solution:

1. $$EOQ = \sqrt{\frac{2UP}{S}}$$

where U = Annual usage of tubes

= Normal usage per week × 52 weeks

= 100 tubes × 52 weeks = 5,200 tubes

P = Ordering cost per order = Rs. 100 per order

S = Inventory carrying cost per unit per annum

= 20% × Rs. 500 = Rs. 100 per unit per annum

$$EOQ = \sqrt{\frac{2 \times 5{,}200 \text{ units} \times \text{Rs.}100}{\text{Rs.}100}} = 102 \text{ tubes (approx.)}$$

Evaluation of offer. If the supplier is willing to supply 1,500 units at a discount of 5%:

(i) Total Cost (when order size is 1500 units):

= Cost of 5,200 Units + Ordering Cost + Carrying Cost

$$= 5{,}200 \text{ units} \times \text{Rs. } 475 + \frac{5{,}200 \text{ units}}{1{,}500 \text{ units}} \times \text{Rs. } 100 + \frac{1}{2} \times 1{,}500 \text{ units} \times 20\% \times \text{Rs. } 475$$

= Rs. 24,70,000 + Rs. 346.67 + Rs. 71,250

= Rs. 25,41,596.67

(ii) Total Cost (when order size is 102 units):

$$= 5{,}200 \text{ units} \times \text{Rs. } 500 + \frac{5{,}200 \text{ units}}{102 \text{ units}} \times \text{Rs. } 100 + \frac{1}{2} \times 102 \text{ units} \times 20\% \times \text{Rs. } 500$$

= Rs. 26,00,000 + Rs. 5,098.03 + Rs. 5,100

= Rs. 26,10,198.03

The above calculation shows the total cost under quarterly supply of 1,500 units with 5% discount is lower than that when order size is 102 units. Therefore, the offer should be accepted. However, while accepting this offer consideration of capital blocked on order size of 1,500 units per quarter has been ignored.

2. *Maximum Level of Stock*

= Re-order level + Re-order quantity – (Min. usage × Min. Re-order period)

= 1,600 units + 102 units – 50 units × 6 weeks

= 1,402 units.

3. *Minimum Level of Stock*

= Re-order level – (Normal usage × Average Re-order period)

= 1,600 units – 100 units × 7 weeks = 900 units.

4. *Reorder Level*

= Maximum Consumption × Maximum Re-order Period

= 200 units × 8 weeks

= 1,600 units.

Example 3.12

Shagoon India Ltd. provides the following information in respect of material X

Supply period	: 5 to 15 days
Rate of Consumption	:
Average	: 15 units per day
Maximum	: 20 units per day
Yearly	: 5,000 units

Ordering costs are Rs. 20 per order.
Purchase price per unit is Rs. 50.
Storage costs are 10% of unit value.

Compute:

(i) Reorder Level
(ii) Minimum Level
(iii) Maximum Level

(B. Com. (Hons), Delhi 1998)

Solution:

(i) Re-ordering Level = Maximum Usage per period × Maximum Re-order per period
= 20 units per day × 15 days
= 300 units

(ii) Maximum Level = *ROL* + *ROQ* – (Min. Rate of Consumption × Min. Re-order Period)
= 300 units + 200 units – (10 units per day × 5 days)
= 450 units

(iii) Minimum Level = *ROL* – (Average Rate of Consumption × Average Re-order Period)
= 300 units – (15 units per day × 10 days)
= 150 units

Working Notes:

1. $$ROQ = \sqrt{\frac{2U \times P}{S}} = \sqrt{\frac{2 \times 5000 \text{ units} \times \text{Rs. } 20}{\text{Rs. } 5}} = 200 \text{ units}$$

where ROQ = Reorder Quantity
U = Annual Consumption
P = Cost per order
S = Storage cost per unit

2. Average Rate of Consumption

$$= \frac{\text{Minimum Rate of Consumption } (x) + \text{Maximum Rate of Consumption}}{2}$$

$$15 \text{ units per day} = \frac{x + 20 \text{ units per day}}{2}$$

or x = 10 units per day.

Example 3.13

From the following data, calculate the economic order quantity and the re-order point for Part *Z*:

Working days in a year	200
Safety stock	400 units
Lead time	10 days
Order costs	Rs. 300 per order
Holding cost	15% of cost
Annual consumption	10,000 units
Cost per unit	Rs. 10

Solution:

$$EOQ = \sqrt{\frac{2U \times P}{S}}$$

$$\sqrt{\frac{2 \times 10,000 \times \text{Rs } 300}{15\% \times 10}} = \sqrt{\frac{6,000,000}{1.5}} = \sqrt{4000000} = 2000 \text{ units}$$

Trial and error calculation to arrive at the above answer:

Times ordered	4	5	6
Order size (units)	2,500	2,000	1,666
Average stock (units)	1,250	1,000	833
Holding costs (Rs.)	1,875	1,500	1,250
Order costs (Rs.)	1,200	1,500	1,800
Holding cost has been calculated as follows:	Rs. 3,075	Rs. 3,000	Rs. 3050

Average stock units × Cost per unit × 15%
Economic order quantity : 2,000 units, order 5 times per annum.
Re-order point:

Daily consumption × lead time (10,000 ÷ 200) × 10 =	500
Add safety stock	400
Re-order point	900 units

Holding cost has been calculated as follows :
Average stock units × cost per unit × 15%

Example 3.14

Eats Ltd. supplies a number of products to bakers and confectioners. One of their products consists of packets of cake decorations. The cake decorations are sold in packets of twelve decorations for Rs. 20 per packet. The demand for the cake decorations is very constant and has over a long period of time been at the rate of 2,000 packets per month. The packets cost Eats Ltd. Rs. 10 each from the manufacturer and a lead time of four days is required from date of order to date of delivery. Ordering costs are Rs. 1.20 per order and the holding or carrying cost is 10 per cent per annum.

(a) Calculate the following:
  (i) the economic order quantity:
  (ii) the number of orders to be placed per annum:
  (iii) the total cost of buying and carrying cake decorations per annum.

(b) Assume that the present stock level is 200 packets and that no buffer stocks are kept. When must the next order be given to the supplier? (For purposes of your calculation one year consists of 360 days).

(c) There are certain major difficulties often experienced by firms in seeking to use the *EOQ* Formula. List them briefly.

Solution:

(a) (i) $EOQ = \sqrt{\frac{2U \times P}{S}}$

$$\sqrt{\frac{2 \times 24,000 \times 1.20}{0.10 \times 10}} = \sqrt{\frac{57,600}{1}} = 240 \text{ units}$$

(ii) Number of orders to be placed per annum

$$\frac{\text{Annual usage}}{EOQ} = \frac{24,000}{240} = 100 \text{ orders}$$

(iii) Cost of buying 100 orders × Rs. 1.20	Rs. 120
Cost of holding = average stock × holding cost per unit = 120 units × Re. 1	Rs. 120
Total cost of buying and holding cake decorations per annum	Rs. 240

(b) $\frac{200}{2,000} = \frac{1}{10}$ th of a month or 3 days supply.

With a lead time of four days the order must be placed tomorrow without fail.

(c) Difficulties often experienced by firms in seeking to use the *EOQ* formula are difficulty of estimating, with accuracy, such items as the annual demand for stock items, the cost of ordering and the cost of carrying. Also the *EOQ* formula makes the assumption that stock is used at a constant rate throughout the year. This may not be so.

Example 3.15

The Purchase Department of your organisation has received an offer of quantity discounts on its orders of materials as under:

Price per tonne Rs.	*Tonnes*
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tonnes. The ordering cost per order is Rs. 1,200 and the carrying cost is estimated at 20% per annum.

You are required to compute the most economic order quantity presenting the information in a tabular form. *(B. Com. (Hons), Delhi 2001)*

Solution:

Ordering quantity (Tonnes) *EOQ*	*Price per tonne (Rs.)*	*Purchasing cost of 5,000 tonnes (Rs.)* *5,000 × Per order delivery cost*	*Ordering cost (Rs.)* $\frac{5,000 \times 1,200}{\text{Ordering quantity}}$	*Inventory carrying (Rs.)* $\frac{EOQ}{2} \times$ *price per tonne* × 20%	*Total cost (Rs.)*
400	1,200	60,00,000	15,000	48,000	60,63,000
500	1,180	59,00,000	12,000	59,000	59,71,000
1,000	1,160	58,00,000	6,000	1,16,000	59,22,000
2,000	1,140	57,00,000	3,000	2,28,000	59,31,000
3,000	1,120	56,00,000	2,000	3,36,000	59,38,000

The table shows that most economical purchase level is at a level where the ordering quantity is 1,000 tonnes, since at this level the total cost (that is inventory carrying cost and ordering cost) is the minimum.

Example 3.16

Shriram Enterprises manufactures a special product *ZED*. The following particulars were collected for the year 2002:

(a) Monthly demand of *ZED* 1,000 units.
(b) Cost of placing an order Rs. 100.
(c) Annual carrying cost per unit Rs. 15.
(d) Normal usage 50 units per week.
(e) Minimum usage 25 units per week.
(f) Maximum usage 75 units per week.
(g) Re-order period 4 to 6 weeks.

Compute from the above

1. Re-order quantity
2. Re-order level
3. Minimum level
4. Maximum level
5. Average stock level

Solution:

1. Re-order quantity (of units used)

$$= \sqrt{\frac{2U \times P}{S}}$$

where U = Annual demand of input units
P = Cost of placing an order
S = Annual carrying cost per unit

$$= \sqrt{\frac{2 \times 2,600 \times \text{Rs. } 100}{\text{Rs. } 15}} = \sqrt{34667}$$

= 186 units (approx.)

2. Re-order level = Maximum re-order period × Maximum usage
= 6 weeks × 75 units
= 450

3. Minimum level = Re-order level – (Normal usage × Average re-order period)
= 450 units – (50 units × 5 weeks)
= 450 units – 250 units = 200 units

4. Maximum level = Re-order level + Re-order quantity – (Minimum usage × Minimum order period)
= 450 units + 186 units – (25 units × 4 weeks)
= 536 units.

5. Average stock level = 1/2 (Minimum stock level + Maximum stock level)
= 1/2 (200 units + 536 units)
= 368 units