**UNIT I**

**MICRO AND MACRO ECONOMICS AND ITS APPLICATIONS**

* 1. **NATURE AND SCOPE OF ECONOMICS**

## Economics

Economics is the science that deals with the production and consumption of goods and services and the distribution and rendering of these for human welfare.

The following are the economic goals.

* A high level of employment
* Price stability
* Efficiency
* An equitable distribution of income
* Growth

### Definition and Scope of Engineering Economics

**Definition**

Engineering economics deals with the methods that enable one to take economic decisions towards minimizing costs and/or maximizing benefits to business organizations.

**Scope**

The issues that are covered in this book are elementary economic analysis, interest formulae, bases for comparing alternatives, present worth method, future worth method, annual equivalent method, rate of return method, replacement analysis, depreciation, evaluation of public alternatives, inflation adjusted investment decisions, make or buy decisions, inventory control, project management, value engineering, and linear programming.

* 1. **MICRO ECONOMICS**

Microeconomics is that branch of economics which is concerned with the decision-making of a single unit of an economic system. How does an individual (or a family) decide on how much of various commodities and services to consume? How does a business firm decide how much of its product (or products) to produce? These are the typical questions discussed in microeconomics. Determination of income, employment, etc. in the economic system as a whole is not the concern of microeconomics. Thus, microeconomics can be defined as the study of economic decision-making by micro-units.

**Usefulness of Microeconomics**

* **Determination of demand pattern:** The study of microeconomics has several uses.It determines the pattern of demand in the economy, i.e., the amounts of the demand for the different goods and services in the economy, because the total demand for a good or service is the sum total of the demands of all the individuals. Thus, by determining the demand patterns of every individual or family, microeconomics determines the demand pattern in the country as a whole.
* **Determination of the pattern of supply:** In a similar way, the pattern of supply inthe country as a whole can be obtained from the amounts of goods and services produced by the firms in the economy. Microeconomics, therefore, determines the pattern of supply as well.
* **Pricing:** Probably the most important economic question is the one of price determination. The prices of the various goods and services determine the pattern of resource allocation in the economy. The prices, in turn, are determined by the interaction of the forces of demand and supply of the goods and services. By determining demand and supply, microeconomics helps us in understanding the process of price determination and, hence, the process of determination of resource allocation in a society.
* **Policies for improvement of resource allocation:** As is well-known, economic development stresses the need for improving the pattern of resource allocation in the country. Development polices, therefore, can be formulated only if we understand how the pattern of resource allocation is determined. For instance, if we want to analyse how a tax or a subsidy will affect the use of the scarce resources in the economy, we have to know how these will affect their prices. By explaining prices and, hence, the pattern of resource allocation, microeconomics helps us to formulate appropriate development policies for an underdeveloped economy.
* **Solution to the problems of micro-units:** Finally, it goes without saying that, since the study of microeconomics starts with the individual consumers and producers, policies for the correction of any wrong decisions at the micro-level are also facilitated by microeconomics. For example, if a firm has to know exactly what it should do in order to run efficiently, it has to know the optimal quantities of outputs produced and of inputs purchased. Only then can any deviation from these optimal levels be corrected. In this sense, microeconomics helps the formulation of policies at the micro-level.

In every society, the economic problems faced by different economic agents (such as individual consumers, producers, etc.) can be analysed with the help of microeconomic theories. This shows that **economics is a social science** which aims at analysing the economic behaviour of individuals in a social environment.

* + 1. **Limitations of Microeconomics**

However, microeconomics has its limitations as well:

* **Monetary and fiscal policies:** Although total demand and total supply in theeconomy is the sum of individual demands and individual supplies respectively, the total economic picture of the country cannot always be understood in this simplistic way. There are many factors affecting the total economic system, which are outside the scope of microeconomics. For example, the role of monetary and fiscal policies in the determination of the economic variables cannot be analysed completely without going beyond microeconomics.
* **Income determination:** Microeconomics also does not tell us anything about howthe income of a country (i.e., national income) is determined.
* **Business cycles:** A related point is that, it does not analyse the causes of fluctuationsin national income. The ups-and-downs of national income over time are known as businesscycles. Microeconomics does not help us in understanding as to why these cycles occur andwhat the remedies are.
* **Unemployment:** One of the main economic problems faced by an economy likeIndia is the problem of unemployment. This, again, is one of the areas on which microeconomics does not shed much light. Because, if we are to find a solution to the unemployment problem, we must first understand the causes of this problem. For that, in turn, we must understand how the total employment level in the economy is determined. This is difficult to understand from within the confines of microeconomics.

**1.3 MACROECONOMICS**

Macroeconomics is that branch of economics which is concerned with the economic magnitudes relating to the economic system as a whole, rather than to the microeconomic units like individuals or firms. It has, therefore, been called ‘aggregative economics’. In the picturesque language of Kenneth Boulding, “Macroeconomics deals ... not with individual income but with national income, not with individual prices but with the price level, not with individual outputs but with national output”.

**Importance of Macroeconomics**

Why is the study of macroeconomics important? To put it briefly, macroeconomics deals with some of the questions untouched by microeconomics. The study of economics is, therefore, left incomplete, if we do not study macroeconomics. Some of the important issues analysed in macroeconomics are the following:

* **Income and employment determination:** The determination of national income and of total employment in the country is vital concerns of macroeconomics. Since the volume of unemployment is simply population minus the number of people employed, unemployment is determined as soon as the employment level is known.
* **Price level:** The determination of the general price level is discussed in macroeconomic theories. Upward movement of the general price level is known as inflation. Thus, if we want to understand the process of inflation and find ways of controlling it, we must resort to the study of macroeconomics.
* **Business cycles:** The economic booms and depressions in the levels of income and employment follow one another in a cyclical fashion. While income rises and employment expands during boom periods, they shrink during depressions. Since depressions bring business failures and unemployment in their wake, economists have sought remedies to depressions. Discussion of business cycles in general and anti-depression policies in particular, falls within the scope of macroeconomics.
* **Balance of payments:** The balance of payments theory is also a part of macroeconomics. The difference between the total inflow and the total outflow of foreign exchange is known as the balance of payments of a country. When this balance is negative (i.e., outflow exceeds inflow), the country faces a lot of economic hardships. The causes and remedies of such balance of payments problems are discussed in macroeconomics.
* **Government policies:** The effects of various government policies on the economic variables like national income or the general price level are also studied in macroeconomics. [It should be noted that, we are talking of the macroeconomic effects of government policies. The effects of these policies on the micro-units (for instance, the effects of taxes on the output of an individual firm), are the subject-matter of microeconomics.] Since, the Government occupies an important position in any modern economic system, the analysis of these effects is of obvious importance.
* **Interrelations between markets:** Probably, the most important contribution of macro economic theories is to show that different markets of the economic system (for example, the commodity market, the labour market, the bond market, the money market, etc.) are interrelated. Any disturbance in one of these markets affects all the others.

Thus, we see that the study of microeconomics and that of macroeconomics are complementary to each other. The limitations of microeconomics are covered by macroeconomics. On the other hand, macroeconomics does not make a detailed study of the individual consumer or producer. This is taken care of by microeconomics. One can hope to form a comprehensive notion of what economics is all about only when one is acquainted with both microeconomics and macroeconomics.

**Differences between Microeconomics and Macroeconomics**

We can now indicate some of the important differences between Microeconomics and Macroeconomics. This is shown in Table 1.1 and Chart 1.

**Table 1.1: Differences between Microeconomics and Macroeconomics**

|  |  |
| --- | --- |
| **Microeconomics** | **Macroeconomics** |
|  |  |
| 1. It is that branch of economics which deals with the economic decision-making of individual economic agents  consumer, etc. | It is that branch of economic which deals of the entire economy, e.g., aggregate output, national income, aggregate savings and investment, etc. |
| 2. It takes into account small components of the whole economy. | It takes into consideration the economy of any country as awhole |
| 3. It deals with the process of price- determination in case of individual products and factors of production. | It deals with general price-level in any economy. |
| 4.It is known as price theory (since it explains the process of allocation of economic resources along alternative lines of production on the basis of relative prices of various goods and services.) | It is also known as the income theory (since it explains the changing levels of national income in any economy during any particular time period.) |
| 5.It is concerned with the optimisation goals of individual consumers and producers (e.g., individual consumers are utility-maximisers, while individual producers are profit- maximisers.) | It is concerned with the optimisation of the growth process of the entire economy. |
| 6. It studies the flow of economic resources or factors of production from any individual owner of such resources to any individual user of these resources, etc. | It studies the circular flow of income and expenditure between different sectors of the economy (say, between the firm sector and the household sector.) |
| 7. Microeconomic theories help us in formulating appropriate policies for resourceallocation at the firm level. | Macroeconomic theories help us in formulating appropriate policies for controlling inflation (i.e., rising price-level), unemployment, etc. |
| 8. It takes into account the aggregates over homogeneous or similar products (e.g., the supply of steel in an economy.) | It takes into account the aggregates over heterogeneous or dissimilar products (say, the Gross Domestic Product of any country during any year.) |

### 1.4 TYPES OF EFFICIENCY

Efficiency of a system is generally defined as the ratio of its output to input. The efficiency can be classified into *technical efficiency* and *economic efficiency*.

**Technical efficiency**

It is the ratio of the output to input of a physical system. The physical system may be a diesel engine, a machine working in a shop floor, a furnace, etc.

Technical efficiency (%) = Output . 100

Input

The technical efficiency of a diesel engine is as follows:

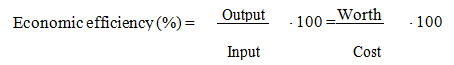
|  |  |  |  |
| --- | --- | --- | --- |
|  | Heat equivalent of mechanical |  |  |
| Technical efficiency (%)= = | energy produced | . 100 |  |
|  |  |
|  |  |

Heat equivalent of fuel used

In practice, technical efficiency can never be more than 100%. This is mainly due to frictional loss and incomplete combustion of fuel, which are considered to be unavoidable phenomena in the working of a diesel engine.

**Economic efficiency**

Economic efficiency is the ratio of output to input of a business system.



‘Worth’ is the annual revenue generated by way of operating the business and ‘cost’ is the total annual expenses incurred in carrying out the business. For the survival and growth of any business, the economic efficiency should be more than 100%.

Economic efficiency is also called ‘productivity’. There are several ways of improving productivity.

* Increased output for the same input
* Decreased input for the same output
* By a proportionate increase in the output which is more than the proportionate increase in the input
* By a proportionate decrease in the input which is more than the proportionate decrease in the output

Through simultaneous increase in the output with decrease in the input

**Increased output for the same input.** In this strategy, the output is increased while keeping the input constant. Let us assume that in a steel plant, the layout of the existing facilities is not proper. By slightly altering the location of the billet-making section, and bringing it closer to the furnace which produces hot metal, the scale formation at the top of ladles will be considerably reduced. The molten metal is usually carried in ladles to the billet-making section. In the long run, this would give more yield in terms of tones of billet produced. In this exercise, there is no extra cost involved. The only task is the relocation of the billet-making facility which involves an insignificant cost.

**Decreased input for the same output**. In this strategy, the input is decreased to produce the same output. Let us assume that there exists a substitute raw material to manufacture a product and it is available at a lower price. If we can identify such a material and use it for manufacturing the product, then certainly it will reduce the input. In this exercise, the job of the purchase department is to identify an alternate substitute material. The process of identification does not involve any extra cost. So, the productivity ratio will increase because of the decreased input by way of using cheaper raw materials to produce the same output.

**Less proportionate increase in output is more than that of the input.** Consider the example of introducing a new product into the existing product mix of an organization. Let us assume that the existing facilities are not fully utilized and the R&D wing of the company has identified a new product which has a very good market and which can be manufactured with the surplus facilities of the organization. If the new product is taken up for production, it will lead to—an increase in the revenue of the organization by way of selling the new product in addition to the existing product mix and an increase in the material cost and operation and maintenance cost of machineries because of producing the new product.

**When proportionate decrease in input is more than that of the output**. Let us consider the converse of the previous example, i.e. dropping an uneconomical product from the existing product mix. This will result in the following:

* A decrease in the revenue of the organization
* A decrease in the material cost, and operation and maintenance cost of machinery

If we closely examine these two decreases, we will see that the proportionate decrease in the input cost will be more than the proportionate decrease in the revenue. Hence, there will be a net increase in the productivity ratio.

**Simultaneous increase in output and decrease in input**. Let us assume that there are advanced automated technologies like robots and automated guided vehicle system (AGVS), available in the market which can be employed in the organization we are interested in. If we employ these modern tools, then:

* There will be a drastic reduction in the operation cost. Initially, the cost on equipment would be very high. But, in the long run, the reduction in the operation cost would break-even the high initial investment and offer more savings on the input.
* These advanced facilities would help in producing more products because they do not experience fatigue. The increased production will yield more revenue.

In this example, in the long run, there is an increase in the revenue and a decrease in the input. Hence, the productivity ratio will increase at a faster rate.

**1.5 LAW OF SUPPLY AND DEMAND**

An interesting aspect of the economy is that the demand and supply of a product are interdependent and they are sensitive with respect to the price of that product. The interrelationships between them are shown in Fig. 1.2.

From Fig. 1.2 it is clear that when there is a decrease in the price of a product, the demand for the product increases and its supply decreases. Also, the product is more in demand and hence the demand of the product increases. At the same time, lowering of the price of the product makes the producers restrain from releasing more quantities of the product in the market. Hence, the supply of the product is decreased. The point of intersection of the supply curve and the demand curve is known as the *equilibrium point*. At the price corresponding to this point, the quantity of supply is equal to the quantity of demand. Hence, this point is called the *equilibrium point*.

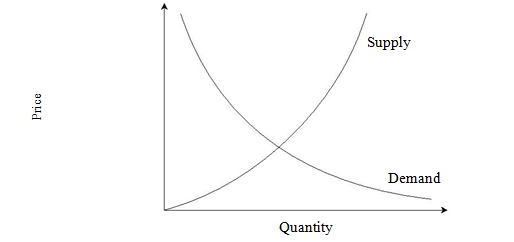
**Factors influencing demand**

The shape of the demand curve is influenced by the following factors:

* Income of the people
* Prices of related goods
* Tastes of consumers

If the income level of the people increases significantly, then their purchasing power will naturally improve. This would definitely shift the demand curve to the north-east direction of Fig. 1.2. A converse situation will shift the demand curve to the south-west direction.

If, for instance, the price of television sets is lowered drastically its demand would naturally go up. As a result, the demand for its associated product, namely VCDs would also increase. Hence, the prices of related goods influence the demand of a product.Over a period of time, the preference of the people for a particular product may increase, which in turn, will affect its demand. For instance, diabetic people prefer to have sugar-free products. If the incidence of diabetes rises naturally there will be increased demand for sugar-free products.



**Fig. 1.2 Demand and supply curve**

**Factors influencing supply**

The shape of the supply curve is affected by the following factors:

* Cost of the inputs
* Technology
* Weather
* Prices of related goods

If the cost of inputs increases, then naturally, the cost of the product will go up. In such a situation, at the prevailing price of the product the profit margin per unit will be less. The producers will then reduce the production quantity, which in turn will affect the supply of the product. For instance, if the prices of fertilizers and cost of labour are increased significantly, in agriculture, the profit margin per bag of paddy will be reduced. So, the farmers will reduce the area of cultivation, and hence the quantity of supply of paddy will be reduced at the prevailing prices of the paddy.

If there is advancement in technology used in the manufacture of the product in the long run, there will be a reduction in the production cost per unit. This will enable the manufacturer to have a greater profit margin per unit at the prevailing price of the product. Hence, the producer will be tempted to supply more quantity to the market.

Weather also has a direct bearing on the supply of products. For example, demand for woollen products will increase during winter. This means the prices of woollen goods will be incresed in winter. So, naturally, manufacturers will supply more volume of woollen goods during winter.

Again, take the case of television sets. If the price of TV sets is lowered significantly, then its demand would naturally go up. As a result, the demand for associated products like VCDs would also go up. Over a period of time, this will lead to an increase in the price of VCDs, which would result in more supply of VCDs.

**1.6 ELASTICITY OF DEMAND**

**Factors Affecting Elasticity of Demand**

**1. Nature of goods:** Elasticity of demand depends on the nature of goods. The elasticity of demand for a commodity depends upon the necessity of it for a human life. Goods may be necessary for human life, comfort or luxurious. Necessary goods are extremely essential so the demand for these goods-is inelastic.

But the consumption of comfort and luxury goods enhances man's efficiency and social prestige. So their consumption is less important and can be very well postponed. Thus the elasticity of demand for such commodities is elastic.

**2. Availability of substitutes:** The demand for a commodity having perfect substitute is relatively more elastic. If a flood gives the same pleasure and satisfaction in place of the consumption of another commodity, it is called a substitute commodity. A substitute may be close and remote.

Close substitute has got more elastic demand and remote substitute has less elastic demand. Tea and coffee are substitute commodities. Both can be used in absence of another. Thus the demand for tea and coffee is elastic.

**3. Alternative use:** The demand for those goods having more than one use is said to be elastic. In other words goods having alternative uses are elastic. All the uses are not of same importance. As the commodities are put to certain less urgent needs or uses as a result of fall in price their demand raises. People use those commodities for certain urgent use in response to a rise in price.

For example electricity can be used for a number of purposes like heating, lighting, cooking, cooling etc. If the electricity hill increases people utilise electricity for certain important urgent purpose and if the bill falls people use electricity for a number of other unimportant uses. Thus the demand for electricity is elastic.

**4. Possibility of postponing consumption:** The demand for those goods whose consumption can be postponed for sometime is said to be elastic. On the other hand if the commodities cannot be postponed and need to be fulfilled the demand for them is in elastic.

Medicine for a patient, books for a student and milk for a child cannot be postponed. They are to be satisfied first. That is why the demand for those commodities is in elastic.

**5. Proportion of income spent:** Elasticity of demand also depends on the proportion of income spent on different goods. The demand for those goods on which a negligible amount of the total income of the consumer is spent is said to be inelastic.

Salt, edible oil, match box, soap etc account for a very negligible amount of the consumer income. That is why their demand is inelastic.

**6. Price-level:** The demand for high priced commodities is elastic. On the other hand the low priced goods is said to have inelastic demand. High priced commodities are luxurious goods and low priced goods are necessaries. Luxurious goods are mainly consumed by the people of high income brackets. For example if the price of a colour TV falls from Rs 15000 to Rs 5000 the price comes to the reach of the people who were unable to buy at the old price.

Now they rush to buy colour TV. Thus with a rise or fall in price the amount demanded of colour TV remarkably falls or rise. But if the price of salt raises from Rs 2.00 to Rs 5.00 it account for no such remarkable fall in the quantity demanded of salt.

**7. Force of habit:** A repeated and constant use of a commodity by a person forms habit. A habit can't be avoided. Thus in such a case the consumption of the commodity can't be abstained in spite of the rise in price.

The consumer has to satisfy his habit regardless of change in price. Thus the demand for habitual commodities is fairly inelastic.

**8. Durability of Commodities:** The demand for durable commodities is elastic whereas the demand for less durable commodity is inelastic. Durable commodity is used over a long period of time. The utility of a durable good is destroyed continuously. Once a durable good is bought the buyer feels no want of it for a long period of time. Thus the change (rise or fall) in price can't influence the demand.

Thus the demand becomes elastic. On the other hand less durable or perishable goods are consumed repeatedly. Any change in price affects the demand. Thus the demand for perishable goods is less elastic.

**9. Income level:** Elasticity of demand depends on income level. The rich and the poor are not equally affected at the change in price. Poor people are more affected than the rich. Because of high income rich people buy the same amount of an expensive commodity in response to a rise in price.

For example with a rise in price of Horlicks, poor people by other milk powder relatively cheaper than Horlicks. Thus for rich people the demand for Horlicks is inelastic whereas for poor people the demand for the Horlicks is elastic.

**Types of Elasticity of Demand.**

**Price Elasticity of Demand**

The degree of responsiveness of quantity demanded of a commodity to the change in price is called elasticity of demand. Price elasticity of demand is popularly called elasticity of demand. It is the rate of which quantity demanded changes in response to the change in price. Elasticity of demand expresses the magnitude of change in quantity of a commodity.

Precisely stated, price elasticity demand is defined as the ratio of percentage change in quantity demanded to a percentage change in price. Thus elasticity of demand can be expressed in form of the following as price and quantity demanded move opposite.

**Five cases of Elasticity of Demand:**

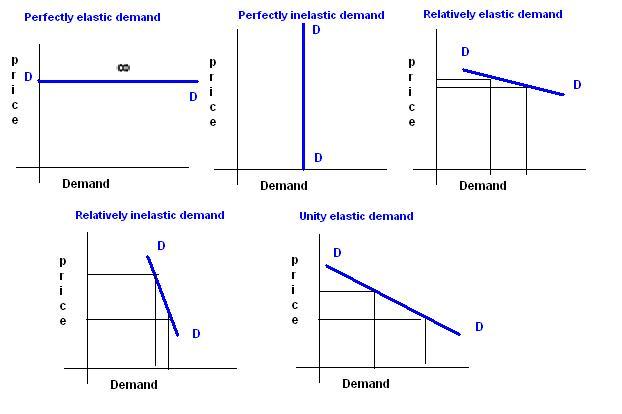
1. Perfectly elastic demand

2. Perfectly inelastic demand

3. Relatively elastic demand

4. Relatively inelastic demand

5. Unitary elastic demand



**Figure 1.3 Types of Elasticity**

**1. Perfectly elastic demand:**

The demand is said to be perfectly .elastic when a very insignificant change in price leads to an infinite change in quantity demanded. A very small fall in price causes demand to rise infinitely. Likewise a very insignificant rise in price reduces the demand to zero. This case is theoretical which is never found in real life.

**2. Perfectly inelastic demand:**

The demand is said to be perfectly inelastic when a change in price produces no change in the quantity demanded of a commodity. In such a case quantity demanded remains constant regardless of change in price. The amount demanded is totally unresponsive of change in price. The elasticity of demand is said to be zero.

**3. Relatively more elastic demand:**

The demand is relatively more elastic when a small change in price causes a greater change in quantity demanded. In such a case a proportionate change in price of a commodity causes more than proportionate change in quantity demanded. If price changes by 10% the quantity demanded of the commodity change by more than 10% i.e. 25%. The demand curve in such a situation is relatively flatter.

**4. Relatively inelastic demand:**

It is a situation where a greater change in price leads to smaller change in quantity demanded. The demand is said to be relatively inelastic when a proportionate change in price is greater than the proportionate change in quantity demanded. For example If price falls by 20% quantity demanded rises by less than 20% i.e 15%.

**5. Unitary elastic demand:**

The demand is said to be unit when a change in price produces exactly the same percentage change in the quantity demanded of a commodity. In such a situation the percentage change in both the price and quantity demanded is the same. For example if the price falls by 25% the quantity demanded rises by the same 25%. It takes the shape of a rectangular hyperbola. Numerically elasticity of demand is said to be equal to 1.(ed = 1).

**Factors Affecting Price Elasticity of Demand**

* **The number of close substitutes**– the more close substitutes there are in the market, the more elastic is demand because consumers find it easy to switch
* **The cost of switching between products**– there may be **costs** involved in switching. In this case, demand tends to be inelastic. For example, mobile phone service providers may insist on a12 month contract.
* **The degree of necessity or whether the good is a luxury** – necessities tend to have an inelastic demand whereas luxuries tend to have a more elastic demand.
* **The proportion of a consumer’s income allocated to spending on the good** – products that take up a high % of income will have a more elastic demand
* **The time period allowed following a price change** – demand is more price elastic, the longer that consumers have to respond to a price change. They have more time to search for cheaper substitutes and switch their spending.
* **Whether the good is subject to habitual consumption** – consumers become less sensitive to the price of the good of they buy something out of habit (it has become the default choice).
* **Peak and off-peak demand** - demand is price inelastic at peak times and more elastic at off-peak times – this is particularly the case for transport services.
* **The breadth of definition of a good or service** – if a good is broadly defined, i.e. the demand for petrol or meat, demand is often inelastic. But specific brands of petrol or beef are likely to be more elastic following a price change.

**Importance of Elasticity of Demand**

The concept of elasticity of demand is of much practical importance.

**Price fixation**: Under Imperfect competition and monopoly prices are fixed for commodities on the basis of elasticity of demand. A monopolist can charge a high price for a commodity, which has inelastic demand. On the other hand he will fix a low price for a commodity, which has elastic demand.

**Taxation:** The finance minister takes into account the concept before taxing a commodity. He levies more tax on those goods having inelastic demand.

**Factor’s Rewards:** If the demand for labour is inelastic, higher wages are paid and if the demand is elastic lower wages are paid.

**Terms of trade:** The terms of trade very much depends upon the relative elasticity of demand for exports and imports. If the demand for home product is inelastic, the terms of trade will be profitable to the home country.

**Rate of foreign exchange**: The Government has to take into account the concept of elasticity of demand while determining the rate of foreign exchange for its domestic currency.

**Government economic policy:** The knowledge of elasticity of demand is very important for the government in such matters as controlling of business cycle, removing inflationary and deflationary gaps in the economy. Similarly, for price stabilization and the purchase and sale of stocks and information about elasticity is most useful.

**Determination of price of public utilities:** Economic welfare of the society largely depends upon the cheap availability of the essential products like water, electricity, cooking gas, transportation etc. For such commodities, demand is inelastic and these should be controlled by the government. The government will distribute these products at fair price. Therefore, government helps to fix the prices of necessities of life.

**1.7 COSTS**

**Introduction**:-

There are several types of costs that a firm may consider relevant under various circumstances. Such costs include future costs, accounting costs, opportunity costs, implicit costs, fixed costs, variable costs, semi variable costs, private costs, social costs, common costs, etc. For the purposes of decision-making, it is essential to know the fundamental difference between the main cost concepts along with the conditions of their use in decision-making.

**Total Cost**

**Fixed cost (FC):** the cost of all fixed inputs in a production process. Another way of saying this: production costs that do not change with the quantity of output produced.

**Variable cost (VC):** The cost of all variable inputs in a production process. Variable cost, on the other hand, does depend on the quantity the firm produces. Variable cost rises when quantity rises, and it falls when quantity falls.

**Total cost (TC):** the total cost of producing a given amount of output.

TC = FC + VC

**Note:** The total cost curve has the same shape as the variable cost curve because total costs

rise as output increases.

**Average Cost Or Average Total Cost:**

Average cost (AC), also known as average total cost (ATC), is the average cost per unit of output. To find it, divide the total cost (TC) by the quantity the firm is producing (Q). Average cost (AC) or average total cost (ATC): the per-unit cost of output.

**ATC = TC/Q**

Since we already know that TC has two components, fixed cost and variable cost, that means ATC has two components as well: average fixed cost (AFC) and average variable cost (AVC). The AFC is the fixed cost per unit of output, and AVC is the variable cost per unit of output.

**ATC = AFC + AVCAFC = FC/QAVC = VC/Q**

**Marginal Cost:**

Often, we are interested in knowing what happens to a firm’s costs if output is increased by just a small amount. This is not the same as the average cost, because the next unit of output the firm produces might be more or less costly to produce than previous units.

Marginal cost (MC): the additional cost that results from increasing output by one unit.

Another way of saying this: the additional cost per additional unit of output. We use the symbol D (the Greek letter delta) to designate the change in a variable. For instance, if total cost (TC) rose from 75 to 100, we would say DTC = 100 - 75 = 25.Using this symbol, we can write the mathematical formula for marginal cost:

**MC = DTC/∆Q**

Notice that we divide by the change in quantity (DQ). Often, we set DQ = 1, because marginal cost is defined as the additional cost from one more unit of output. But sometimes we don’t know how much the added cost from just one more unit is, so we calculate marginal cost for a larger change in quantity.

Total cost is variable cost and fixed cost combined.

##### **TC=VC+FC**

Now divide total cost by quantity of output to get average total cost.

##### **ATC=TC/Q**

Marginal cost is a concept that's a bit harder for people grasp. The "margin" is the end or the last. The marginal unit is the last unit. Think of marginal cost as the cost of the last unit, or what it costs to produce one more unit. It's hard to find exactly what the cost of the last unit is, but it's not hard to find the average cost of a group of a few more units. To find this, simply take the change in costs from a previous level divided by the change in quantity from the previous level.

##### **MC = Change in TC / Change in Q**

**Opportunity cost:** In the words of Benham,” the opportunity cost of anything is the next best alternative that could be produced instead by the same factor or by an equivalent group of factors, costing the same amount of money”.

**1.8 BREAK-EVEN ANALYSIS**

Break even analysis is the relationship between cost volume and profits at various levels of activity, with emphasis being placed on the break even point. The break even point is where the business neither receive a profit nor a loss, this is when total money received from sales is equal to total money spent to produce the items for sale.

## Uses of a Break Even Analysis

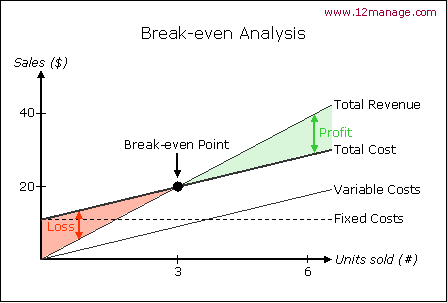
Break even analysis enables a business organization to:

1. Measure profit and loses at different levels of production and sales.
2. To predict the effect of changes in price of sales.
3. To analysis the relationship between fixed cost and variable cost.
4. To predict the effect on profitablilty if changes in cost and efficiency.

Even though break even has these advantages or uses, there are also several demerits of break even analysis.

## Disadvantages of Break Even Analysis

1. Assumes that sales prices are constant at all levels of output.
2. Assumes production and sales are the same.
3. Break even charts may be time consuming to prepare.
4. It can only apply to a single product or single mix of products.



**Figure 1.4 Break even analysis**

**BEP In Terms Of Sales Value:**

The BEP in terms of physical output is suitable only in the case of single product firm. If the firm is producing many products, the BEP can be approached only in terms of money value or total sale value or total revenue. Here also the principle of total contribution margin is made equal to total fixed cost, but the contribution margin is expressed as a ration to sales.

**Contribution Margin = Total Revenue – Total Variable Cost / Total Revenue**

**BEP = Total Fixed Cost/ Contribution Ratio.**

**Assumptions of BEA:**

* The volume of production and the volume of sales are equal.
* The price is assumed to be constant
* All revenue is perfectly variable with the physical volume of output and
* All costs are either perfectly variable or absolutely fixed over the entire range of volume of production.
* Operating efficiency will not undergo any changes.
* Semi variable costs can be segregated into variable and fixed components.

**Managerial Uses of BEA:**

The main advantage of using break even analysis in managerial decision-making can be state below;

* It helps in determining the optimum level of output, below which it would not be profitable for a firm to produce.
* With the help of the break-even analysis, the firm can determine minimum cost for a given level of output.
* It helps in deciding which products to be produced and which to be bought by the firm.
* Plant expansion or contraction decisions are often based on the break even analysis of the perceived situation.
* Impact of changes in prices and costs on profits of the firm can also be analyzed with the help of break-even techniques.
* Sometimes a management has to take decisions regarding dropping or adding a product to the product line. The break even analysis comes very handy in such situations.
* The break-even analysis can be used in finding the selling price which would prove most profitable for the firm.

**Limitations**:

* It is static in character.
* Projection of future with the past is not correct.
* The assumption that cost- revenue – output relationship is linear is true only over a small range of output.
* The profits are a function of not only output but also other factors like technological change, improved management etc.
* BEA if not an effective tool for long range use and its use should be restricted to the short run only (i.e., calendar year).

**Margin of safety (Safety Margin):**

The excess of actual sales over the break even sale is known as the margin of safety. It is usually expressed as a percentage of sales. Thus the margin of safety is,

**(Actual sales – break even point)**

**MOS= -------------------------------------------- × 100**

**Actual sales**

The margin of safety refers to the extent to which sales may fall before the firm starts incurring a loss. Larger the margin of safety, the safer the firm. If the margin of safety is dropping over a period of time, it means that the firm’s resistance capacity to avoid losses is becoming poorer. A high margin of safety means that the break-even point is much below the actual sales so that even if there is a slight fall in sales, still there will be profit. A margin of safety can be negative as well. In such case, it indicates the increase in sales necessary to reach the BEP so as to avoid losses.

**1.9 MONEY AND ITS FUNCTION**

**Money:** Money is one of the greatest inventions of mankind. Money is any good that is widely used and accepted in transactions involving the transfer of goods and services from one person to another. Economists differentiate among three different types of money: **commodity money, fiat money**, and **bank money.**

* **Commodity money** is a good whose value serves as the value of money. Gold coins are an example of commodity money. In most countries, commodity money has been replaced with fiat money.
* **Fiat money** is a good, the value of which is less than the value it represents as money. Dollar bills are an example of fiat money because their value as slips of printed paper is less than their value as money.
* **Bank money** consists of the book credit that banks extend to their depositors. Transactions made using checks drawn on deposits held at banks involve the use of bank money.

According to **Walker,**"Money is what Money does."

In a wider sense, Money includes all mediums of exchanges like Gold, Silver, Copper, Paper, Cheques, and Bills of exchange, etc.

According to **Crowther,** "Anything that is generally acceptable as a means of exchange and which at the same time acts as a measure and store of value."

Thus, Anything is Money, which is generally acceptable as a medium of exchange, and at the same time it must act as a measure and a store of value. Anything implies a thing to be used as money need not be necessarily composed of any precious metal. The only necessary **condition is that, it should** be universally accepted by people as a medium of exchange.

**Functions of Money**

Money performs five important functions:-

* **Medium of exchange:** Money acts as a medium of exchange as it's generally accepted. On the payment of money, purchase of goods and services can be made i.e. goods and services are exchanged for money. Money bifurcates buying and selling activities separately so it facilitates the exchange transactions.
* **Measure of value:** Money is a common measure of value so it is possible to determine the rate of exchange between various goods and services purchased by the people. Exchange value of commodity can be expressed in terms of money. For e.g. we can say that 10 metres of Cotton Cloth cost $220 dollars or Rs.10,000 rupees only.
* **Store of value:** Money acts as a store of value. Money being generally acceptable and its value being more or less stable, it is ideal for use as a store of value. Being non-perishable and also comparatively stable in value, the value of other assets can be stored in the form of money. Property can be sold and its value can be held in money and converted into other assets as and when necessary.
* **Standard or Deferred payment:** Money is also inevitably used as the unit in terms of which all future or deferred payments are stated. Future transactions can be carried on in terms of money. The loans, which are taken at present, can be repaid in money in the future. The value of the future payments is regulated by money.
* **Transfer of value:**Value of any asset can be transferred from one person to another or to any institution or to any place by transferring money. The transfer of money can take place irrespective of places, time and circumstances. Transfer of purchasing power, which is necessary in commerce and other transactions, has become available because of money.

**The Demand for Money**

**The demand for money** is affected by several factors, including the level of income, interest rates, and inflation as well as uncertainty about the future. The way in which these factors affect money demand is usually explained in terms of the three motives for demanding money: the **transactions**, the **precautionary**, and the **speculative** motives.

* **Transactions motive.** The**transactions motive** for demanding money arises from the fact that most transactions involve an exchange of money. Because it is necessary to have money available for transactions, money will be demanded. The total number of transactions made in an economy tends to increase over time as income rises. Hence, as income or GDP rises, the **transactions demand**for money also rises.
* **Precautionary motive.** People often demand money as a precaution against an uncertain future. Unexpected expenses, such as medical or car repair bills, often require immediate payment. The need to have money available in such situations is referred to as the **precautionary motive**for demanding money.
* **Speculative motive.** Money, like other stores of value, is an asset. The demand for an asset depends on both its **rate of return** and its **opportunity cost.** Typically, money holdings provide no rate of return and often depreciate in value due to inflation. The opportunity cost of holding money is the interest rate that can be earned by lending or investing one's money holdings. The **speculative motive** for demanding money arises in situations where holding money is perceived to be less risky than the alternative of lending the money or investing it in some other asset.

# Supply of Money

There are several definitions of the **supply of money.** M1 is narrowest and most commonly used. It includes all **currency** (notes and coins) in circulation, all **checkable deposits** held at banks (bank money), and all **traveler's checks.** A somewhat broader measure of the supply of money is M2, which includes all of M1 plus **savings** and **time deposits** held at banks. An even broader measure of the money supply is M3, which includes all of M2 plus large denomination, long‐term time deposits—for example, **certificates of deposit** (CDs) in amounts over $100,000. Most discussions of the money supply, however, are in terms of the M1 definition of the money supply.

**Banking Business.** In order to understand the factors that determine the supply of money, one must first understand the role of the **banking** sector in the money‐creation process. Banks perform two crucial functions. First, they receive funds from depositors and, in return, provide these depositors with a checkable source of funds or with interest payments. Second, they use the funds that they receive from depositors to make loans to borrowers; that is, they serve as **intermediaries** in the borrowing and lending process.

When banks receive deposits, they do not keep all of these deposits on hand because they know that depositors will not demand all of these deposits at once. Instead, banks keep only a fraction of the deposits that they receive. The deposits that banks keep on hand are known as the banks' **reserves.** When depositors withdraw deposits, they are paid out of the banks' reserves.

**Reserve Requirement** is the fraction of deposits set aside for withdrawal purposes. The reserve requirement is determined by the nation's banking authority, a government agency known as the **central bank.** Deposits that banks are not required to set aside as reserves can be lent to borrowers, in the form of **loans.** Banks earn**profits** by borrowing funds from depositors at zero or low rates of interest and using these funds to make loans at higher rates of interest.

**Concept of Money Supply in India**

Monetary policy refer to steps taken by RBI to regulate cost and supply of money in order to achieve certain socio Economic objective like price stabilization full employment, exchange regulation and increased economic growth

There is no unique measure to money aggregate **Money Supply M : M1 + M2 + M3 + M4**

**M1**

It consist of

Currency notes and coins with public ( excluding cash in hand of all banks)

Demand deposit ( excludinginter bank deposit)

Deposit held with RBI ( excluding IMF,PF, guarantee fund &adhoc liabilities N A RROW MONEY

**M2**

It consist of

M1 Saving deposit with post office saving bank

**M3**

It consist of

M1 Time deposit of commercial bank & cooperative bank ( excludinginter bank deposit)

It includes net bank credit to government +bank credit to commercial sector + net foreign exchange assets + government currency liability to the public BROAD MONEY

**M4**

It consist of M3

Total deposit with post office organization

The growth in money supply must be higher then the growth in the real national Income This stems for two reasons (iii)As income grows ,the demand for money as one of the component of saving tends to increase (v)An increase in money supply is also necessitated by gradual reduction of the non-mentioned sector of the economy. In our country, the rate of increase in money supply has been far excess of the rate of growth in real national income

**Money Market**

MM is “ Centre for dealings, mainly of a short term character, in monetary assets; it meets the short term requirement of the borrowers and provides liquidity or cash to the lenders. It is a place where short term surplus investible funds at the disposal of the financial and other institution and individual are bid by borrowers, again comprising institutions and individual and also by government

**Function of Money Market**

It provides various kind of credit instrument to augment the money supply • It helps to minimise the gluts and stringencies in money market due to seasonal variations in the flow of and demand of funds • It helps in quick transfer of funds

**Operation in Money Market**

* Call (overnight) money
* Notice money
* Commercial Bills Treasury Bills
* Certificate of Deposit
* Commercial Paper

**Call/Notice Money**

All categories of bank and financial institution are allowed to participate in call/notice market. The fund are lent for one day or from Saturday to Monday or for a period up to 14 days. Both the borrower and lender have current account with the RBI. It is also used by banks to maintain CRR/SLR level to avoid punitive measure by the RBI

**1.10 INFLATION**

**Inflation:** Inflation refers to a continuous rise in general price level which reduces the value of money or purchasing power over a period of time.

Statistically speaking, inflation is measured in terms of a percentage rise in the price index (i.e. percentage rate per unit time) usually for an annum (a year) or for 30-31 days (a month).

**Definition:**

According to **Crowther,** "Inflation is a state in which the value of money is failing i.e. the prices are rising."

According to **Coulbourn,** "Inflation is too much of money chasing too few goods."

**Features of Inflation**

The characteristics or features of inflation are as follows :-

* Inflation involves a process of the persistent rise in prices. It involves rising trend in price level.
* Inflation is a state of disequilibrium.
* Inflation is scarcity oriented.
* Inflation is dynamic in nature.
* Inflationary price rise is persistent and irreversible.
* Inflation is caused by excess demand in relation to supply of all types of goods and services.
* Inflation is a purely monetary phenomenon.
* Inflation is a post full employment phenomenon.
* Inflation is a long-term process.

**Types of Inflation**

**1. Types of Inflation on Coverage**

**Comprehensive Inflation :** When the prices of all commodities rise throughout the economy it is known as Comprehensive Inflation. Another name for comprehensive inflation is Economy Wide Inflation.

**Sporadic Inflation :** When prices of only few commodities in few regions (areas) rise, it is known as Sporadic Inflation. It is sectional in nature. For example, rise in food prices due to bad monsoon (winds bringing seasonal rains in India).

**2. Types of Inflation on Time of Occurrence**

**War-Time Inflation**: Inflation that takes place during the period of a war-like situation is known as War-Time inflation. During a war, scare productive resources are all diverted and prioritized to produce military goods and equipments. This overall result in very limited supply or extreme shortage (low availability) of resources (raw materials) to produce essential commodities. Production and supply of basic goods slow down and can no longer meet the soaring demand from people. Consequently, prices of essential goods keep on rising in the market resulting in War-Time Inflation.

**Post-War Inflation:** Inflation that takes place soon after a war is known as Post-War Inflation. After the war, government controls are relaxed, resulting in a faster hike in prices than what experienced during the war.

**Peace-Time Inflation:** When prices rise during a normal period of peace, it is known as Peace-Time Inflation. It is due to huge government expenditure or spending on capital projects of a long gestation (development) period.

**3. Types of Inflation on Government Reaction**

**Open Inflation** : When government does not attempt to restrict inflation, it is known as Open Inflation. In a free market economy, where prices are allowed to take its own course, open inflation occurs.

**Suppressed Inflation :** When government prevents price rise through price controls, rationing, etc., it is known as Suppressed Inflation. It is also referred as Repressed Inflation. However, when government controls are removed, Suppressed inflation becomes Open Inflation. Suppressed Inflation leads to corruption, black marketing, artificial scarcity, etc.

**4. Types of Inflation on Rising Prices**

**Creeping Inflation :**When prices are gently rising, it is referred as Creeping Inflation. It is the mildest form of inflation and also known as a Mild Inflation or Low Inflation. According to R.P. Kent, when prices rise by not more than (upto) 3% per annum (year), it is called Creeping Inflation.

**Chronic Inflation :** If creeping inflation persist (continues to increase) for a longer period of time then it is often called as Chronic or Secular Inflation. Chronic Creeping Inflation can be either Continuous (which remains consistent without any downward movement) or Intermittent (which occurs at regular intervals). It is called chronic because if an inflation rate continues to grow for a longer period without any downturn, then it possibly leads to Hyperinflation.

**Walking Inflation :** When the rate of rising prices is more than the Creeping Inflation, it is known as Walking Inflation. When prices rise by more than 3% but less than 10% per annum (i.e between 3% and 10% per annum), it is called as Walking Inflation. According to some economists, walking inflation must be taken seriously as it gives a cautionary signal for the occurrence of Running inflation. Furthermore, if walking inflation is not checked in due time it can eventually result in Galloping inflation.

**Moderate Inflation :** Prof. Samuelson clubbed together concept of Crepping and Walking inflation into Moderate Inflation. When prices rise by less than 10% per annum (single digit inflation rate), it is known as Moderate Inflation. According to Prof. Samuelson, it is a stable inflation and not a serious economic problem.

**Running Inflation :** A rapid acceleration in the rate of rising prices is referred as Running Inflation. When prices rise by more than 10% per annum, running inflation occurs. Though economists have not suggested a fixed range for measuring running inflation, we may consider price rise between 10% to 20% per annum (double digit inflation rate) as a running inflation.

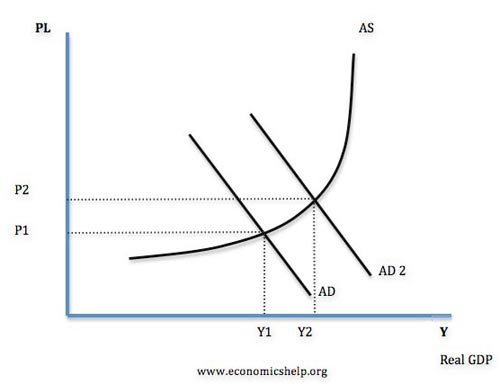
**Galloping Inflation :**According to Prof. Samuelson, if prices rise by double or triple digit inflation rates like 30% or 400% or 999% per annum, then the situation can be termed as Galloping Inflation. When prices rise by more than 20% but less than 1000% per annum (i.e. between 20% to 1000% per annum), galloping inflation occurs. It is also referred as Jumping inflation. India has been witnessing galloping inflation since the second five year plan period.

**Hyperinflation :** Hyperinflation refers to a situation where the prices rise at an alarming high rate. The prices rise so fast that it becomes very difficult to measure its magnitude. However, in quantitative terms, when prices rise above 1000% per annum (quadruple or four digit inflation rate), it is termed as Hyperinflation. During a worst case scenario ofhyperinflation, value of national currency (money) of an affected country reduces almost to zero. Paper money becomes worthless and people start trading either in gold and silver or sometimes even use the old barter system of commerce. Two worst examples of hyperinflation recorded in world history are of those experienced by Hungary in year 1946 and Zimbabwe during 2004-2009 under Robert Mugabe's regime.

**Causes of Inflation**

#### 1. Demand pull inflation

If the economy is at or close to full employment then an increase in AD leads to an increase in the price level. As firms reach full capacity, they respond by putting up prices leading to inflation.

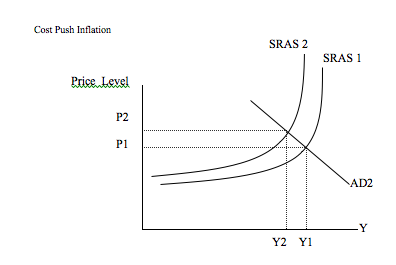


**Figure 1.5 Demand pull Inflation**

* AD can increase due to an increase in any of its components C+I+G+X-M
* The link between output and inflation suggests that there will be a similar link between inflation and unemployment,
* The Phillips curve initially showed a link between money wages and unemployment, it was then argued an increase in wages would lead to inflation

### 2. Cost Push Inflation

If there is an increase in the costs of firms, then firms will pass this on to consumers. There will be a shift to the left in the AS.



**Figure 1.6 Cost Push Inflation**

Cost push inflation can be caused by many factors

**1.The Labour Market**

If trades unions can present a common front then they can bargain for higher wages, this will lead to wage inflation.

**2. Import prices**

One third of all goods are imported in the UK. If there is a devaluation then import prices will become more expensive leading to an increase in inflation

E.G. a German car costs DM 40,000. If the exchange rate is DM £1:3DM then it will be priced at £13,333.  
If the E.R falls to £1 : 2DM then it will be priced at £20,000

**3. Raw Material Prices**,

The best example is the price of oil, if the oil price increase by 20% then this will have a significant impact on most goods in the economy and this will lead to cost push inflation.

E.g. in early 2008, there was a spike in the price of oil to over $150 causing a rise in inflation.

**4.    Profit Push Inflation**

When firms push up prices to get higher rates of inflation.

**5.   Declining productivity**

If firms become less productive and allow costs to rise, this invariably leads to higher prices.

**Effects or The Impact Of Inflation.**

## Positive Effects of Inflation

Inflation isn’t without its positive effects. Even hyperinflation can have beneficial effects:

* **Debt:** High inflation tends to wipe out debt. Once the current inflation rate exceeds the interest rate on a loan or other debt, inflation is literally eating it away.
* **Mundell-Tobin effect:** This is a complex effect related to inflation. Moderate inflation has a tendency to cause firms holding onto money to start lending. This glut of lending capital [causes interest rates to fall](http://www.gobankingrates.com/banking/factors-bank-rates-interest-federal-reserve/). This in turn makes it easier for firms to get loans for further investment and economic growth.
* **Offsetting negative effects of deflation:** Deflation might sound good on the surface–an increased value of your money. In reality, however, deflation often leads to short, sharp jags of hyperinflation.

## Negative Effects of Inflation

Inflation has a number of effects. These are worthy of note to businesses, investors and everyday consumers:

* **Unemployment:** When the cost of goods and services go up, companies have higher overhead costs and consumers purchase less. This can lead to a downturn in the economy where jobs are the first casualty.
* **Investment Bubbles:** When inflation is kept artificially low it can lead to speculative lending and borrowing. This has a tendency to increase [bad investments](http://www.gobankingrates.com/investments/when-investing-goes-wrong-lose-money/) overall–a tendency that will eventually be corrected by the market.
* **Hoarding:** Particularly during periods of hyperinflation, people have a tendency to hoard goods. This is because the goods might cost more tomorrow than they did today.
* **Social Unrest:** One of the most far-reaching effects of inflation is general social unrest. Food inflation was identified as one of the primary causes behind the Arab Spring revolts.

**Strategies or Measures Taken To Control Inflation**

**(A). Monetary** **measures:** Monetary measures relate to the control in the supply and circulation of money in the country.  
**Bank rate policy:** In case of inflation, the bank rate is increased; the supply of money is controlled.  
**Open market operation:** During inflation, the central bank sells govt. securities and price bonds in the open market in order to contract the supply of money.

**Variable reserve ratio:** In order to control inflation, the central bank increases the reservation.  
**Credit Rationing**: When there is inflationary pressure, the state bank adopts the policy of credit rationing.

**(B). Fiscal** **Measures**: Measures in connection with public borrowing, public expenditures and public revenues are called fiscal measures.

**Public Borrowing:** During inflation, increase the public borrowing, during deflation, decrease in public borrowing.  
**Public Revenues:** In order to control inflation, the increase in public revenues by the Govt.  
**Public** **expenditures:** Inflation is also controlled by decreasing the public expenditures by the Govt.

**(C). Realistic** **Measures:**

**Increase the supply of goods and services:** When the supply of goods and services is increased, the prices will come down.

**Population planning:** Control on population by adopting different measures of family planning will reduce the demand and finally prices will be controlled.

**Price control policy:** The govt. should adopt strict price control policy against the profiteers and hoarders.  
**Economic** **Planning:** Effective economic planning is necessary to control the inflation in the country.

**1.11 DEFLATION**

Deflation is the reduction of prices of goods, and although deflation may seem like a good thing when you’re standing at the checkout counter, it’s not. Rather, deflation is an indication that economic conditions are deteriorating. Deflation is usually associated with significant unemployment, which is only corrected after wages drop considerably. Furthermore, businesses’ profits drop significantly during periods of deflation, making it more difficult to raise additional capital to expand and develop new technologies.

“Deflation” is often confused with “disinflation.” While deflation represents a decrease in the prices of goods and services throughout the economy, disinflation represents a situation where inflation increases at a slower rate. However, disinflation does not usually precede a period of deflation. In fact, deflation is a rare phenomenon that does not occur in the course of a normal economic cycle, and therefore, investors must recognize it as a sign that something is severely wrong with the state of the economy.

**The Causes or Reasons for Deflation**

**1. Change in Structure of Capital Markets:** When many different companies are selling the same goods or services, they will typically lower their prices as a means to compete. Often, the capital structure of the economy will change and companies will have easier access to debt and equity markets, which they can use to fund new businesses or improve productivity.

There are multiple reasons why companies will have an easier time raising capital, such as declining interest rates, changing banking policies, or a change in investors’ aversion to risk. However, after they have utilized this new capital to increase productivity, they are going to have to reduce their prices to reflect the increased supply of products, which can result in deflation.

**2. Increased Productivity:** Innovative solutions and new processes help increase efficiency, which ultimately leads to lower prices. Although some innovations only affect the productivity of certain industries, others may have a profound effect on the entire economy.

For example, after the Soviet Union collapsed in 1991, many of the countries that formed as a result struggled to get back on track. In order to make a living, many citizens were willing to work for very low prices, and as companies in the United States outsourced work to these countries, they were able to significantly reduce their operating expenses and bolster productivity. Inevitably, this increased the supply of goods and decreased their cost, which led to a period of deflation near the end of the 20th century.

**3. Decrease in Currency Supply:** As the currency supply decreases, prices will decrease so that people can afford goods. How can currency supplies decrease? One common reason is through central banking systems.

For instance, when the Federal Reserve was first created, it considerably contracted the money supply of the United States. In the process, this led to a severe case of deflation in 1913. Also, in many economies, spending is often completed on credit. Clearly, when creditors pull the plug on lending money, customers will spend less, forcing sellers to lower their prices to regain sales.

**4. Austerity Measures:** Deflation can be the result of decreased governmental, business, or consumer spending, which means government spending cuts can lead to periods of significant deflation. For example, when Spain initiated austerity measures in 2010, preexisting deflation began to spiral out of control.

**The Effects or Impacts of Deflation**

**1. Reduced Business Revenues**

Businesses must significantly reduce the prices of their products in order to stay competitive. Obviously, as they reduce their prices, their revenues start to drop. Business revenues frequently fall and recover, but deflationary cycles tend to repeat themselves multiple times.

Unfortunately, this means businesses will need to increasingly cut their prices as the period of deflation continues. Although these businesses operate with improved production efficiency, their profit margins will eventually drop, as savings from material costs are offset by reduced revenues.

**2. Wage Cutbacks and Layoffs**

When revenues start to drop, companies need to find ways to reduce their expenses to meet their bottom line. They can make these cuts by reducing wages and cutting positions. Understandably, this exacerbates the cycle of inflation, as more would-be consumers have less to spend.

**3. Changes in Customer Spending**

The relationship between deflation and consumer spending is complex and often difficult to predict. When the economy undergoes a period of deflation, customers often take advantage of the substantially lower prices. Initially, consumer spending may increase greatly; however, once businesses start looking for ways to bolster their bottom line, consumers who have lost their jobs or taken pay cuts must start reducing their spending as well. Of course, when they reduce their spending, the cycle of deflation worsens.

**4. Reduced Stake in Investments**

When the economy goes through a series of deflation, investors tend to view cash as one of their best possible investments. Investors will watch their money grow simply by holding onto it. Additionally, the interest rates investors earn often decrease significantly as central banks attempt to fight deflation by reducing interest rates, which in turn reduces the amount of money they have available for spending.

In the meantime, many other investments may yield a negative return or are highly volatile, since investors are scared and companies aren’t posting profits. As investors pull out of stocks, the stock market inevitably drops.

**5. Reduced Credit**

When deflation rears its head, financial lenders quickly start to pull the plugs on many of their lending operations for a variety of reasons. First of all, as assets such as houses decline in value, customers cannot back their debt with the same collateral. In the event a borrower is unable to make their debt obligations, the lenders will be unable to recover their full investment through foreclosures or property seizures.

Also, lenders realize the financial position of borrowers is more likely to change as employers start cutting their workforce. Central banks will try to reduce interest rates to encourage customers to borrow and spend more, but many of them will still not be eligible for loans.

**Causes of deflation**

* Deflation is caused by a shift in the supply-and-demand curve for goods and services, particularly a fall in the aggregate level of demand.
* Deflation can be caused by either a reduction in the money supply, a reduction in the velocity of money or an increase in the number of transactions.
* Deflation may be caused by a combination of the supply and demand for goods and the supply and demand for money, specifically the supply of money going down and the supply of goods going up.

**Effects of Deflation**

* Decreasing nominal prices for goods and services
* Increasing real value of cash money and all monetary items
* Discourages bank savings and decreases investment
* Enriches creditors at the expenses of debtors
* Benefits fixed-income earners
* Recessions and unemployment

**Measures or Strategies to Control Deflation.**

**1. Reduction in Taxation:**

The government should reduce the number and burden of various taxes levied on commodities. This will increase the purchasing power of the people. As a result, the demand for goods and services willincrease. Moreover, sufficient tax relief should be given to businessmen to encourage investment.

**2. Redistribution of Income:**

Marginal propensity to consume can be raised by a redistribution of income and wealth from the rich to the poor. Since the marginal propensity to consume of the poor is high and that of the rich is low, such a measure will help increasing the aggregate demand in the economy.

**3. Repayment of Public Debt:**

During deflation period, the government can repay the old public debts. This will increase the purchasing power of the people and push up effective demand.

**4. Subsidies:**

The government should give subsidies to induce the businessmen to increase investment.

**5. Public Works Programme:**

The government should also directly undertake public works programme and thus increase expenditure in public sector. Care should, however, be taken that the public works policy of the government does not adversely affect investment in the private sector; it should supplement, and not supplant, private investment. For this, it is important that only those projects should be selected for the government's public works policy, which is either too big or not so profitable to attract private investment.

**1.12 National Income**

The labour and capital of a country acting on its natural resources produce annually a certain net aggregate of commodities material an immaterial including services of all kinds- **Marshall**

National income consists solely of services as received by ultimate consumers, whether from their material or from their human environments- **Fisher**

A national income estimate measures the volume of commodities and services turned out during a given period counted without duplication- **National Income Committee of India (1951)**

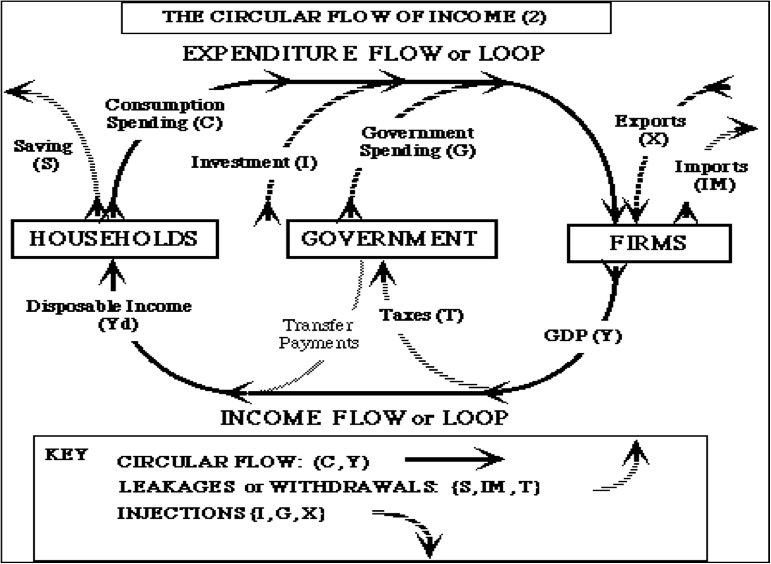
Gross national product at market prices is the market value of the produce before deduction of provisions for the consumption of fixed capital distributable to the factors of production supplied by the normal residents of the given country- **United Nations Department of Economic Affairs**

National income is a collection of goods and services reduced to a common basis by being measured in terms of money- **Hicks**

**Therefore, all the above definitions make it clear that national income is the monetary measure of**

* The net value of all products and services
* In an economy during a year
* Counted without duplication
* After allowing for depression
* Both in the public and private sector of products and services
* In consumption and capital goods sector
* The net gains from international transactions

**Circular Flow of Income and Expenditure**



**Figure 1.6 Circular Flow of Income and Expenditure**

**Gross National Product (G.N.P.)**

It is the basic measure of a nation’s output stated in terms of money representing the total value of a nation’s annual output. It is evaluated in terms of market prices. It includes all the economic productions in the economy from apples and automobiles to zinc and zippers.  
G.N.P. is defined as the money value of the national production for any given period. Here we take into account: The money value of the final goods and services produced in the economy to avoid double counting. Intermediate products are excluded from it. The money value of only currently produced goods and services as G.N.P. is a measure of the economy’s productivity during the year.

The word gross has significance. We do not deduct the depreciation or replacement of the fixed assets. In the process of production there is wear and tear of fixed assets. This depreciation is loss to the economy and it will not be deducted from GNP produced in the economy.

**Net National Product (N.N.P.)**

It refers to the net production of goods and services in a country during the year. It is G.N.P. less depreciation during the year.

**N.N.P. = G.N.P. - depreciation for the given year**

It is also called national income at market prices. It is a useful concept in study of growth economics as it takes into consideration the net increase in the total production of the country.

**National Income at Factor Cost (N.I.Fc)**

It is the total of all incomes earned by the owner of factors of production for their contribution of factors of production.  Therefore, for calculating it, such payments which are not made for any productive service is not included. Example- an individual may get gifts, transfer payments from business, etc. which form a part of his income but, since he has not rendered any service to get from them, they do not enter the calculation of national income at factor cost.

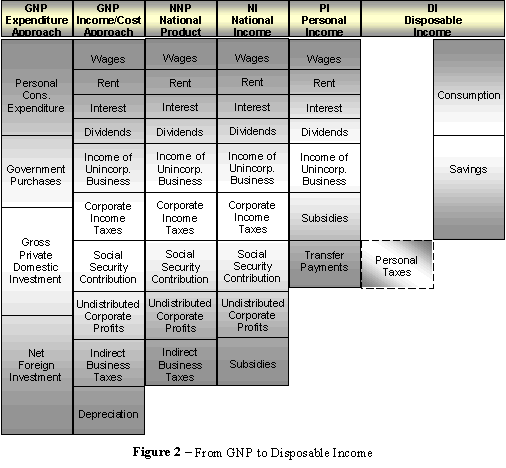
**N.I.FC= N.N.P. - indirect taxes+ subsidies**

It is therefore the aggregation of factor earnings. It does not include capital consumption allowance government business and individual transfer payments and indirect taxes. All these do not reach the factors of production. Similarly, if the government pays any subsidy in support of any industry whose cost of production is high, thesesubsidies have to be added.

**Personal Income (P.I.)**

This is the actual income received by the individuals and households in the country from all sources. It denotes aggregate money payments received by the people by way of wage, interest, profits, and rents. It is the spendable income at current prices available to individuals. Corporate income taxes and payment towards social security measured will not be available for individuals, so these have to be deducted from what is earned. Payments such as old age pensions, widow pensions, etc. that accrue to people have to be added.  
P.I. = N.I. – corporate taxes – undistributed corporate profits – social security contributions + transfer payments

Transfer payments may be by government or business transfers, interest paid by government, dividends, etc.



Disposable Personal Income (D.P.I.)  
The whole of personal income is not available for consumption as personal direct taxes have to be paid. What is left after payment of personal direct taxes is call disposable personal income.  
D.P.I = P.I. – personal taxes, property taxes and insurance payments

This is the amount available for individuals and households for consumption. It is not that the entire D.P.I. is spent on consumption. A part of it may be saved, therefore

D.P.I. = consumption + savings

What remains after saving is called the personal outlay, which represents the community’s demand for goods and services.

Various Methods of Calculating National Income

I. Product Method: This is also called the output method, the inventory method or the census method. It consists of finding out the market value of all the goods and services produced during a year. According to this method the economy is classified into different sectors, namely  
Direct sector: in this sector the value of services of such professions like doctors, dramatics, soldiers, politicians, etc., are taken by equating to their services

Agriculture industry: International transaction sector: in this sector, we take into account the value of goods exported and imported payment from abroad, payments to other countries. In each sector we make an inventory of goods produced and find out the end product making an addition to the value of goods. The value added method can be followed in order to avoid double counting. The value added of a firm is its output less whatever it purchases from other firms such as raw materials, and other inputs. This method has a merit because it helps us to have a comparative idea of the importance of various activities in economy like agriculture, manufacturing, trade, etc. However in advanced countries this method may be successful as it is very easy to get data from government records. But in under developed countries this method may give rise to various problems like imputation of money values to non- monetized sector.

II. Income Method: This method refers to the gross national income obtained by adding together wages and salaries, interests, profits and rents of persons and institution and including government incomes are earned either from property or through work. To arrive at the totality of income of nation, the following procedure will be adopted:

a)      Net rents include the rental value of owner occupied houses.

b)      Wages, salaries and all such earnings of person employed, pensions are excluded.  
c)      Earnings by way of interest.

d)      Income of joint stock companies.

e)      Income from overseas investment.

This method gives national income at factor cost.

III. Expenditure Method: This method is also called the flow of product approach (by American economist Samuelson) or the outlay method. Here we take into account the expenditure on finished products-  
Expenditure by consumers on goods and services.

Expenditure by producers on investment of goods.

Expenditure by government on consumption as well as capital goods.

The Factors That Determine National Income

Quality and quantity of factors of production: the quality and quantity of land, the climate, the rainfall, etc., determine the quantity and quality of agricultural production. This determines the size of national income. The quantity of labour has double influence since labour is both a factor of production as well as the consumer of what is produced. The quality of labour depends upon intelligence, training, which in turn decides the volume of industrial productivity. This will have decisive influence on output. Likewise, the quantity and quality of entrepreneurial ability is also a main element in the determination of national income.

State of technical know-how: the extent of technical know-how and technology in production determine the capital formation in the country. A country with abundant resources will be dormant without any determination if the resources are not scientifically exploited. Natural resources combined with advanced technology will go a long way in increasing the size of national income.

 Political stability: the key to increase the national income rests with important factors like capital formation, natural resources, technical know-how and political stability.

Uses of National Income Statistics

National income figures help governments in planning, policy making, preparation of budgets and forecasting the level of economic activity.

Formulation of economic policies: national income statistics are valuable instruments of economic analysis and a guide to economic policies to be pursued. It is more useful in context of planning and formulation of realistic plans.

Studying economic structure: it gives an idea of the structure of the economy. It helps to make inter- sectoral comparisons and to study the rate of growth of the economy. The growth of national income is an index of the growth of the productive capacity of an economy.

Inter-sectoral comparisons: it helps to study inter-sectoral growth. Such comparisons are useful. Share of various sectors can be studied to find out structural defects and weaknesses of the economy.

Indicator of economic welfare: it enables us to study per capita income or per capita consumption which are general indicators of economic growth. But it is not helpful in revealing distribution of income in the society.

Making international comparisons: national income estimates enables us to make international comparisons and standard of living of people.

Contribution to international institutions: it shows the capacity of a country to bear some common burden of international institutions like the U.N.O.

Importance of National Income Analysis

The following are the main uses of national income.

1. Since income is a flow of wealth changes in the national income give some indication of economic welfare.

2. National income is used to compare standards of living in different countries.

3. National income figures are used to measure the rate of growth of a country.

4. The national income accounts make it possible for an analysis of the behaviour of the different sectors of the economy.

5. Inflationary and deflationary pressures can be estimated with the help of national income statistics.

6 National income statistics can be used to forecast the level of business activity at later date, and to find out trends in other annual data.

7. The national income figures are useful in providing a correct sense of proportion about the structure of the economy.

8. In war time, the study of components of national income is of great importance because they show the maximum possible production possibilities of the country.

9. National income statistics can be used to determine how an international financial burden should be an apportioned between different countries. The quantum of national income measures the ability of a country to pay contributions for international purposes, just as the income of a person measures his ability to pay for the upkeep of his country.

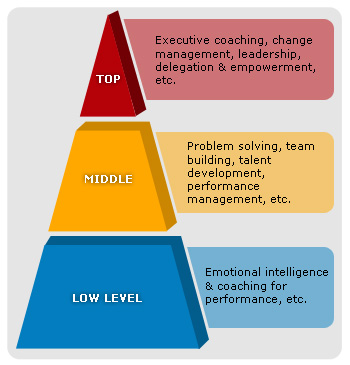
**1.13 Management Concepts**

* Management is an important element in every organization.
* It is the element that coordinates currents organizational activities and plans for the future.
* The management adapts the organization to its environment and shapes the organization to make it more suitable to the organization.
* 4 M’s in Organization – Men, Machine, Materials, Money, and leads to nothing. For efficient and profitable functioning it is necessary that all these factors are put to work in a co- ordinate manner.
* According to Harold Koontz, “Management is an art of getting things done through and with the people in formally organized groups”

**Types of Management**

Generally, there are Three Levels of Management,

1. Administrative or Top Level of Management.
2. Executive or Middle Level of Management.
3. Supervisory or Lower Level of Management.



**Fig 1.7 Types Of Management**

**Top Level of Management**

The Top Level [Management](http://kalyan-city.blogspot.com/2011/04/what-is-management-definitions-meaning.html) consists of the Board of Directors (BOD) and the Chief Executive Officer (CEO).

**The main role of the top level management is summarized as follows** :-

* The top level management determines the objectives, policies and plans of the organization.
* They mobilizes (assemble and bring together) available resources.
* The top level management does mostly the work of thinking, planning and deciding. therefore, they are also called as the Administrators and the Brain of the organization.
* They spend more time in planning and organizing.
* They prepare long-term plans of the organization which are generally made for 5 to 20 years.
* The top level management has maximum authority and responsibility. They require more conceptual skills and less technical Skills.

**Middle Level of Management**

The Middle Level Management consists of the Departmental Heads (HOD), Branch Managers, and the Junior Executives.

**The middle level management emphasize more on following tasks:-**

* Middle level management gives recommendations (advice) to the top level management.
* It executes (implements) the policies and plans which are made by the top level management.
* It co-ordinate the activities of all the departments.
* They also have to communicate with the top level Management and the lower level management.
* They spend more time in co-coordinating and communicating.
* They prepare short-term plans of their departments which are generally made for 1 to 5 years.
* The middle Level Management has limited authority and responsibility. Require more managerial and technical skills and less conceptual skills.

**Lower Level of Management**

The lower level management consists of the Foremen and the Supervisors. They are selected by the middle level management. It is also called Operative / Supervisory level or First Line of Management.

**The lower level management performs following activities:-**

* Lower level management directs the workers / employees.
* They develop morale in the workers.
* It maintains a link between workers and the middle level management.
* The lower level management informs the workers about the decisions which are taken by the management. They also inform the management about the performance, difficulties, feelings, demands, etc., of the workers.
* They spend more time in directing and controlling.
* The lower level managers make daily, weekly and monthly plans.
* They have limited authority but important responsibility of getting the work done from the workers. Along with the experience and basic management skills, they also require more technical and communication skills.

**1.14 PRINCIPLES OF MANAGEMENT**

**Fayol’s14 Principles of Management - Administrative Management**

The fourteen principles given by Fayol are as under:

1. **Division of Labor**

* Henry Fayol has stressed on the specialization of jobs.
* He recommended that work of all kinds must be divided & subdivided and allotted to various persons according to their expertise in a particular area.
* Subdivision of work makes it simpler and results in efficiency.
* It also helps the individual in acquiring speed, accuracy in his performance.
* Specialization leads to efficiency & economy in spheres of business.

1. **Party of Authority & Responsibility**

* Authority & responsibility are co-existing.
* If authority is given to a person, he should also be made responsible.
* In a same way, if anyone is made responsible for any job, he should also have concerned authority.
* Authority refers to the right of superiors to get exactness from their sub-ordinates whereas responsibility means obligation for the performance of the job assigned.
* There should be a balance between the two i.e. they must go hand in hand.
* Authority without responsibility leads to irresponsible behavior whereas responsibility without authority makes the person ineffective.

1. **Principle of One Boss**

* A sub-ordinate should receive orders and be accountable to one and only one boss at a time.
* In other words, a sub-ordinate should not receive instructions from more than one person because -
  + It undermines authority  
    -  Weakens discipline  
    -  Divides loyalty  
    -  Creates confusion  
    -  Delays and chaos  
    -  Escaping responsibilities  
    -  Duplication of work  
    -  Overlapping of efforts
* Therefore, dual sub-ordination should be avoided unless and until it is absolutely essential.
* Unity of command provides the enterprise a disciplined, stable & orderly existence.
* It creates harmonious relationship between superiors and sub-ordinates.

1. **Unity of Direction**

* Fayol advocates one head one plan which means that there should be one plan for a group of activities having similar objectives.
* Related activities should be grouped together. There should be one plan of action for them and they should be under the charge of a particular manager.
* According to this principle, efforts of all the members of the organization should be directed towards common goal.
* Without unity of direction, unity of action cannot be achieved.
* In fact, unity of command is not possible without unity of direction.

1. **Equity**

* Equity means combination of fairness, kindness & justice.
* The employees should be treated with kindness & equity if devotion is expected of them.
* It implies that managers should be fair and impartial while dealing with the subordinates.
* They should give similar treatment to people of similar position.
* They should not discriminate with respect to age, caste, sex, religion, relation etc.
* Equity is essential to create and maintain cordial relations between the managers and sub-ordinate.
* But equity does not mean total absence of harshness.
* Fayol was of opinion that, “at times force and harshness might become necessary for the sake of equity”.

1. **Order**

* This principle is concerned with proper & systematic arrangement of things and people.
* Arrangement of things is called material order and placement of people is called social order.
* Material order- There should be safe, appropriate and specific place for every article and every place to be effectively used for specific activity and commodity.
* Social order- Selection and appointment of most suitable person on the suitable job. There should be a specific place for everyone and everyone should have a specific place so that they can easily be contacted whenever need arises.

1. **Discipline**

* According to Fayol, “Discipline means sincerity, obedience, respect of authority & observance of rules and regulations of the enterprise”.
* This principle applies that subordinate should respect their superiors and obey their order.
* It is an important requisite for smooth running of the enterprise.
* Discipline is not only required on path of subordinates but also on the part of management.

1. **Initiative**

* Workers should be encouraged to take initiative in the work assigned to them.
* It means eagerness to initiate actions without being asked to do so.
* Fayol advised that management should provide opportunity to its employees to suggest ideas, experiences& new method of work.
* It helps in developing an atmosphere of trust and understanding.
* People then enjoy working in the organization because it adds to their zeal and energy.
* To suggest improvement in formulation & implementation of place.
* They can be encouraged with the help of monetary & non-monetary incentives.

1. **Fair Remuneration**

* The quantum and method of remuneration to be paid to the workers should be fair, reasonable, satisfactory & rewarding of the efforts.
* As far as possible it should accord satisfaction to both employer and the employees.
* Wages should be determined on the basis of cost of living, work assigned, financial position of the business, wage rate prevailing etc.
* Logical & appropriate wage rates and methods of their payment reduce tension & differences between workers & management creates harmonious relationship and pleasing atmosphere of work.
* Fayol also recommended provision of other benefits such as free education, medical & residential facilities to workers.

1. **Stability of Tenure**

* Fayol emphasized that employees should not be moved frequently from one job position to another i.e. the period of service in a job should be fixed.
* Therefore employees should be appointed after keeping in view principles of recruitment & selection but once they are appointed their services should be served.
* According to Fayol. “Time is required for an employee to get used to a new work & succeed to doing it well but if he is removed before that he will not be able to render worthwhile services”.
* As a result, the time, effort and money spent on training the worker will go waste.
* Stability of job creates team spirit and a sense of belongingness among workers which ultimately increase the quality as well as quantity of work.

1. **Scalar Chain**

* Fayol defines scalar chain as ’The chain of superiors ranging from the ultimate authority to the lowest”.
* Every orders, instructions, messages, requests, explanation etc. has to pass through Scalar chain.

1. **Sub-Ordination of Individual Interest to General Interest**

* An organization is much bigger than the individual it constitutes therefore interest of the undertaking should prevail in all circumstances.
* As far as possible, reconciliation should be achieved between individual and group interests.
* But in case of conflict, individual must sacrifice for bigger interests.

1. **Espirit De’ Corps (can be achieved through unity of command)**

* It refers to team spirit i.e. harmony in the work groups and mutual understanding among the members.
* Spirit De’ Corps inspires workers to work harder.
* There should be proper co-ordination of work at all levels
* Subordinates should be encouraged to develop informal relations among themselves.
* Efforts should be made to create enthusiasm and keenness among subordinates so that they can work to the maximum ability.
* Efficient employees should be rewarded and those who are not up to the mark should be given a chance to improve their performance.
* Subordinates should be made conscious of that whatever they are doing is of great importance to the business & society.

1. **Centralization & De-Centralization**

* Centralization means concentration of authority at the top level. In other words, centralization is a situation in which top management retains most of the decision making authority.
* Decentralization means disposal of decision making authority to all the levels of the organization. In other words, sharing authority downwards is decentralization.
* According to Fayol, “Degree of centralization or decentralization depends on no. of factors like size of business, experience of superiors, dependability & ability of subordinates etc.
* Anything which increases the role of subordinate is decentralization & anything which decreases it is centralization.
* Fayol suggested that absolute centralization or decentralization is not feasible. An organization should strike to achieve a lot between the two.

# 1.15 ELEMENTS OR FUNCTIONS OF MANAGEMENT

For theoretical purposes, it may be convenient to separate the function of management but practically these functions are overlapping in nature i.e. they are highly inseparable. Each function blends into the other & each affects the performance of others.

**1. Planning:**

* Planning involves the formulation of what is to be done, how, when and where it is to be done, who is to do it and what results are to be evaluated.
* Planning means looking ahead, it is mental work, it is selecting from among many choices following the procedure given below:

**2. Organizing:**

After determining the course and make-up of action, the next step, in order to accomplish the task, is to distribute the necessary work among the working groups.

It is the process of by which the structure and allocation of jobs is determined.

It means, organizing people, materials, job, time etc., and establishing framework in which responsibilities are defined and authorities and laid down

The process of organizing involves:

-Divide the work into component activities

-Assign people to task (component activities)

-Define responsibilities

-Delegate authority

-Establish structural relationship ( i.eorganization structure) to secure coordination

##### **3.** [**Staffing**](http://www.managementstudyguide.com/staffing-function.htm)**:**

It is the function of manning the organization structure and keeping it manned. Staffing has assumed greater importance in the recent years due to advancement of technology, increase in size of business, complexity of human behavior etc. The main purpose o staffing is to put right man on right job Staffing involves:

* [Manpower Planning](http://www.managementstudyguide.com/manpower-planning.htm) (estimating man power in terms of searching, choose the person and giving the right place).
* Recruitment, selection & placement.
* Training & development.
* Remuneration.
* Performance appraisal.
* Promotions & transfer.

##### **4.** [**Directing**](http://www.managementstudyguide.com/directing_function.htm)

It is that part of managerial function which actuates the organizational methods to work efficiently for achievement of organizational purposes. It is considered life-spark of the enterprise which sets it in motion the action of people because planning, organizing and staffing are the mere preparations for doing the work. Direction has following elements:

* Supervision
* Motivation
* Leadership
* Communication

**Supervision-** implies overseeing the work of subordinates by their superiors. It is the act of watching & directing work & workers.

**Motivation-**means inspiring, stimulating or encouraging the sub-ordinates with zeal to work. Positive, negative, monetary, non-monetary incentives may be used for this purpose.

**Leadership-** may be defined as a process by which manager guides and influences the work of subordinates in desired direction.

**Communications-** is the process of passing information, experience, opinion etc from one person to another. It is a bridge of understanding.

##### **5.** [**Controlling**](http://www.managementstudyguide.com/controlling_function.htm)

“Controlling is the process of checking whether or not proper progress is being made towards the objectives and goals and acting if necessary, to correct any deviation”. According to Koontz &O’Donell “Controlling is the measurement & correction of performance activities of subordinates in order to make sure that the enterprise objectives and plans desired to obtain them as being accomplished”. Therefore controlling has following steps:

* + Establishment of standard performance.
  + Measurement of actual performance.
  + Comparison of actual performance with the standards and finding out deviation if any.
  + Corrective action, if necessary
  + Follow up

**Table 1.2 Functions of Management**

|  |  |
| --- | --- |
| **FUNCTIONS** | **SUB FUNCTIONS** |
| Planning | Forecasting, decision making, strategy formulation, policy making, programming, scheduling, innovation,dudgeting |
| Organising | Grouping of functions, Departmentation, Delegation, Decentralization, task allocation |
| Staffing | Manpower planning, job analysis, Recruitment, Selection, Training, Placement , Compensation, promotion, appraisal, etc |
| Directing | Supervision , Motivation, Communication, Leadership, etc |
| Controlling | Fixation of standard, recording, measurement, reporting corrective action. |

**Planning**

**Definition :**

Planning is deciding in advance what is to be done. It involves the selection of objectives , policies, procedures, and programmes from among alternatives.

Planning is the process of thinking through and making explicit the strategy, actions and relationships necessary to accomplish an overall objective or purpose.

## Characteristics Or Features Of Planning

## (i) Planning is goal-oriented:All plans arise from objectives. Objectives provide the basic guide for planning activities. Planning has no meaning unless it contributes some positive achievement of predetermined goals.

**(ii) Planning is a primary function:** Planning is the foundation of management. It is a parent exercise in management process. It is a preface to business activities. According to Koontz, “Planning provides the basic foundation from which all future management functions arise”. Terry also supported the view, that “without planning there is nothing to organize, no one to motivate and no need to control”.

**(iii) Planning is all-pervasive:** Planning is a function of all managers. It is needed and practiced at all managerial levels. Planning is inherent in everything a manager does. Managers have to plan before launching a new business. They have to plan whenever things change.

**(iv) Planning is a mental exercise:** Planning is a mental process involving imagination, foresight and sound judgement. Planning compels managers to abandon guesswork and wishful thinking. It makes them think in a logical and systematic manner.

**(v) Planning is a continuous process:** Planning is continuous. It is a never-ending activity. Once plans for a specific period are prepared, they are translated into action. At the end of that period, there is a need for a new plan to be drawn based on new situations and conditions

**(vi) Planning involves choice:** Planning essentially involves choice among various alternative courses of action. If there is one way of doing something, there is no need for planning. The need for planning arises only when alternatives are available.

**(vii) Planning is forward looking:** Planning means looking ahead and preparing for the future. It means peeping into the future, analyzing it and preparing for it. Managers plan today with a view to flourish tomorrow. Without planning, business becomes random in nature and decisions would become meaningless, adhoc choices.

**(viii) Planning is flexible:** Planning is based on a forecast of future events. Since future is uncertain, plans should be reasonably flexible. The onset of colour television sets forced many a manufacturer in the West to abandon production of black and white television sets long back. When market conditions change, planners have to make necessary changes in the existing plans.

## 

## Benefits of Planning

**(i) Focuses Attention on Objectives.** Since all planning is directed towards achieving enterprise objectives, the very act of planning focuses attention on these objectives. Laying down the objectives is the first step in planning. If the objectives are clearly laid down, the execution of plans will also be directed towards these objectives.

**(ii) Ensures Economical Operation.** Planning involves a lot of mental exercise, which is directed towards achieving efficient operation in the enterprise. It substitutes joint directed effort for uncoordinated piecemeal activity, even flow of work for uneven flow, and deliberate decisions for snap judgements. This helps in better utilization of resources and thus minimizing costs.

**(iii) Reduces Uncertainty.** Planning helps in reducing uncertainties of future because it involves anticipation of future events. Effective planning is the result of deliberate thinking based on facts and figures. It involves forecasting also.

**(iv) Facilitates Control.** Planning helps the managers in performing their function of control. Planning and control are inseparable in the sense that unplanned action cannot be controlled because control involves keeping activities on the predetermined course by rectifying deviations from plans.

**Organizing**

According to Koontz and O'Donnell, "Organization involves the grouping of activities necessary to accomplish goals and plans, the assignment of these activities to appropriate departments and the provision of authority, delegation and co-ordination."

Organization involves division of work among people whose efforts must be co-ordinated to achieve specific objectives and to implement pre-determined strategies.

**Nature or Characteristics of Organizing**

From the study of the various definitions given by different management experts we get the following information about the characteristics or nature of organization

(1) **Division of Work**: Division of work is the basis of an organization. In other words, there can be no organization without division of work. Under division of work the entire work of business is divided into many departments .The work of every department is further sub-divided into subworks. In this way each individual has to do the saran work repeatedly which gradually makes that person an expert.

(2) **Coordination**: Under organizing different persons are assigned different works but the aim of all these persons happens to be the some - the attainment of the objectives of the enterprise.

Organization ensures that the work of all the persons depends on each other’s work even though it happens to be differentThe work of one person starts from where the work of another person ends. The non-completion of the work of one person affects the work of everybody.

(3) **Plurality of Persons**: Organization is a group of many persons who assemble to fulfill a common purpose. A single individual cannot create an organization.

(4) **Common Objectives**: There are various parts of an organization with different functions to perform but all move in the direction of achieving a general objective.

(5) **Well-defined Authority and Responsibility**: Under organization a chain is established between different posts right from the top to the bottom. It is clearly specified as to what will be the authority and responsibility of every post.

(6) **Organization is a Structure of Relationship**: Relationship between persons working on different posts in the organization is decided. In other words, it is decided as to who will be the superior and who will be the subordinate.

(7) **Organization is a Machine of Management**: Organization is considered to be a machine of management because the efficiency of all the functions depends on an effective organization. In the absence of organization no function can be performed in a planned manner.

(8) **Organization is a Universal Process**: Organization is needed both in business andnon-business organizations. Not only this, organization will be needed where two or mom than two people work jointlyTherefore, organization has the quality of universality.

(9) **Organization is a Dynamic Process**: Organization is related to people and the knowledge and experience of the people undergo a change. The impact of this change affects the various functions of the organizations.

**Staffing**

Staffing involves filling the positions needed in the organization structure by appointing competent and qualified persons for the job.

The staffing process encompasses man power planning, recruitment, selection, and training.

a) **Manpower requirements**:

Manpower Planning which is also called as Human Resource Planning consists of

putting right number of people, right kind of people at the right place, right time, doing the right things for which they are suited for the achievement of goals of the organization. The primary function of man power planning is to analyze and evaluate the human resources available in the organization, and to determine how to obtain the kinds of personnel needed to staff positions ranging from assembly line workers to chief executives.

b) **Recruitment:**

Recruitment is the process of finding and attempting to attract job candidates who are capable of effectively filling job vacancies.

Job descriptions and job specifications are important in the recruiting process because they specify the nature of the job and the qualifications required of job candidates.

c) **Selection**:

Selecting a suitable candidate can be the biggest challenge for any organization. The success of an organization largely depends on its staff. Selection of the right candidate builds the foundation of any organization's success and helps in reducing turnovers.

d) **Training and Development**: Training and Developmentis a planned effortto facilitate employee learning of jobrelated behaviors in order to improve employee performance. Experts sometimes distinguish between the terms “training” and “development”; “training” denotes efforts to increase employee skills on present jobs, while “development” refers to efforts oriented toward improvements relevant to future jobs. In practice, though, the distinction is often blurred (mainly because upgrading skills in present jobs usually improves performance in future jobs).

**Objectives of staffing:**

The general objective of Staffing is to contribute towards the accomplishment of the goals of an enterprise. However, the Staffing in any working organization should have the following specific objectives:

(i) To attain maximum individual development;

(ii) To establish desirable working relationship between employers and employees and between groups of employees;

(iii) To mould effectively the human resources;

(iv) To ensure satisfaction of the workers so that they are freely ready to work;

(v) To provide fair wages, good working conditions and service benefits to the workers;

(vi) To ensure that every employee makes his maximum contribution to the success of the enterprise.

**Directing**

"Activating deals with the steps a manager takes to get sub-ordinates and others

to carry out plans" - Newman and Warren.

Directing concerns the total manner in which a manager influences the actions of subordinates. It is the final action of a manager in getting others to act after all preparations have been completed.

Direction hasfollowing elements:

• Supervision

• Motivation

• Leadership

• Communication

(i) Supervision- implies overseeing the work of subordinates by their superiors. It is theact of watching & directing work & workers.

(ii) Motivation- means inspiring, stimulating or encouraging the sub-ordinates with zealto work. Positive, negative, monetary, non-monetary incentives may be used for thispurpose.

(iii) Leadership- may be defined as a process by which manager guides and influences

the work of subordinates in desired direction.

(iv) Communications- is the process of passing information, experience, opinion etc

from one person to another. It is a bridge of understanding.

**Characteristics**

• Elements of Management

• Continuing Function

• Pervasive Function

• Creative Function

• Linking function

• Management of Human Factor

**Scope of Directing**

• Initiates action

• Ensures coordination

• Improves efficiency

• Facilitates change

• Assists stability and growth

**Controlling**

Control is the process through which managers assure that actual activities conform to planned activities.

In the words of Koontz and O'Donnell - "Managerial control implies measurement of

accomplishment against the standard and the correction of deviations to assure attainment of objectives according to plans."

Nature & Purpose of Control

• Control is an essential function of management

• Control is an ongoing process

• Control is forward – working because pas cannot be controlled

• Control involves measurement

• The essence of control is action

• Control is an integrated system

**Control Process**

**a) The Establishment of Standards**:

Because plans are the yardsticks against which controls must be revised, it follows logically that the first step in the control process would be to accomplish plans. Plans can be considered as the criterion or the standards against which we compare the actual performance in order to figure out the deviations.

Examples for the standards

• Profitability standards: In general, these standards indicate how much the company would like to make as profit over a given time period- that is, its return on investment.

•Market position standards: These standards indicate the share of total sales in a particular market that the company would like to have relative to its competitors.

•Productivity standards: How much that various segments of the organization should produce is the focus of these standards.

**b) Measurement of Performance:**

The measurement of performance against standards should be on a forward looking basis so that deviations may be detected in advance by appropriate actions. The degree of difficulty in measuring various types of organizational performance, of course, is determined primarily by the activity being measured. For example, it is far more difficult to measure the performance of highway maintenance worker than to measure the performance of a student enrolled in a college level management course.

**c) Comparing Measured Performance to Stated Standards:**

When managers have taken a measure of organizational performance, their next step in controlling is to compare this measure against some standard. A standard is the level of activity established to serve as a model for evaluating organizational performance. The performance evaluated can be for the organization as a whole or for some individuals working within the organization. In essence, standards are the yardsticks that determine whether organizational performance is adequate or inadequate.

**d) Taking Corrective Actions:**

After actual performance has been measured compared with established performance standards, the next step in the controlling process is to take corrective action, if necessary. Corrective action is managerial activity aimed at bringing organizational performance up to the level of performance standards. In other words, corrective action focuses on correcting organizational mistakes that hinder organizational performance.

**1.16 TYPES OF OWNERSHIP**

# When organizing a new business, one of the most important decisions to be made is choosing the structure of a business

# Sole Proprietorships

# The vast majority of small business starts out as sole proprietorships . . . very dangerous. These firms are owned by one person, usually the individual who has day-to-day responsibility for running the business. Sole proprietors own all the assets of the business and the profits generated by it. They also assume "complete personal" responsibility for all of its liabilities or debts. In the eyes of the law, you are one in the same with the business.

**Advantages**

# •Easiest and least expensive form of ownership to organize.

# • Sole proprietors are in complete control, within the law, to make all decisions.

# • Sole proprietors receive all income generated by the business to keep or reinvest.

# • Profits from the business flow-through directly to the owner's personal tax return.

# • The business is easy to dissolve, if desired.

**Disadvantages**

# Unlimited liability and are legally responsible for all debts against the business.

# Their business and personal assets are 100% at risk.

# Has almost been ability to raise investment funds.

# Are limited to using funds from personal savings or consumer loans.

# Have a hard time attracting high-caliber employees, or those that are motivated by the opportunity to own a part of the business.

# Employee benefits such as owner's medical insurance premiums are not directly deductible from business income (partially deductible as an adjustment to income).

# Partnerships

# In a Partnership, two or more people share ownership of a single business. Like proprietorships, the law does not distinguish between the business and its owners.

# The Partners should have a legal agreement that sets forth how decisions will be made, profits will be shared, disputes will be resolved, how future partners will be admitted to the partnership, how partners can be bought out, or what steps will be taken to dissolve the partnership when needed.

**Advantages**

* Partnerships are relatively easy to establish; however time should be invested in developing the partnership agreement.
* With more than one owner, the ability to raise funds may be increased**.**

# The profits from the business flow directly through to the partners' personal taxes.

# Prospective employees may be attracted to the business if given the incentive to become a partner.

**Disadvantages**

# • Partners are jointly and individually liable for the actions of the other partners.

# • Profits must be shared with others.

# • Since decisions are shared, disagreements can occur.

# • Some employee benefits are not deductible from business income on tax returns.

# • The partnerships have a limited life; it may end upon a partner withdrawal or death.

**Public Limited Company**

Limited companies which can sell share on the stock exchange are Public Limited companies. These companies usually write PLC after their names.

|  |
| --- |
|  |
| According to companies Act, 1956, every company both private and public limited company has to be compulsorily registered. Public limited company is a voluntary association of members which is incorporated and, therefore has a separate legal existence and the liability of whose members is limited. Its main features are :-   * The company has a separate legal existence apart from its members who compose it. * Its formation, working and its winding up, in fact, all its activities are strictly governed by laws, rules and regulations. [The Indian Companies Act, 1956](http://business.gov.in/outerwin.php?id=http://indiacode.nic.in/rspaging.asp?tfnm=195601) contains the provisions regarding the legal formalities for setting up of a public limited company. Registrars of Companies (ROC) appointed under the Companies Act covering the various States and Union Territories are vested with the primary duty of registering companies floated in the respective states and the Union Territories. * A company must have a minimum of seven members but there is no limit as regards the maximum number. * The company collects its capital by the sale of its shares and those who buy the shares are called the members. The amount so collected is called the share capital. * The shares of a company are freely transferable and that too without the prior consent of other shareholders or without subsequent notice to the company. * The liability of a member of a company is limited to the face value of the shares he owns. Once he has paid the whole of the face value, he has no obligation to contribute anything to pay off the creditors of the company. * The shareholders of a company do not have the right to participate in the day-to-day management of the business of a company. This ensures separation of ownership from management. The power of decision making in a company is vested in the Board of Directors, and all policy decisions are taken at the Board level by the majority rule. This ensures a unity of direction in management. * As a company is an independent legal person, its existence is not affected by the death, retirement or insolvency of any of its shareholders.  |  | | --- | | **Minimum requirements:** | | • Minimum 7 Shareholders  • Minimum 3 Directors  • The directors and shareholders can be same person • Minimum Share Capital shall be Rs. 500,000 (INR Five Lac) • DIN (Director Identification Number) for all the Directors • DSC (Digital Signature Certificate) for one of the Directors |   **Advantages**   * Continuity of existence * Larger amount of capital * Unity of direction * Efficient management * Limited liability   **Disadvantages**   * Scope for promotional frauds * Undemocratic control * Scope for directors for personal profit * Subjected to strict regulations * There are lot of **legal formalities** required for forming a public limited company. It is costly and time consuming. * In order to protect the interest of the ordinary investor there are **strict controls and regulations** to comply. These companies have to publish their accounts. * The original owners may **lose control**. * Public Limited companies are huge in size and may face **management problems** such as slow decision making and industrial relations problem |

# Private Limited Companies

These are closely held businesses usually by family, friends and relatives.

Private companies may issue stock and have shareholders. However, their shares do not trade on public exchanges and are not issued through an initial public offering.

Shareholders may not be able to sell their shares without the agreement of the other shareholders.

|  |  |  |  |
| --- | --- | --- | --- |
| Its main features are :-   * It has an independent legal existence. [The Indian Companies Act,1956](http://business.gov.in/outerwin.php?id=http://indiacode.nic.in/rspaging.asp?tfnm=195601)contains the provisions regarding the legal formalities for setting up of a private limited company. Registrars of Companies (ROC) appointed under the Companies Act covering the various States and Union Territories are vested with the primary duty of registering companies floated in the respective states and the Union Territories. * It is relatively less cumbersome to organize and operate it as it has been exempted from many regulations and restrictions to which a public limited company is subjected to. Some of them are :-   + it need not file a prospectus with the Registrar.   + it need not obtain the Certificate for Commencement of business.   + it need not hold the statutory general meeting nor need it file the statutory report.   + restrictions placed on the directors of the public limited company do not apply to its directors. * The liability of its members is limited. * The shares allotted to it's members are also not freely transferable between them. These companies are not allowed to invite public to subscribe to its shares and debentures. * It enjoys continuity of existence i.e. it continues to exist even if all its members die or desert it.   Hence, a private company is preferred by those who wish to take the advantage of limited liability but at the same time desire to keep control over the business within a limited circle and maintain the privacy of their business.   |  | | --- | | **Minimum requirements:** | |  | | • Minimum 2 Shareholders  • Minimum 2 Directors  • The directors and shareholders can be same person • Minimum Share Capital shall be Rs. 100,000 (INR One Lac) • DIN (Director Identification Number) for all the Directors • DSC (Digital Signature Certificate) for one of the Directors | |

## Advantages

* Limited Liability: It means that if the company experience financial distress because of normal business activity, the personal assets of shareholders will not be at risk of being seized by creditors.
* Continuity of existence: business not affected by the status of the owner.
* Minimum number of shareholders need to start the business are only2.
* More capital can be raised as the maximum number of shareholders allowed is 50.

**UNIT II**

**PRODUCTION MANAGEMENT**

**AND MARKETING MANAGEMENT**

**2.1 INTRODUCTION**

* Production [management](http://kalyan-city.blogspot.com/2011/04/what-is-management-definitions-meaning.html) means planning, organizing, directing and controlling of production activities.
* Production management deals with converting raw materials into finished goods or products. It brings together the 6M's i.e. men, money, machines, materials, methods and markets to satisfy the wants of the people.
* Production management also deals with decision-making regarding the quality, quantity, cost, etc., of production. It applies management principles to production.
* Production management is a part of [business](http://kalyan-city.blogspot.com/2011/03/what-is-business-meaning-definitions.html) management. It is also called "Production Function." Production management is slowly being replaced by operations management.
* The main objective of production management is to produce goods and services of the right quality, right quantity, at the right time and at minimum cost. It also tries to improve the efficiency. An efficient organization can face competition effectively. Production management ensures full or optimum utilization of available production capacity.

**2.2 TYPES OF PRODUCTION**

Production systems can be classified as

* Job Shop
* Batch
* Mass
* Continuous Production Systems

**2.2.1 Job Shop Production**

Job shop production are characterized by manufacturing of one or few quantity of products designed and produced as per the specification of customers within prefixed time and cost. The distinguishing feature of this is low volume and high variety of products.

A job shop comprises of general purpose machines arranged into different departments.

Each job demands unique technological requirements, demands processing on machines in a certain sequence.

**Characteristics**

The Job-shop production system is followed when there is:

* High variety of products and low volume.
* Use of general purpose machines and facilities.
* Highly skilled operators who can take up each job as a challenge because of uniqueness.
* Large inventory of materials, tools, parts.
* Detailed planning is essential for sequencing the requirements of each product, capacities for each work centre and order priorities.

**Advantages**

Following are the advantages of job shop production:

* Because of general purpose machines and facilities variety of products can be produced.
* Operators will become more skilled and competent, as each job gives them learning Opportunities.
* Full potential of operators can be utilised.
* Opportunity exists for creative methods and innovative ideas.

**Limitations**

Following are the limitations of job shop production:

* Higher cost due to frequent set up changes.
* Higher level of inventory at all levels and hence higher inventory cost.
* Production planning is complicated.

**2.2.2 Batch Production**

Batch production is defined by American Production and Inventory Control Society (APICS) “as a form of manufacturing in which the job passes through the functional departments in lots or batches and each lot may have a different routing.” It is characterised by the manufacture of limited number of products produced at regular intervals and stocked awaiting sales.

**Characteristics**

Batch production system is used under the following circumstances:

* When there is shorter production runs.
* When plant and machinery are flexible.
* When plant and machinery set up is used for the production of item in a batch and change of set up is required for processing the next batch.
* When manufacturing lead time and cost are lower as compared to job order production.

**Advantages**

Following are the advantages of batch production:

* Better utilization of plant and machinery.
* Promotes functional specialization.
* Cost per unit is lower as compared to job order production.
* Lower investment in plant and machinery.
* Flexibility to accommodate and process number of products.
* Job satisfaction exists for operators.

**Limitations**

Following are the limitations of batch production:

* Material handling is complex because of irregular and longer flows.
* Production planning and control is complex.
* Work in process inventory is higher compared to continuous production.
* Higher set up costs due to frequent changes in set up.

**2.2.3 Mass Production**

Manufacture of discrete parts or assemblies using a continuous process are called mass production. This production system is justified by very large volume of production. The machines are arranged in a line or product layout. Product and process standardization exists and all outputs follow the same path.

**Characteristics**

Mass production is used under the following circumstances:

1. Standardization of product and process sequence.

2. Dedicated special purpose machines having higher production capacities and output rates.

3. Large volume of products.

4. Shorter cycle time of production.

5. Lower in process inventory.

6. Perfectly balanced production lines.

7. Flow of materials, components and parts is continuous and without any back tracking.

8. Production planning and control is easy.

9. Material handling can be completely automatic.

**Advantages**

Following are the advantages of mass production:

* Higher rate of production with reduced cycle time.
* Higher capacity utilization due to line balancing.
* Less skilled operators are required.
* Low process inventory.
* Manufacturing cost per unit is low.

**Limitations**

Following are the limitations of mass production:

* Breakdown of one machine will stop an entire production line.
* Line layout needs major change with the changes in the product design.
* High investment in production facilities.
* The cycle time is determined by the slowest operation.

**2.2.4 Continuous Production**

Production facilities are arranged as per the sequence of production operations from the first operations to the finished product. The items are made to flow through the sequence of operations through material handling devices such as conveyors, transfer devices, etc.

**Characteristics**

Continuous production is used under the following circumstances:

* Dedicated plant and equipment with zero flexibility.
* Material handling is fully automated.
* Process follows a predetermined sequence of operations.
* Component materials cannot be readily identified with final product.
* Planning and scheduling is a routine action.

**Advantages**

Following are the advantages of continuous production:

* Standardization of product and process sequence.
* Higher rate of production with reduced cycle time.
* Higher capacity utilization due to line balancing.
* Manpower is not required for material handling as it is completely automatic.
* Person with limited skills can be used on the production line.
* Unit cost is lower due to high volume of production.

**Limitations**

Following are the limitations of continuous production:

* Flexibility to accommodate and process number of products does not exist.
* Very high investment for setting flow lines.
* Product differentiation is limited.

**2.3 PROCESS OF PLANNING**

A process is defined as a group of actions instrumental to the achievement of the output of an operation system in accordance with a specified measure of effectiveness.

Process planning is the systematic determination of the methods by which a product is to be manufactured, economically and competitively.

Process planning has been defined as the subsystem responsible for the conversion of design data to work instruction.

It is also defined as the function within a manufacturing facility which establishes the the processes and process parameters to be used in order to convert a piece-part from its initial form that is predetermined on detailed drawing.

**2.3.1 Process Planning Procedure**

**Preparation of Work Drawings**

* It is a document complete in itself to manufacture a component or product. It contains dimensions, tolerances, kind of treatment etc.,
* The tooling department uses them to plan the tooling that is required for manufacturing
* The drawings should be in standard form
* All the particulars about the should be included in the drawing
* Notes on drawing should be shown on in a standard panel on the drawing pro-forma

**Make or Buy Decisions**

The reasons for make or buy decisions are

* Idle facilities
* Product quality
* Patents
* Skills and materials
* Number of outside suppliers
* Reliability of outside sources
* Seasonal demands
* Long term considerations

1. **Process Selection**

* Major technological change – existence of technology, availability of more technologies, licensing of technology, innovation o technology etc.,
* Minor technological change – deciding the combination of processes in terms of cost and the total operation process can be difficult
* Specific component choice – type of equipment, degree of replacing the human labour, using of CAM and industrial robots
* Process flow choice – analysis of product flow lead to re-sequencing, combining or eliminating operation in order to reduce material handling and storage costs

1. **Machine Capacity**

* Machine capacity may be defined as the time- available for work at a machine expressed in machine hours.
* It has to be calculated for per day or week or month

1. **Process And Equipment Selection Procedure**

* Prepare a general statement on the manufacturing operations to be performed
* Establish a provisional process to provide each individual feature identified by the product designer
* Develop a list of alternative process
* Compare the alternatives with each other
* Select the best alternative
* Communicate the same to all the departments ( production, industrial, plant and maintenance, industrial relations, finance department )to Perform detailed processing

1. **Selection of Material, Jigs Etc**

* The material should be of right quality and chemical composition as per product specification
* The shape and size of the material should restrict the scrap
* The jigs, fixtures and other special attachments should give higher production rate and should reduce cost of production per piece
* The selection of cutting tools and inspection gauges should reduce production time and inspection

1. **Process Analysis**

* It means the study of overall process in a factory.
* It analyses each step of manufacturing process and aims at improving the industrial operations.
* It aids in finding better methods of doing a job by eliminating unproductive and unnecessary elements of the process or through modified layout of facilities.
* The process is analyzed with the help of process charts of flow diagrams.

1. **Process Chart**

A chart may be a diagram or a graph which gives an overall view of the situation say a process. It records graphically or diagrammatically , in sequence , the operation connected with a process. It helps visualizing various possibilities of alteration or improvement.

1. **Operation Planning And Tooling Requirements**

It is concerned with planning the details of the method to be used to complete each operation as its chosen work centre and with designing the necessary tooling.

The operations are divided into work elements. It is recorded in the operation sheet. It is prepared for each part, assembly and sub-assembly.

1. **Manual / Automated Process Planning**

The process planner tries to select the best set of processes and machines either manually or by using computers.

**2.4 PROCESS SCHEDULING**

**Kimball and Kimball**define scheduling as “the determination of the time that should be required to perform each operation and also the time necessary to perform the entire series as routed, making allowances for all factors concerned”.

**Objectives of Scheduling**

* Ensure maximum utilization of plant at minimum cost
* Ensure the requirements of manpower is optimum and is evenly distributes, there being no peaks and valleys.
* Keep yourself abreast of hiring, dismissals, retrenchments, holidays, leave etc., of the work force.
* Possess up-to-date information regarding availability of materials, expected date of delivery, materials rejection, shortages, purchase orders cancelled etc.,
* Update with data on each machine regarding its availability of spares, frequency of breakdowns, servicing and overhauling schedules, replacement schedules etc.,
* Have complete information on performance standards and their revisions, method revisions, changes in materials and machines etc.
* Obtain quick feedback from machine regarding delays and interruptions which may held up production activity.

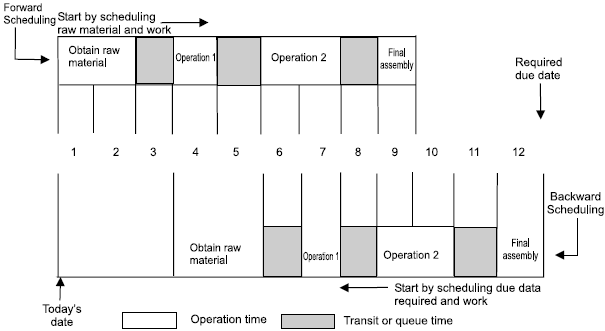
**2.4.1** **Types of Scheduling**

Types of scheduling can be categorized as forward scheduling and backward scheduling.

1. **Forward scheduling**: is commonly used in job shops where customers place their orders on  “needed as soon as possible” basis.

* Forward scheduling determines start and finish times of next priority job by assigning it the earliest available time slot and from that time, determines when the job will be finished in that work centre.
* Since the job and its components start as early as possible, they will typically be completed before they are due at the subsequent work centers in the routing.
* The forward method generates in the process inventory that are needed at subsequent work centers and higher inventory cost.
* Forward scheduling is simple to use and it gets jobs done in shorter lead times, compared to backward scheduling.

1. **Backward scheduling** : is often used in assembly type industries and commit in advance to specific delivery dates. Backward scheduling determines the start and finish times for waiting jobs by assigning them to the latest available time slot that will enable each job to be completed just when it is due, but done before.  By assigning jobs as late as possible, backward scheduling minimizes inventories since a job is not completed until it must go directly to the next work centre on its routing. Forward and backward scheduling methods are shown in the following figure.

****

**Fig 2.1 Forward and backward scheduling**

**2.4.2 Scheduling Methodology**

1. Charts and boards,
2. Priority decision rules, and
3. Mathematical programming methods.
4. **Gantt Charts and Boards**: Gantt charts and associated scheduling boards have been extensively used scheduling devices in the past, although many of the charts are now drawn by computer. Gantt charts are extremely easy to understand and can quickly reveal the current or planned situation to all concerned. They are used in several forms, namely,
   1. Scheduling or progress charts, which depicts the sequential schedule;
   2. Load charts, which show the work assigned to a group of workers or machines; and
   3. Record a chart, which are used to record the actual operating times and delays of workers and machines.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| GANTT CHART | | | | |
|  | WEEK - 1 | WEEK - 2 | WEEK- 3 | WEEK - 4 |
| SECTION - A |  |  |  |  |
| SECTION – B |  |  |  |  |
| SECTION – C |  |  |  |  |

**Fig 2.2 Gantt Charts**

**Advantages**

* It is simple and easy to understand
* It can be kept running
* It involves less cost
* It can be maintained by non-technical staff
* A certain percentage of total weekly capacity can be allotted for rush orders

**Disadvantages**

* It provides only overall picture
* It does not give detailed information

**2. Priority Decision Rules**: Priority decision rules are simplified guidelines for determining the sequence in which jobs will be done. In some firms these rules take the place of priority planning systems such as MRP systems. Following are some of the priority rules followed.

|  |  |
| --- | --- |
| **Symbol** | **Priority rule** |
| FCFS | First come, first served |
| EDO | Earliest due date |
| LS | Least slack(time due less processing time) |
| SPT | Shortest processing time |
| LPT | Longest processing time |
| PCO | Preferred customer order |
| RS | Random selection |

1. **Mathematical Programming Methods**: Scheduling is a complex resource allocation problem. Firms process capacity, labor skills, materials and they seek to allocate their use so as to maximize a profit or service objective, or perhaps meet a demand while minimizing costs.   
   The following are some of the models used in scheduling and production control.
   1. **Linear programming model:** Here all the constraints and objective functions are formulated as a linear equation and then problem is solved for optimality. Simplex method, transportation methods and assignment method are major methods used here.
   2. **PERT/CPM network model:** PERT/CPM network is the network showing the sequence of operations for a project and the precedence relation between the activities to be completed.

**2.5 ROUTING**

Routing may be defined as the selection of path which each part of the product will follow while being transformed from raw materials to finished products. Path of the product will also give sequence of operation to be adopted while being manufactured. In other way, routing means determination of most advantageous path to be followed from department to department and machine to machine till raw material gets its final shape, which involves the following steps:

* Type of work to be done on product or its parts.
* Operation required to do the work.
* Sequence of operation required.
* Where the work will be done.
* A proper classification about the personnel required and the machine for doing the work.

For effective production control of a well-managed industry with standard conditions, the routing plays an important role, i.e., to have the best results obtained from available plant capacity. Thus routing provides the basis for scheduling, dispatching and follow-up.

**Techniques of routing:**

1. **Route card*:*** This card always accompanies with the job throughout all operations. This indicates the material used during  manufacturing and their progress from one operation to another. In addition to this the details of scrap and good work produced are also recorded
2. **Work sheet:** It contains
   1. Specifications to be followed while manufacturing.
   2. Instructions regarding routing of every part with identification number of machines and This sheet is made for manufacturing as well as for maintenance
3. **Route sheet*:*** It deals with specific production order. Generally made from operation sheets. One sheet is required for each part or component of the order. This includes the following:
   1. Number and other identification of order.
   2. Symbol and identification of part.
   3. Number of pieces to be made.
   4. Number of pieces in each lot if put through in lots.
   5. Operation data which includes:
      1. List of operation on the part.
      2. Department in which operations are to be performed.
      3. Machine to be used for each operation.
      4. Fixed sequence of operation, if any.
4. **Move order*:*** Though this is document needed for production control, it is never used for routing system. Move order is prepared for each operation as per operation sheet. On this the quantity passed forward, scrapped and to be rectified are recorded.  It is returned to planning office when the operation is completed.

**Factors affecting routing procedure:**

1. **Types of manufacture:** Layout of the plant depends on the type of production. In case of product layout, routing is built into production line and the flow of materials is virtually automatic.
2. **Characteristics of individual machine:** Machines do differ in age, condition, degree of precision, capacity of range, speed, tooling and such other traits such a list should also include the conveyors, cranes, containers and other equipment which may be available in one section of the plant but not in another.
3. **Availability of alternative routing::**Machines may breakdown (or) an operator may be absent, in such situation routing selection must readily have an alternative routing to substitute the standard route.
4. **Human factors:** Personnel vary in various characteristics. For eg., there is a different between operators regarding experience and capability relating to visual exactness, manual dexterity, physical limitations, intelligence and emotional stability.

**2.6 MATERIALS CONTROL**

Materials management is defined as “the function responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an optimum manner so as to provide a pre-decided service to the customer at a minimum cost*”.*

Material management is the “management of the flow of materials into an organization to the point, where, those materials are converted into the firm’s end products”.

The fundamental objectives of the Materials Management function, often called the famous 5 Rs of Materials Management

* + Of the right quality
  + In the right quantity
  + At the right time
  + From the right source
  + At the right price

**2.6.1 Introduction**

* Materials and supplies constitute the most important assets in the majority of business enterprises. The success of the business, besides other factors, depends to a large extent on the efficient storage and material control.
* Material pilferage, deterioration of material and careless handling of stores lead to reduced profits.
* Even losses can be incurred by concerns in which the store-room is available to all employees without check as to the quantities and purpose for which materials are to be used.

**2.6.2 Requirements of a Material Control system**

* Proper coordination of departments such purchase, receiving testing storage accounting, etc.
* Making economy in purchase and use of materials
* Operating an internal check to verify all transactions involving materials, supplies, equipment, etc.
* Storing materials and supplies properly in a safe place
* Operating a system of perpetual inventory to find at any time the amount and value of each kind of material in stock.
* Setting of quantity standards
* Operating a system to see that right material is available to a department at the time of its need.
* Keeping proper records of all material transactions.

**2.6.3 Stores Management**

Stores play a vital role in the operations of company. It is in direct touch with the user departments in its day-to-day activities. The most important purpose served by the stores is to provide uninterrupted service to the manufacturing divisions. Further, stores are often equated directly with money, as money is locked up in the stores.

Store keeping may be defined as a function of receiving, storing and issue of materials, bought out parts and components, spare parts, tools, consumables, supplies, stationary items etc.

**Objectives of Storekeeping**

* It offers protection against fire, damage, deterioration, theft, losses.
* To facilitate a balanced and smooth flow of raw materials, components, tools and any other items necessary to meet production
* To maintain optimum stock of materials to compensate for irregular supplies by suppliers.
* To achieve efficient utilization of storage space.
* To reduce usage of materials handling equipment.
* To enable flexibility in production schedules.
* To facilitate quantity purchases at discount prices.
* It must allow for easy, quick and sure receipt, storage and disbursement of material when properly authorized.
* It is an organized store and as such it must provide means for identifying and quickly locating articles and any contents. For this purpose it has the device of indexing, identification marks and labels.
* Minimum investment in inventories can be assured

**Functions of Stores**

The functions of stores can be classified as follows:

* To receive raw materials, components, tools, equipment’s and other items and account for them.
* To provide adequate and proper storage and preservation to the various items.
* To meet the demands of the consuming departments by proper issues and account for the consumption.
* To minimize obsolescence, surplus and scrap through proper codification, preservation and handling.
* To highlight stock accumulation, discrepancies and abnormal consumption and effect control measures.
* To ensure good housekeeping so that material handling, material preservation, stocking, receipt and issue can be done adequately.
* To assist in verification and provide supporting information for effective purchase action.
* Efficient and orderly record-keeping of all materials into storage
* Storage of material in safe and convenient locations
* Issue of purchase requisition as per instruction of production controllers to the purchasing agent.
* Issuing (disbursement) of materials to the operators and/or foremen against written authority.
* Conduct of physical inventory control
* Timely intimation to proper authorities regarding out-of-stock conditions of items
* Custodian of goods against losses, damages, unauthorized use, pilfering. Standard items often invite theft and are stolen for resale. Such thefts should be prevented.

**2.7 CONCEPTS OF PRODUCTIVITY**

**Productivity**

* Productivity of a production system is analogous to the efficiency of a machine. Just as it desired to increase the efficiency of a machine, it is also aimed at to raise the productivity within the available resources.
* Productivity may be defined as the ratio between output and input. Output means the amount produced or the number of items produced and inputs are the various resources employed, e.g., land and building, equipment and machinery, materials, labour, etc.

**Example: Calculation of Productivity**

**Plant A Plant B**

No. of workers 200 300

No. of items produced per unit time 10 20

10 20

Therefore productivity = 200 = 300

= 1 = 1

20 15

* + 1. **Purpose to Increase Productivity**

**For Management**

* To produce good earning (profits).
* To clear the debts or loans acquired from different sources
* To sell more, and
* To stand better in the market

**For Workers**

* Higher wages
* Better working conditions
* Higher standard of living and
* Job security and satisfaction

**For Customers**

* Reduced price of the articles
  + 1. **FACTORS AFFECTING PRODUCTIVITY**

**Factors affecting National Productivity**

* Human resources
* Technology and capital investment
* Government regulations

**Human resources**

* The general level of education is an important factor in national Productivity. The use of computers and others sophisticated equipment and systems require better educated employees.
* Employees need to be motivated to be productive. Pay is not enough; they need to have good, safe, working conditions and to be recognized as the most vital part of the enterprise.

**Technology and capital investment**

* The major factor in long range continuingproductivity improvement is technology, and new technology depends on research & development.
* For industry or services to put new technology into use they must invest in new machinery and equipment.

**Government regulations**

* An excessive amount of government regulation may have a detrimental effect on productivity.
* Government can do much to eliminate unneeded regulations and to make cost-benefit analysis to determine the necessary regulations such as those on health and safety.

**Factors affecting Productivity in Manufacturing and Services**

* Product or system design
* Machinery and equipment
* The skill and effectiveness of the worker
* Production volume

**Product or system design**

* Value analysis can bring out many product design changes that improve productivity
* R & D is a vital contributor to improved product design
* Standardization of the product and the use of group technology are other design factors that make possible greater productivity in the factory.

**Machinery and equipment**

* Once the product is designed, then how it is made offers the next opportunity for productivity improvement. The equipment used- machines, tools, conveyors, robots, the way the factory is laid out-all are important.
* Computer has helped design the products (CAD), it helps operating complicated machine tools (CNC machines) and it controls the inventory of material and parts. It has become an essential ingredient in productivity improvement.

**Skill and Effectiveness of the Worker**

* The trained and experienced worker can do the same job in a much shorter time and with far greater effectiveness than a new one.
* However, even the well-trained employees must be motivated to be products.

**Production volume**

* Assume that the volume of output is to be doubled. The number of direct workers would have to be doubled and a few indirect workers might also be needed. But there would probably not be a need for more engineers, research scientists, headquarters staff people or other support personnel.
* So if the output is doubled, the productivity of these support people is in effect doubled.
  + 1. **INCREASING PRODUCTIVITY OF RESOURCES**
* **Material**

Industries in which the cost of raw material is a big percentage of the cost of finished goods, higher productivity can be achieved through proper use of materials.

* **Labour**

A little change in the design of component parts so as to facilitate final assembly can increase the number of products assembled per day with the same amount of labour.

* **Plant, Equipment and Machinery**

Productivity can be increased through the use of improved tools (e.g., cutting tools in a machine shop), simple attachments and other devices.

* **Land and buildings**

A suitable plant layout can accommodate more machinery in the same space and thus raise productivity. Proper orientation, construction and inside conditions of a inside conditions of a building definitely affect productivity.

**Example:**

There are two industries manufacturing two types of plugs. The standard time per piece is 1.5 minutes. The output of the two industries is 300 and 200 respectively per shift of 8 hours.

1. What is the productivity of each per shift of 8 hours?
2. What is the production of each per week (6 days) on the basis of double shift?

**Solution:**

**Industry 1 Industry 2**

Actual Production

1. Productivity =

Standard production

Therefore Productivity of factory-1 Productivity of factory-2

300 200

= =

8\*60 8\*60

1.5 1.5

15 5

= 16 = 8

1. P1= Productivity of factory-1 P2= Productivity of factory-2

= 300\*6\*2 =200\*6\*2

=3600 =2400

* + 1. **KINDS OF PRODUCTIVITY MEASURES**

1. **Labour Productivity**

* The resources input are aggregated in terms of labor hours.
* Hence this index is relatively free of changes caused by wages rates and labour mix

1. **Direct labour cost productivity**

* The resources input are aggregated in terms of labor costs.
* This index will reflect the effect of both wages rates and changes in the labour mix.

1. **Capital productivity**

* Several formulations are possible
* In one, the resources inputs may be the charges during the period to depreciation; in another, the inputs may be the book value of capital investment.

1. **Direst cost productivity**

* In this formulation, all items of direct cost associated with resources used are aggregated on a monetary value basis.

1. **Energy productivity**

* In this formulation the only resource considered is the amount of energy consumed.

1. **Raw material productivity**

* In this formulation, the numerators are usually weight of product; the denominators are the weight of raw material consumed.
  + 1. **Sources of Information For Developing Measures of Productivity**
* Product identification information
* Accounting information
* Work measurement information
  + 1. **Productivity Measurement System**

A Productivity Measurement System has the following basic components.

**Components:**

* A statement of the objectives of the organization
* A list of the units of output of the organization
* Standard time, standard cost, raw material use, equipment use, tool use, etc., for each kind of output.
* A method of building a zero base budget using forecasts of outputs, standard times and forecasts of the productivity.
* A means of computing the productivity indexes at selected intervals.
* A means of computing output forecasts with actual output at selected intervals.

**2.8 CORE CONCEPTS OF MARKETING**

* Marketing mix prefers to one of the major concept in modern marketing according Philip kotler “marketing mix is a set of controllable marketing variables that the firm blends to produce the response it wants in the target market”.
* The principle ingredients of marketing mix are: - *Marketing mix (Price, Place, Promotion, Product)*

**2.8.1 Introduction:**

**Marketing** is the process of communicating the value of a product or service to [customers](http://en.wikipedia.org/wiki/Customers), for the purpose of selling that product or service.

**Definition of marketing:**

* Marketing is the process of planning and executing the conception, pricing, promotion, and distribution (4 Ps) of ideas, goods and services to create exchanges (with customers) that satisfy individual and organizational objectives.
* Bringing together the needs and wants of the consumer with the products and services that match them.

**A Few Relevant Terms on Marketing**

**Market**: Normally people understand the term market as a place where goods are bought and sold. But, in the context of Marketing, it refers to a group of buyers for a particular product or service.

**Marketer**: It refers to the person who organizes the various marketing activitiessuch as market research, product planning, pricing, distribution etc.

**Seller**: It refers to a person or organization who is directly involved in the process of exchange of goods and services for money. This includes the wholesaler, retailer etc.

**Buyer**: A buyer is one who is directly involved in the process of purchase of goods and services. He/she is one who selects the goods, makes payment and takes the delivery.

**Consumer**: One who actually uses the product or service. For example, you boughta shirt and gifted it to your friend who uses it. Here your friend is the consumer you are a buyer. However, a consumer can also be the buyer.

**Customer:** A customer usually refers to the person who takes the buying decision.

For example, in a family, father decides on the brand of the toothpaste to be used by his children. Here, the children are the consumers and the father is the customer. A customer can also be the consumer. Similarly, the buyer may be different from the customer or one can be the customer as well as the buyer.

**2.8.2 Concepts of Marketing**

Marketing is a social and managerial process by which individuals and groups obtain what they need and want through creating, offering and exchanging products of value with others.

The above definition of marketing rests on the following concepts: needs, wants and demands; products; value, cost and satisfaction; exchange, transactions, and relationships; markets; and marketing and marketers. Needs wants and demands are a part of basic marketing principles

A product can be differentiated on the basis of whether it satisfies a customer’s needs, wants or demands.

**2.9 NEEDS**

Human needs are the basic requirements and include food clothing and shelter. Without these humans cannot survive. An extended part of needs today has become education and healthcare. Generally, the products which fall under the **needs category** of products do not require a push. Instead the customer buys it themselves. But in to days tough and competitive world, so many brands have come up with the same offering satisfying the needs of the customer, that even the “needs category product” has to be pushed in the customers mind.

**Physical needs: These types of need are related to food, clothing and shelter.  
Safety needs: Under this need, people want protection from physical harm and economic threat.  
Social needs: Under this need, they want love, friendship and belongingness.  
Ego needs: Under this need, they want status recognition and self-esteem.  
Self-development needs: They want knowledge, achievement and creativity.**

**2.10 WANTS**

Wants are a step ahead of needs and are largely dependent on the needs of humans themselves. For example, you need to take a bath. But i am sure you take baths with the best soaps. Thus Wants are not mandatory part of life. You DONT need a good smelling soap. But you will definitely use it because it is your want. In the above image, the baby needs milk but it WANTS candy

**Example: A consumer in the United States needs food but may want a hamburger. French fries and soft drinks. A person in Mauritius needs food but may want a mango, rice, lentils, and beans. Wants are shaped by our society.**

**2.11 DEMANDS**

You might want a BMW or a Mercedes for a car. You might want to go for a cruise. But can you actually buy a BMW or go on a cruise? You can provide you have the abilityto buy a BMW or go on a cruise. Thus a step ahead of wants is demands. When an individual wants something which is premium, but he also has the ability to buy it, then these wants are converted to demands. The basic difference between wants and demands is desire. A customer may desire something but he may not be able to fulfill his desire.

Example of **demands** – Cruises, BMW’s, 5 star hotels etc.

The needs wants and demands are a very important component of marketing because they help the marketer decide the products which he needs to offer in the market. Thus the flow is like this.

**Market >> Identify needs wants and demands >> Offer products to satisfy either needs wants or demands.**

**2.12 MARKETING VS. SELLING**

**Table 2.1 Marketing Vs. Selling**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Marketing** | **Selling** |
|  | Marketing includes selling and other activities  like various promotional measures,  marketing research, after sales service, etc. | Selling is confined to persuasion of  consumers to buy firm’s goods and  services. |
|  | It starts with research on consumer needs,  wants, preference, likes, dislike etc., and  continues even after the sales have taken  place. | Focus is on earning profit through maximisation of sales. |
|  | Focus is on earning profit through  maximisation of customers’ satisfaction | Focus is on earning profit through  maximisation of sales. |
|  | Customer’s need is the central point around  whom all marketing activities revolve | Fragmented approach to achieve short- term gain |
|  | It is an integrated approach to achieve long  term goals like creating, maintaining and  retaining the customers. | All activities revolve around the product  that has been produced. |
|  | Stresses on needs of buyer. | Stresses on needs of the seller. |
|  | Marketing is more ‘pull’than ‘push’ | Selling involves ‘push’ strategy |
|  | Marketing starts with the buyer and focuses constantly on buyer’s needs. | Selling starts with the seller and is preoccupied all the time with the seller’s needs. |
|  | Seeks to convert “customer needs” into ‘products’. | Seeks to convert ‘products’ into “cash” |
|  | It is a broad composite and worldwide concept, more so in this era of globalisation | It narrow concept related to product,sellerand sales activity. |
|  | The main job is to find the right product for your customer | The main job is to find the customer for your products. |
|  | It assumes:”let the seller beware” | It assumes:”let the buyer beware” |
|  | Customer statisfaction is a prime motive | Sales is a prime motive |

**2.13 PRODUCTS**

Anything that is offered to the market for attention, acquisition, use or consumption that satisfies a want or a need

**Product Life Cycle**

A new product passes through set of stages known as **product life cycle**. Product life cycle applies to both brand and category of products. Its time period vary from product to product. Modern **product life cycles** are becoming shorter and shorter as products in mature stages are being renewed by [market segmentation](http://notesdesk.com/notes/marketing/market-segmentation/) and product differentiation.

**Stages of Product Life Cycle**

Product life cycle comprises four stages:

* + Introduction stage
  + Growth stage
  + Maturity stage
  + Decline stage

## Introduction stage

Product is introduced in the market with intention to build a clear identity and heavy promotion is done for maximum awareness. Before actual offering of the product to customers, product passes through product development, involves prototype and market tests. Companies incur more costs in this phase and also bear additional cost for distribution. On the other hand, there are a few customers at this stage, means low sales volume. So, during **introductory stage** company’s profits shows a negative figure because of huge cost but low sales volume.

At **introduction stage**, the company core focus is on establishing a market and arising demand for the product. So, the impact on [marketing mix](http://notesdesk.com/notes/marketing/the-marketing-mix-4-ps-of-marketing/) is as follows:

**Product**  
Branding, Quality level and intellectual property and protections are obtained to stimulate consumers for the entire product category. Product is under more consideration, as first impression is the last impression.

**Price:**

High(skim) pricing is used for making high profits with intention to cover initial cost in a short period and low pricing is used to penetrate and gain the market share. company choice of pricing strategy depends on their goals.

**Place*:***  
Distribution at this stage is usually selective and scattered.

**Promotion**:  
 At **introductory stage**, promotion is done with intention to build brand awareness. Samples/trials are provided that is fruitful in attracting early adopters and potential customers. Promotional programs are more essential in this phase. It is as much important as to produce the product because it positions the product.

## Growth Stage

In this stage, company’s sales and profits starts increasing and competition also begin to increase. The product becomes well recognized at this stage and some of the buyers repeat the purchase patterns. During this stage, firms focus on brand preference and gaining market share. It is market acceptance stage. But due to competition, company invest more in advertisement to convince customers so**profits may decline near the end of growth stage.**

Effect on [4 P’s of marketing](http://notesdesk.com/notes/marketing/the-marketing-mix-4-ps-of-marketing/) is as under:

**Product***:*  
 Along with maintaining the existing quality, new features and improvements in product quality may be done. All this is done to compete and maintain the market share.

**Price:**  
Price is maintained or may increase as company gets high demand at low competition or it may be reduced to grasp more customers.

**Distribution***:*Distribution becomes more significant with the increase demand and acceptability of product. More channels are added for intensive distribution in order to meet increasing demand. On the other hand resellers start getting interested in the product, so trade discounts are also minimal.

**Promotion***:*At **growth stage**, promotion is increased. When acceptability of product increases, more efforts are made for brand preference and loyalty.

## Maturity stage

At **maturity stage**, brand awareness is strong so sale continues to grow but at a declining rate as compared to past. At this stage, there are more competitors with the same products. So, companies defend the market share and extending **product life cycle**, rather than making the profits, By offering sales promotions to encourage retailer to give more shelf space to the product than that of competitors. At this stage usually loyal customers make purchases.

**Marketing mix** decisions include:

**Product***:*  
 **At maturity stage**, companies add features and modify the product in order to compete in market and differentiate the product from competition. At this stage, it is best way to get dominance over competitors and increase market share.

**Price***:*Because of intense competition, at maturity stage, price is reduced in order to compete. It attracts the price conscious segment and retain the customers.

**Distribution***:*  
New channels are added to face intense competition and incentives are offered to retailers to get shelf preference over competitors.

**Promotion**  
 Promotion is done in order to create product differentiation and loyalty. Incentives are  also offered to attract more customers.

## Decline stage

Decline in sales, change in trends and unfavorable economic conditions explains decline stage. At this stage market becomes saturated so sales declines. It may also be due technical obsolescence or customer taste has been changed.

At decline stage company has three options:

* Maintain the product, Reduce cost and finding new uses of product.
* Harvest the product by reducing marketing cost and continue offering the product to loyal niche until zero profit.
* Discontinue the product when there’s no profit or a successor is available. Selling out to competitors who want to keep the product.

At **declining stage,** marketing mix decisions depends on company’s strategy. For example, if company want to harvest, the product will remain same and price will be reduced. In case of liquidation, supply will be reduced dramatically.

## Limitations of Product Life Cycle (Plc):

Product life cycle is criticized that it has no empirical support and it is not fruitful in special cases. Different products have different properties so their life cycle also vary. It shows that **product life cycle**is not best tool to predict the sales. Sometimes managerial decisions affect the life of products in this case **Product Life Cycle** is not playing any role. product life cycle is very fruitful for larger firms and corporations but it is not hundred percent accurate tool to predict the life cycle and sales of products in all the situations.

**2.14 FUNCTIONS PERFORMED IN MARKETING**

You have learnt that marketing is the performance of those business activities that direct the flow of goods and services from producers to consumers or users. Let us now learn

What those activities are? These are briefly discussed hereunder.

1. **Marketing Research**

Marketing research involves collection and analysis of facts relevant to various aspects of marketing. It is a process of collecting and analysing information regarding customer needs and buying habits, the nature of competition in the market, prevailing prices, distribution network, effectiveness of advertising media, etc. Marketing research gathers, records and analyses facts for arriving at rational decisions and developing suitable marketing strategies.

2. **Product Planning and Development**

As you know marketing starts much before the actual production. The marketers gather information regarding what are the needs of the consumers and then decide upon what to produce. So, the task of marketing begins with planning and designing a product for the consumers. It can also be done while modifying and improving an already existing product. For example, now-a-days we find much better soaps and detergent powders than we used to get earlier. Similarly, we have many new products introduced almost on a regular basis.

3. **Buying and Assembling**

Buying and assembling activities as a part of marketing refer to buying and collection of required goods for resale. This function of marketing is primarily relevant to those business organisations that are engaged in trading activities. In the context of manufacturing organisations, buying and assembling involves buying raw materials and components required for production of finished goods.

4. **Packaging**

Packaging involves putting the goods in attractive packets according to the convenience of consumers. Important considerations to be kept in view in this connection are the size of the package and the type of packaging material used. Goods may be packaged in bottles (plastic or glass), boxes (made of tin, glass, paper, plastic), cans or bags. The size of the package generally varies from a few grams to a few kilograms.

5. **Standardization and Grading**

Standardization refers to development of standards for production of goods with respect to shape, design, colour and other characteristics. If products are standardized, customers are able to identify a product and its characteristics very well. So good scan be sold by sample or description. Standardization helps in promoting the sale of the product by increasing consumers’ confidence in the product quality. Grading involves separating products into different classes on the basis of certain predetermined standards relating to size and quality. Grading is required in case of agricultural, forest and mineral products such as cotton, sugar cane, iron ore, coal, timber, etc.

6. **Branding**

Branding means giving an attractive name, symbol or identity mark to the product to make a product different from others so that it is known by that name or symbol or mark. For example, Surf is the brand name of a detergent powder produced by Hindustan Unilever Limited (HUL). Similarly, you must be familiar with brands like Colgate for toothpaste, Lux for soap and so on.

7. **Pricing the Product**

Pricing involves decisions regarding fixation of product prices, keeping in view the product costs, the capacity of customers to pay, and the prices of the competitive products. It is an important decision as it influences the sales and so also the profits. So pricing has to be done very carefully.

8. **Promotion of the Product**

Promotional activities include advertising, personal selling, sales promotion and publicity. All promotional activities involve communication with the existing and prospective customers whereby they are made aware of the product, its distinctive features, price, availability etc. The objective of promotional activities is to motivate the customers to buy the product.

9. **Distribution**

Distribution refers to those activities that are undertaken for sale of products to then customers and the physical transfer thereof. The first aspect i.e., sale of product involves use of middlemen such as wholesalers and retailers whose services are used for making the products available at convenient points and helping in their sale to the ultimate consumers. The second aspect i.e., physical transfer involves warehousing and transportation of goods from the point of production to the point of sale or the consumer.

10. **Selling**

Selling is an important function of marketing whereby the ownership of goods and services is transferred from the seller to the buyer for a consideration known as price. To initiate and complete the process of selling, the seller has to inform the prospective buyer about availability of goods, the nature and uses of products, their prices and the needs of the customers that may be effectively satisfied by the product. In the process, the arouses customers’ interest in the product and persuades them to buy it.

11. **Storage and Warehousing**

Storage refers to holding and preserving goods from the time of their procurement or production till the time of their sale. In other words storage involves making suitable arrangements for preserving the goods till they are bought by the consumers and delivered to them. Warehousing is synonymous to storage but is normally used for large-scale storage facility for goods and commodities. You must have seen cold storage where vegetables like tomato, cabbage, potato etc. are stored to be consumed throughout the year. In marketing it is essential to store raw material and finished goods to be used later by the company for production or for resale.

12. **Transportation**

Transportation refers to the physical movement of goods from one place to another. In marketing, transport as an activity refers to physical movement of raw materials aswell as finished goods from the place of production to place of consumption. Goodsare transported through various means like railways, roadways, waterwaysandairways. For heavy and bulky goods, the railways and waterways are the best. Forother goods, it depends upon the demand, cost involved, urgency, nature of the goodsetc. to decide about a suitable means of transportation.

**2.14.1 Marketing Mix**

Marketing mix prefers to one of the major concept in modern marketing according Philip kotler “marketing mix is a set of controllable marketing variables that the firm blends to produce the response it wants in the target market”.

It is the combination of four controllable variables which constitutes the companies marketing system .the four controllable variables are

* The product
* The price structure
* The promotional activities
* The distribution system

These elements are inter related and inter dependent since decisions in one area usually actions in other area

**Principles of marketing mix:**

## When marketing their products firms need to create a successful mix of : 1. the right product

2. Sold at the right price

3. in the right place

4. Using the most suitable promotion.

**Product is the actual offering** by the company to its targeted customers which also includes value added stuff. Product may be tangible (goods) or intangible (services).

While formulating the marketing strategy, **product decisions** include:

* What to offer?
* Brand name
* Packaging
* Quality
* Appearance
* Functionality
* Accessories
* Installation
* After sale services
* Warranty

## Price:

**Price includes the pricing strategy**of the company for its products. How much customer should pay for a product? Pricing strategy not only related to the profit margins but also helps in finding target customers. Pricing decision also influence the choice of marketing channels. **Price decisions** include:

* Pricing Strategy (Penetration, Skim, etc)
* List Price
* payment period
* Discounts
* Financing
* Credit terms

Using price as a weapon for rivals is as old as mankind. but it’s risky too. Consumers are often sensitive for price, discounts and additional offers. Another aspect of pricing is that expensive products are considered of good quality.

## Place (placement):

It not only includes the place **where the product is placed**, all those activities performed by the company to ensure the availability of the product tot he targeted customers. Availability of the product at the right place, at the right time and in the right quantity is crucial in placement decisions.

**Placement decisionsinclude:**

* Placement
* Distribution channels
* Logistics
* Inventory
* Order processing
* Market coverage
* selection of channel members

## Promotion:

**Promotion** includes all communication and selling activities to pursuade future prospects to buy the product. Promotion decisions include:

* Advertising
* Media Types
* Message
* Budgets
* Sales promotion
* Personal selling
* Public relations
* Direct marketing

As these costs are huge as compared to product price, So it’s good to perform a break-even analysis before allocating the budget. It helps in determining whether the new customers are worth of promotion cost or not.

It often takes time and requires market research to develop a successful marketing mix. You should not depend on one mix always try new mixes. While designing the mix, make changes to all mixes in such a way that all conveys the same message. Don’t confuse your customers by just changing one variable and keeping the rest same.

**2.15 PRICING**

Price goes by a variety of names. Rent is paid for apartment, tuition fee is paid for education and a consultation fee is paid for doctor. Price is a factor that creates value for the product.

“Price is the amount of money charged for a product or service. It may be the sum of the values that consumers exchange for the benefits of having or using the product or service” – PHILIP KOTLER

**2.15.1 Pricing Policies**

## 1) Competitive Pricing:

Competitive pricing means setting prices relative to competitors. For example, a new neighborhood restaurant might use the prices of entrees at other restaurants in the area to inform pricing decisions. Companies may choose to set prices slightly below those offered by competitors to attract more customers. Competitive pricing can potentially result in a price war, in which competitors repeatedly slash prices in an attempt to undercut one another.

## 2) Cost-Based Pricing Or Break Even Pricing:

Cost-based pricing is a strategy that uses the cost of production as a baseline to inform pricing decisions. For instance, a company that sells office supplies might set prices that are 10 percent higher than production costs to ensure that it covers its expenses. Similarly, a company that sells T-shirts could simply charge a $5 markup over the production costs of all of its products. Cost-based pricing is a relatively straightforward strategy since it doesn't take consumer demand or competition into account.

## 3) Value Pricing:

Setting prices based on the benefit or value consumers derive from products is called value pricing. In other words, value-based pricing seeks to set prices based on what consumers are willing to pay. A business pursuing value-based pricing might charge prices that are significantly higher than competitors if it believes its products are more valuable to consumers than those offered by competitors or if wishes to establish itself as a luxury brand. Value-based pricing requires managers to have a deep understanding of customer needs and preferences.

**4) Mark-Up Pricing:**

Mark-up is the difference between the costs of producing and selling a product (fixed costs plus variable costs) and the market selling price of the product. It is the difference between what you spend to produce the product and what the customer spends to purchase it.

It is calculated as follows:

* Fixed Cost per unit = Total Fixed Cost / Units Produced
* Variable Cost per unit = Total Variable Costs / Units Produced
* Selling Price = Fixed Cost per unit Variable Cost per unit Desired Profit Margin

**5) Target Return Pricing:**

Using this strategy, a business first determines what level of demand there is for the product and then identifies the desired profit the business would like to make from the product. The price is calculated by dividing the total desired profit by the expected level of sales. Therefore, by meeting the level of expected sales, a certain amount of profit will be received.

**6) Going-Rate Pricing:**

In the situation where the business is in a competitive market, the business charges the average price of what its competitors are charging for a similar or the same product. This may be the case where there is only a small amount of competition and the product is a necessity. It is sometimes in a business's best interest to not compete by undercutting their competition.

**2.15.2 Methods of Pricing**

* **Odd pricing:** It means setting prices that end in odd numbers. Here the consumer is impressed with the accuracy of the price set on the product. It is adopted generally by the seller of specialty or convenience goods.
* **Psychological pricing:** It tries to overcome consumer’s psychological barrier in respect of price. The price under this method fixed at a full number.
* **Customary pricing:** These are fixed by customs. When a company sells goods and services and seeks to maintain them over an extended period of time, customary prices are changed. Even when cost increases price is not changed. Organization may reduce package size, and change ingredients in order to absorb increases in cost.
* **Pricing at a prevailing prices:** The marketer fixes the price of his product at the price prevailing in the market. So, it is also known as pricing at the market. A price above the current price will bring down the sales. This kind of pricing tries to avoid price competition and price wars. Where the marketer is not able to differentiate this offering that of the competitor, he chooses the prevailing prices.
* **Prestige pricing:** It is based on the assumption that consumers do not buy goods or services at prices they consider to be too low.
* **Price lining:** It is quite common with retailers. This is closely related to psychological and customary prices. It is selling products at a range of prices with each price representing a distinct level of quality. It involves two decisions:
* **Dual pricing:** It means selling the same product at two different prices. This is also known as discriminatory pricing. Example: railway fares differ for each class.
* **Administered pricing:** It is not governed by cost of the product, competitive pressure, laws of demand and supply, etc., It is dependent solely upon the policy decisions of the seller. It remains constantly fairly over a long period.
* **Monopoly pricing:** In monopoly, the market consists of one seller. This happens while introducing a new product. The seller is free to price at what the market can beat. However, he does not always charge the full price for a number of reasons.
* **Skimming pricing;** It is related to a new product. Initially, high price is charged for a new product. Then price is gradually reduced as competitors enter the market.
* **Penetration pricing:** A low price is charged in the initial stage or until the product gains the acceptance of the buyers.
* **Mark up pricing:** Middlemen like wholesalers and retailers follow mark up pricing. It add a certain percentage to the manufacturer’s price in order to determine the retail price.

**2.16 CHANNELS OF DISTRIBUTION**

A channel of distribution or trade channel is defined as the path or route along which goods move from producers or manufacturers to ultimate consumers or industrial users. In other words, it is a distribution network through which producer puts his products in the market and passes it to the actual users. This channel consists of :- producers, consumers or users and the various middlemen like wholesalers,selling agents and retailers(dealers) who intervene between the producers and consumers. Therefore,the channel serves to bridge the gap between the point of production and the point of consumption thereby creating time, place and possession utilities.

**A channel of distribution consists of three types of flows:-**

* Downward flow of goods from producers to consumers
* Upward flow of cash payments for goods from consumers to producers
* Flow of marketing information in both downward and upward direction i.e. Flow of information on new products, new uses of existing products, etc from producers to consumers. And flow of information in the form of feedback on the wants, suggestions, complaints, etc from consumers/users to producers.

**These channels of distribution are broadly divided into four types:-**

* **Producer-Customer**:- This is the simplest and shortest channel in which no middlemen is involved and producers directly sell their products to the consumers. It is fast and economical channel of distribution. Under it, the producer or entrepreneur performs all the marketing activities himself and has full control over distribution. A producer may sell directly to consumers through door-to-door salesmen, direct mail or through his own retail stores. Big firms adopt this channel to cut distribution costs and to sell industrial products of high value. Small producers and producers of perishable commodities also sell directly to local consumers.
* **Producer-Retailer-Customer**:- This channel of distribution involves only one middlemen called 'retailer'. Under it, the producer sells his product to big retailers (or retailers who buy goods in large quantities) who in turn sell to the ultimate consumers.This channel relieves the manufacturer from burden of selling the goods himself and at the same time gives him control over the process of distribution. This is often suited for distribution of consumer durables and products of high value.
* **Producer-Wholesaler-Retailer-Customer**:- This is the most common and traditional channel of distribution. Under it, two middlemen i.e. wholesalers and retailers are involved. Here, the producer sells his product to wholesalers, who in turn sell it to retailers. And retailers finally sell the product to the ultimate consumers. This channel is suitable for the producers having limited finance, narrow product line and who needed expert services and promotional support of wholesalers. This is mostly used for the products with widely scattered market.
* **Producer-Agent-Wholesaler-Retailer-Customer**:- This is the longest channel of distribution in which three middlemen are involved. This is used when the producer wants to be fully relieved of the problem of distribution and thus hands over his entire output to the selling agents. The agents distribute the product among a few wholesalers. Each wholesaler distribute the product among a number of retailers who finally sell it to the ultimate consumers. This channel is suitable for wider distribution of various industrial products.

**2.17 SALES PROMOTION**

“Sales promotion, in a specific sense, refers to those sales activities that supplement both personal selling and advertising and coordinate them and help to make them effective, such as displays, shows, and the expositions, demonstrations and other non-recurrent selling efforts not in the ordinary routine” – AMERICAN MARKETING ASSOCIATION

**Types of Sales Promotion**

It can be divided into three types

1. Consumer sales promotion
2. Dealer sales promotion
3. Sales force promotion

**1. Consumers sales promotion:**

Activities aimed at reaching the customer at his office or at home may be called as consumer sales promotion. It is aimed to inform or educate the consumers and to stimulate the consumers. Success in sales depends on consumer’s cooperation. It increases the use of product by the consumers, attract new customers. The following are various sales promotion schemes used at consumer level

1. **Sampling:**  Free samples are given to consumers to increase their interest in the product. They are also given to introduce a new product and expand the market. It increases the sales volume when the product is new one. It is an effective device when the product is purchased often. It is the method of demand creation. It gives the chance to customers to compare the products with other substitutes.

The samples may be door delivered, sent by mail, picked up in a store, attached to another product etc. it is most effective way to introduce the product. It is the most expensive method. It is costly to distributors also.

1. **Coupons :**Coupons are supplied along with a product. It is a certificate that reduces prices. Coupons can be mailed, enclosed in packets or printed in the advertisements. The purchase is to attract the customers and bring them to a particular shop to increase the sales of a particular brand.

The coupons are used to introduce new products, to increase the sale of an established product, to sell new and larger size of a product, and to encourage the repeated sales. It is a short run stimulus.

1. **Demonstration:**  It is the instructions to educate the consumers in the manners of using the product. It is the promotional tool to attract the attention of the consumers. When the products are complex and are of a technical nature, demo is necessary. It is done in front of the customers.
2. **Contests:** These are conducted to attract new customers or to introduce the new products. The consumers are asked to state in a few words why they prefer that product. To enter into the contest, the consumers must purchase a product and submit the evidence with the entry form for the contest. To take part in the contest the consumers must be interested in the product. This stimulates the sales at the retail level. Entry forms correctly filled are submitted to panel of judges. They will select the best and prices will be given to winners.
3. **Money refund offers:**  If the purchaser is not satisfied with the product, a part or all of the purchasers money will be refunded. It is stated on the package. It will create new users and strengthen the brand royalty. Sometimes the money will be refunded if 10 top covers or 10 empty packages are sent back to the manufacturers.
4. **Premium offers:**  It is a temporary price reduction which increases the instinct of the buyers. Products are offered free or at a reduced cost as an inducement for purchasing. It is offered to consumers for some of consumer goods like soaps, brush etc.

There are many types of premium offers. They are

* Direct premium: A with-pack premium accompanies the product inside or outside the package.
* A reusable container: It is a container which can be reused after the product is used.
* Free in Mail Premium: Premium items are sent by the companies by mail to consumers who are requested to send the proof of their purchase.
* A Self-liquidating premium: it is an item sold below its normal retail price to consumers. The cost of the additional product is collected from the buyer at a concessional rates.
* Trading stamps: it is given for purchasing the product in a particular shop. It is a premium given to the consumer by the seller in the forms of stamps. These stamps are redeemable at the stamp redemption centres.

1. **Price off offer:**  It stimulates sales during a slump season. It gives a temporary discount to the consumers. That is the goods are offered at a rate less than the labeled rate. Fans are sold at a reduction rate in rainy season.
2. **Consumer sweepstakes:** Consumers submit their names for inclusion in a list of prize winning contest. A ticket is given to the consumer of a specific time, lots will be drawn. The prize winner gets the prize.
3. **Buy back allowance:**  Allowance is given following a previous trade deal. That is, trade deal offers a certain amount of money for new purchases based on the purchased quantities. It prevents decline in post trade deal.
4. **Free trials:** It consists of inviting prospective purchasers to try the product without cost, in the hope that they will buy the product. Thus, buyers are encouraged by free trial to stimulate purchase interest.
5. **Discount vouchers** – a voucher (like a money off coupon).
6. **Free gifts** – a free product when buy another product.
7. **Point of sales materials** – e.g. posters, display stands – ways of presenting the product in its best way or show the customer that the product is there.
8. **Free-standing insert** (FSI): A coupon booklet is inserted into the local newspaper for delivery.
9. **On-shelf couponing**: Coupons are present at the shelf where the product is available.
10. **Checkout dispensers**: On checkout the customer is given a coupon based on products purchased.
11. **On-line couponing**: Coupons are available on line. Consumers print them out and take them to the store.

**2. Dealer’s Sales Promotion:**

The other name for dealer promotion is trade promotion. Manufacturers use a number of techniques to secure the co operation of wholesalers, retailers, or the middlemen. These activities increases the enthusiasm of the dealers and distributors. Following are the dealer’s sales promotion devices:

1. **Buying allowance:** It is an offer of money off or temporary reduction to dealers for purchasing in stipulated period of time. It is an very effective to introduce new products in the market to introduce new products. It encourages the dealers to buy a quantity that they will not buy in ordinary time. This buying allowance gives them immediate profit and price redemption.
2. **Merchandise allowance: A**n advertising allowance is given to the dealers for advertising the features of the manufacturer’s product. A display allowance is given to them for arranging special displays for the product. After verifying the promotional work of the dealer, the manufacturers will give a certain amount of money for promotional activities. They hope that additional efforts will be taken to increase the sales at retail level. Some manufacturers, as an encouragement, offer additional quantities of merchandise.
3. **Price deals:** Apart from the regular discount, special discounts are also allowed to the dealers for a specified quantity of purchase. This special discount is over and above the regular discount.
4. **Push money or premium:**  Manufacturers may offer push money. It is a payment in cash or gifts given to dealers or to their sales force to push the manufacturer’s product. To push this brand, the manufacturer will offer free specialty items that carry company’s name such as pens, pencils, calendars etc. this is a device for aggressive selling.
5. **Co-operative Advertising:** Dealer’s spend money in advertising manufacturer’s product with the consent of the manufacturers. The dealer can claim an allowance by giving the proof of the advertisement. This is an indirect advertising for the manufacturer. It will increase the sales of the product.
6. **Dealer’s Sales contest:** This is an indirect way of boosting the sales. This type of contest is conducted at the level of retailers and wholesalers. This is an form of window display, store display, sales etc. Prize is awarded to the outstanding achievements. This method is aimed at stimulating and motivating distributors, dealers etc.
7. **Dealer’s listed promotion:** Listing dealer is an advertisement. It gives a list of dealers or retailers who stock the product who are engaged in its promotion. This method introduces the dealers to stock the products and the consumer are encouraged to buy the products.

**3. Sales Force Promotion:**

As dealer and consumer promotion, the sales force promotion also is a necessary one. The activities of sales force must be induced. In the channel of distribution the role of salesman is very important. The idea of sales force promotion is to make the salesman’s effect more effective. The tools for sales force promotion are,

1. **Bonus to sales force:** The manufacturer sets a target of sales for a year. If the sales force sell the products above the targeted sales, bonus is offered to them. This is an encouragement incentive given to the sales people to sell more products.
2. **Sales force contest:** To increase the interest and efforts of sales by sales force over a specified time, these contests are announced. The prices are given to the salesman who secures the maximum sales in sales contest. Thus it stimulates the salesmen to sell more products.
3. **Salesmen Meetings and Conferences:** The idea behind these is to educate, inspire and reward salesmen. Encouragement is given to them during the discussion. New selling techniques are described to them and discussed in the conference.

**How sales promotion differ from advertising:**

* Whereas advertising is mostly an indirect and subtle approach towards persuading consumers to buy a product, sales promotion is a direct and almost open inducement to the consumer to immediately try the product
* While advertising normally has long term objectives like building brand awareness or building consumer loyalty or repositioning a brand, sales promotion performs an immediate task of increasing current sales.
* While advertising helps sales by adding some value to the product, sales promotion aids selling by merely changing the price-value relationship of the product

**2.18 ADVERTISING**

“Advertising is a paid form of non personal presentation and promotion of ideas, goods or services by an identified sponsor” – American Marketing Association

“Advertising is a mass communication of information intended to persuade buyers as to maximize profits” – Littlefield.

“Advertising consists of all the activities in presenting to a group, a non-personal, oral or visual, openly sponsored message regarding a product, service or idea” - Stanton

“To give public notice or to announce publicly” – Webster

**Advantages of Advertising:**

**Advantages to Manufacturers**

**Increased sales volume:** Advertising increases the sales volume of the product thereby reducing unit production costs. The manufacturer undertakes mass production of goods and reaps the benefits of large scale production.

**Increased net profit:** Ad makes price reduction possible. When prices are lower, goods are widely demanded by customers. This leads to increased sales of the products or services. When sales increases profit increases.

**Stability in sales volume:** The market is always highly competitive. Large number of players are selling similar goods. Modern technology makes possible product differentiation. Every marketer is striving to retain his market share.

**Control over price:** Most of the advertisements carry the product price. So, the retailers cannot charge a price higher than that printed on the product label.

**New market:** Ad creates new market for the product advertised. New crop of customers perceive the product favourably. So, the advertiser can go in for market expansion. He can also become the market leader.

**Creating goodwill:** Ad carries a message about the product and its manufacturer. So, it creates a favourable climate for selling the product. It builds the product image and goodwill of the manufacturer.

**Wide information:** Ad broadens the buyers knowledge. The purpose of ad is to convey the product information. Any change in quality, or price can be immediately brought to the attention of buyers.

**Advantages to Salesman**

**Favourable climate for selling**: Ad creates a favouralbe climate for the job of salesman. Even before the salesman approaches the customers, they have background knowledge of the product. When salesman contacts customers, they receive the product well.

**Simplifies salesman job:** Ad are salesmanship in print. Ad is more effective way of establishing contact with customers. it attempts to persuade people to purchase foods. The aim of ad and salesmanship is therefore the same.

**Least effort:** Ad easily reaches the masses. Customers gain adequate amount of knowledge of the product. So, the salesman need not explain every minute product details.

**Product awareness:** Ad creates product awareness among the buyers. Buyers become familiar with the new and improved products available in the market. Since, ad are attractive, they create an customers awareness.

**Advantages to Wholesalers and Retailers**

**Increased turnover:** Ad has mass appeal. It reaches target customers and creates awareness among them. People gather sufficient information about the product by going through the advertisement. They are motivated to buy the product.

**Attracts customers:** A customer cannot shy away from the influence of advertisements. These are released for all products. They have become the order of life. Ad catches the people’s attention and induces customers.

**Increases reputation:** A dealer is respected on the product’s strength range he carries. Ad popularizes the product. Product popularizes the dealers.

**Publicity:** Dealers earn p0rofit without spending advertisements. Ads are paid for by the manufacturers. Thus, wholesalers get publicity for the product they deal in.

**Advantages to Customers**

**Wise purchase:** Ads has educative value. It interprets the product features in terms of customers needs and wants. It gives the useful information about the product to buyers. Some ads compare the product’s features advertised with those of substitute and rival products.

**Providing link:** Ads provide a link between the buyers and manufacturers. They speak the language of potential customers. Manufacturers reach the message to the target audience.

**Reduced prices:** Ads increases the sales volume thereby reducing unit product cost. As it enables mass production, production cost is reduced.

**Educative value:** Ads inform customers about the release of improved version of new products. They explain as to how the new product is an improved version over the earlier ones.

**Mail order business:** Ads plays a crucial role in mail order business. On seeing the ads, people can directly buy from mail order houses. People living in villages and remote places can buy goods through mail.

**Types Of Advertisement Media**

|  |  |  |
| --- | --- | --- |
| **Media** | **Advantages** | **Disadvantages** |
| **Television** | * Offers mass coverage. * High level of reach combined impact of sight, sound & motion, prestige value. * Low cost per exposure. Attracts attention. | * Offers low selectivity. * Short span of message life. * High cost. * High production costs. * Creates Advertising Clutter. * Wastage coverage. |
| **Radio** | * Local Coverage. * Lower Cost. * High Frequency, * Focused Segment Selection. * Low Production Costs. | * Only audio. * Noise. * Low on attention getting. * Message short lived. |
| **Newspapers** | * Mass Coverage, * Low Cost, Large Space, * Short Lead time for ad placing. * Ad position choice possible, * Good for current ads, * Reader controls exposure, * Coupons can be inserted. | * Short life of advertisement Clutter. * Low Attention getting. * Poor Production Quality. * Selective Exposure. |
| **Magazines** | * Potential for focused segmentation. * Very good production quality. * Longevity of message. * High information content. * More readers per copy. | * Long lead time for ad placing. * Only Visual. * Low frequency. * Lack of flexibility. |
| **Outdoor** | * Good for specific location. * High repetition. * High visibility. | * Short exposure time. * Short message. * Poor image. |
| **Direct Mail** | * High level of selectivity. * Reader controls exposure. * High information content. * Opportunity for repeat exposures. | * High cost per contact * Clutter often thrown as joint mail. |
| **Internet** | * User controlled. * Increased attention and involvement. | * Limited creative capabilities. |

**2.19 MARKET RESEARCH**

“Marketing research is the systematic gathering, recording and analyzing of data about marketing problems to facilitate decision-making” – **Cundiff and Still**

“The systematic gathering, recording and analyzing of data about problems relating to the marketing of goods and services. Such research may be undertaken by impartial agencies or by business firms or their agencies for the solution of their marketing problems and the inclusive term which embrace all research activities carried on in connection with the management of marketing work” – **American Marketing Association.**

**Objectives of Marketing Research**

* Study the economic factors affecting the sales volume and their opportunities
* Study the competitive position of rival products
* Study the price trends prevailing in the market
* Examine the system of distribution
* Study the relative advantages and limitations of the product offered for sale
* Find new methods of packaging
* Analyse the market size of the existing companies
* Estimate future sales of the product
* Solve the problems in marketing of goods and services

**Advantages of marketing research:**

* Supply the data to be used in selling salesman quota and territorial quotas and in planning production
* Supply the facts for fixing the budget
* Supply materials for sales talks
* Ascertain the consumer’s like and dislikes
* Find the dealer’s reactions to given policies
* Furnish data for fixing dealer’s territories and quota
* Measure the purchasing capacity of a given territory

**Limitations of marketing research:**

* Expensive
* Time consuming
* May not be accurate
* Very difficult to measure the effectiveness of marketing research

**2.19.1 Steps In The Marketing Research Process**

**Step: 1- Problem Definition:** The first step in research is formulating a research problem. It is the most important stage in applied research as poorly defined problems will not yield useful results. It is rightly said that “a problem well defined is half solved”. Poorly defined problems cause confusion and do not allow the researcher to develop a good research design.

In order to define a problem properly, we should determine the research nature. Then a preliminary analysis may be carried out applying the techniques viz.,

* Situation analysis: It means the circumstances under which the research is being conducted. It is useful take note of the factors affecting the marketing operations in a business organization.
* Informal investigation: It refers to the discussion with a few selected customers, dealers, top management personnel of the company, and other parties concerned with the problem. It may be designated as the pilot survey

**Step: 2 - Research Design:** After having defined the problem, the next step is to formulate the objectives of research plan, which will specify the ways of achieving research objectives. A research design specifies the methods and procedures for conducting a particular study. The researcher should specify the approach he intends to use with respect to the proposed study. The research design can be grouped into three categories.

* **Exploratory research:**  It focuses on the discovery ideas and is generally based on secondary data. It isa preliminary investigation which does not have rigid design.
* **Descriptive research:** It is undertaken when the researcher wants to know the characteristics of certaingroups such as age, educative level, income, occupation etc. In contrast, descriptive studies are well structured.
* **Casual research:** It is undertaken when the researcher is interested in knowing the cause and effect relationship between two or more variables. Such studies are based on reasoning along well tested lines.

**Step: 3 - Data Collection:** There are two types of data sources namely:

**Primary data:** It does not exist already in records and publication. The researcher has to gather primary data a fresh for the specific study undertaken by him. Original data collected specifically for a current research are known as primary data. It can be collected from customer, retailers, distributors etc.

**Methods of collecting primary data:**

**Experiment method:** It is employed to collect primary data. It involves controlled experiment which stimulates the real market situation. The manufacturer carries out a small experiment and gets valuable information. It will be of great help in designing large scale marketing programme.

**Observation method:** In this, researcher data are collected by observing the respondents in a marketing situation. The customer may be observed while buying a particular product. Then he may be asked why he preferred this type of product. The actions of a customer are watched personally or mechanically. The buyer is not aware of his being observed. So, his actions are natural and not pre determined.

**Survey method:** In this, information is gathered directly from individual respondents either throughpersonal interview or through mail questionnaires or telephone interviews.

**Secondary data:**It refers to those data which are gathered for some other purpose and are

already available in the firm’s internal records and commercial, trade or govt., publications.

**Step: 4 - Research Instrument:** In survey method, questionnaire is the instrument most frequently used. In observation method instruments like cameras, tapes, etc are used.

**Sampling plan:** The research must decide the sampling unit (who is to be surveyed) the sample size (how many units to be surveyed) the sampling procedure (how to conduct the survey) and contact method (media).

**Field work:** The actual data collection operation is called fieldwork. It is the most expensive of all the steps. The common problems during a field work are “not at homes, refusal to cooperate, and interviewer or respondent bias” etc.

**Step: 5- Data Analysis:** Data analysis and interpretation are possible only when data is processed. Data processing implies data reduction namely editing, tabulating, analyzing and interpretation.

* **Editing:** It is a kind of verifying the answers are consistent and logical
* **Tabulation:** It implies data arrangement as to classes and weightages
* **Coding:** It is a must when data is fed to electronic data processing units
* **Analysis:** The researcher examines the tables so designed, compares them, use statistical techniques
* **Interpretation:** It is a minute and meticulous work involving the use of mental facilities of sound judgement and clear vision to reach a cut-off point.

**Step:6 - Report Presentation:** When the analysis and interpretation are over, the researcher has to prepare the report. The researcher has to prepare the report with great care keeping the following points in mind.

**2.20 SALES FORECASTING**

Sales forecasting is estimating what a company's future sales are likely to be based on sales records as well as [market research](http://www.wisegeek.com/what-is-market-research.htm). The information used in them must be well organized and may include information on the competition and statistics that affect the businesses' customer base. Companies try to forecast sales in hopes of identifying patterns so that revenue and [cash flow](http://www.wisegeek.com/what-is-cash-flow.htm) can be maximized.

**Sales Forecast Methods**

**Qualitative Method**-it based on judgments-expert/collective.

**a) Expert’s opinion method**

 Simplest method used in commercial organisation for forecasting future demand of product/service. Marketing professionals/channel members and professional bodies (market consumers) are asked to give their opinion method works in 2 days.   
1) Seasoned industries.   
2) Group of industries  
Discussion takes place based on key executive sub their op. and discussion is done based on it and consensus is reached.

**b) Delphi Method:**

 Improvement over expert opinion method forecast is based on likely time period of occurrence of certain future Group of exp and a Delphi coordinator. Gives their opinion include to co-ordinate. The co-or processes, complies, refers then back to the panel member. (Process is on for at least 3 rounds) Process stops when consensus is obtained and deviant opinion given with reason.

Coordinator carries out stats analysis of the response, deriving average answers, variability etc. Only coordinator is aware of the members present in the team and access to all responses. Delphi for is median forecast-Method widely used

**c) Sale force composite method**

Sales people come up with forecast. Since people in direct contact like sales people/ channel members are better informed about the trends and demand for the product. Ind forecast is combined with over all demand forecast.   
Results can be affected by the staff’s biases, lack of interest in the process, eg. About economic changes and trends. This method is used to generate forecast for industrial equipment manufacturing industries.  
Eg: - PET mach/ Printing machinery.

**d) Survey of buyer’s expectation**

 Buyer’s intention and market test sample of potential buyer’s – information about product performance etc.   
Likes/ dislikes. (4 P’s)  
Gathering this information for demand forecasts.  
Negative point:- Actual demand varies from stated intention.  
Positive point:- method effective for relatively few buyers usually for B2B buyers.

**e) Historical analogy method**

Used where there is not past demand data.  
Eg: - New product, but markets sold other product with similar features.   
Marketing person may use historical analogy between eg: - two products and derive the demand for the new product using historical data.

**Quantitative Method**

**a)Test Marketing**

 Company’s selected a limited no of cities with population which is representative of target customer- demographic terms – age, income, lifestyle and shopping habits etc.

A product is made available at outlets and features are highlighted either through in store promotion/ small advertising campaign. Then the performance is tracked through consumer research and modification-before national launch.

Target objective is  
1) To study level of acceptance.  
 Second type of test market with similar characteristics is identified- one is called ‘test market’- same as above mention without promo campaign – 2nd is called ‘Control Market’ – where Product is sold with a promotional campaign.  
The different between both markets is a measure of effectiveness of promotion campaign. Any inconsistency with sales variation in both the market is an indicator of the gap between customer perception and performance of the product feature.  
Result- One can measure effectiveness of product helps in making customer loyal, campaigns effectiveness and in store promotion.

**b)NaïveMethod:**  
 This is one of the simplest method- future sales are forecasted as the value of sales for previous period .i.e. Next months sales are predicted based on the month’s performance.  
Negative method ignores irregular component and assumes that seasonality and cyclicality do not exist and trend is flat.

**UNIT III**

**FINANCIAL MANAGEMENT**

**3.1 INTRODUCTION**

**The financial management means:**

To collect [finance](http://kalyan-city.blogspot.com/2012/02/what-is-production-definition-meaning.html) for the company at a low cost and to use this collected finance for earning maximum profits. Thus, financial [management](http://kalyan-city.blogspot.com/2011/04/what-is-management-definitions-meaning.html) means to [plan](http://kalyan-city.blogspot.com/2010/06/planning-first-primary-important.html) and control the finance of the company. It is done to achieve the objectives of the company.

According to Richard A. Brealey, "Financial management is the process of putting the available funds to the best advantage from the long term point of view of [business objectives](http://kalyan-city.blogspot.com/2011/08/business-objectives-meaning-types.html)."

**Scope of financial management:**

Financial management has a wide scope. According to Dr. S. C. Saxena, the scope of financial management includes the following five '**A**'s.

* **Anticipation:** Financial management estimates the financial needs of the company. That is, it finds out how much finance is required by the company.
* **Acquisition:** It collects finance for the company from different sources.
* **Allocation:** It uses this collected finance to purchase fixed and current assets for the company.
* **Appropriation:** It divides the company's profits among the shareholders, debenture holders, etc. It keeps a part of the profits as reserves.
* **Assessment:** It also controls all the financial activities of the company. Financial management is the most important functional area of management. All other functional areas such as [production management](http://kalyan-city.blogspot.com/2011/12/what-is-production-management-meaning.html), marketing management, personnel management, etc. depend on financial management. Efficient financial management is required for survival, growth and success of the company or firm.

**Functions of Financial Management**

* **Estimation of capital requirements:** A finance manager has to make estimation with regards to capital requirements of the company. This will depend upon expected costs and profits and future programmers and policies of a concern. Estimations have to be made in an adequate manner which increases earning capacity of enterprise.
* **Determination of capital composition:** Once the estimation has been made, the capital structure have to be decided. This involves short- term and long- term debt equity analysis. This will depend upon the proportion of equity capital a company is possessing and additional funds which have to be raised from outside parties.
* **Choice of sources of funds:** For additional funds to be procured, a company has many choices like-
  + Issue of shares and debentures
  + Loans to be taken from banks and financial institutions
  + Public deposits to be drawn like in form of bonds.
  + Choice of factor will depend on relative merits and demerits of each source and period of financing.
* **Investment of funds:** The finance manager has to decide to allocate funds into profitable ventures so that there is safety on investment and regular returns is possible.
* Disposal of surplus**:** The net profits decisions have to be made by the finance manager. This can be done in two ways:
  + Dividend declaration - It includes identifying the rate of dividends and other benefits like bonus.
  + Retained profits - The volume has to be decided which will depend upon expansion, innovational, diversification plans of the company.
* **Management of cash:** Finance manager has to make decisions with regards to cash management. Cash is required for many purposes like payment of wages and salaries, payment of electricity and water bills, payment to creditors, meeting current liabilities, maintenance of enough stock, purchase of raw materials, etc.
* **Financial controls:** The finance manager has not only to plan, procure and utilize the funds but he also has to exercise control over finances. This can be done through many techniques like ratio analysis, financial forecasting, cost and profit control, etc.

**3.2 SOURCE OF FINANCE**

Business is concerned with the production and distribution of goods and services for the satisfaction of needs of society. For carrying out various activities, business requires money. Finance, therefore, is called the life blood of any business. The financial needs of a business can be categorized as follows:

* **Fixed capital requirements:** In order to start business, funds are required to purchase fixed assets like land and building, plant and machinery, and furniture and fixtures. This is known as fixed capital requirements of the enterprise. The funds required in fixed assets remain invested in the business for a long period of time.
* **Working Capital requirements:** No matter how small or large a business is, it needs funds for its day-to-day operations. This is known as working capital of an enterprise, which is used for holding current assets such as stock of material, bills receivables and for meeting current expenses like salaries, wages, taxes and rent. For financing such requirements short-term funds are needed.

**Short Term and Long Term Finance**

* **Short-term finance**is needed to cover the day to day running of the business. It will be paid back in a short period of time, so less risky for lenders.
* **Long-term finance**tends to be spent on large projects that will pay back over a longer period of time. More risky so lenders tend to ask for some form of insurance or security if the company is unable to repay the loan. A mortgage is an example of secured long-term finance.

**The main types of short-term finance are:**

* Overdraft
* Suppliers credit
* Working capital

**The main types of long-term finance that are available for to a business are:**

* Mortgages
* Bank loans
* Share issue
* Debentures
* Retained profits
* Hire purchase

**3.2.1 TYPES OF FINANCE**

Sources of finance can be classified into:

* + Internal sources (raised from within the organisation)
  + External (raised from an outside source)

**3.2.1.1 INTERNAL SOURCES**

There are five internal sources of finance:

* 1. Owner’s investment (start up or additional capital)
  2. Retained profits
  3. Sale of stock
  4. Sale of fixed assets
  5. Debt collection

**1. Owner’s investment**

* This is money which comes from the owner/s own savings
* It may be in the form of start up capital - used when the business is setting up
* It may be in the form of additional capital – perhaps used for expansion
* This is a long-term source of finance

**Advantages**

* Doesn’t have to be repaid
* No interest is payable

**Disadvantages**

* There is a limit to the amount an owner can invest

**2. Retained Profits**

* This source of finance is only available for a business which has been trading for more than one year
* It is when the profits made are ploughed back into the business
* This is a medium or long-term source of finance

**Advantages**

* Doesn’t have to be repaid
* No interest is payable

**Disadvantages**

* Not available to a new business
* Business may not make enough profit to plough back

**3. Sale of Stock**

* This money comes in from selling off unsold stock
* This is what happens in the January sales
* It is when the profits made are ploughed back into the business
* This is a short-term source of finance

**Advantages**

* Quick way of raising finance
* By selling off stock it reduces the costs associated with holding them

**Disadvantages**

* Business will have to take a reduced price for the stock

**4. Sale of Fixed Assets**

* This money comes in from selling off fixed assets, such as:
  + a piece of machinery that is no longer needed
* Businesses do not always have surplus fixed assets which they can sell off
* There is also a limit to the number of fixed assets a firm can sell off
* This is a medium-term source of finance

**Advantages**

* Good way to raise finance from an asset that is no longer needed

**Disadvantages**

* Some businesses are unlikely to have surplus assets to sell
* Can be a slow method of raising finance

**5. Debt Collection**

* A debtor is someone who owes a business money
* A business can raise finance by collecting the money owed to them (debts) from their debtors
* Not all businesses have debtors ie those who deal only in cash
* This is a short-term source of finance

**Advantages**

* No additional cost in getting this finance, it is part of the businesses’ normal operations

**Disadvantages**

* There is a risk that debts owed can go bad and not be repaid

**3.2.1.2 EXTERNAL SOURCES**

* There are five internal sources of finance:
  1. Bank Loan or Overdraft
  2. Additional Partners
  3. Share Issue
  4. Leasing
  5. Hire Purchase
  6. Mortgage
  7. Trade Credit
  8. Government Grants

**1. Bank Loan**

* This is money borrowed at an agreed rate of interest over a set period of time
* This is a medium or long-term source of finance

**Advantages**

* Set repayments are spread over a period of time which is good for budgeting

**Disadvantages**

* Can be expensive due to interest payments
* Bank may require security on the loan

**2. Bank Overdraft**

* This is where the business is allowed to be overdrawn on its account
* This means they can still write cheques, even if they do not have enough money in the account
* This is a short-term source of finance

**Advantages**

* This is a good way to cover the period between money going out of and coming into a business
* If used in the short-term it is usually cheaper than a bank loan

**Disadvantages**

* Interest is repayable on the amount overdrawn
* Can be expensive if used over a longer period of time

**3. Additional Partners**

* This is sources of finance suitable for a partnership business
* The new partner/s can contribute extra capital

**Advantages**

* Doesn’t have to be repaid
* No interest is payable

**Disadvantages**

* Diluting control of the partnership
* Profits will be split more ways

**4. Share Issue**

* This is sources of finance suitable for a limited company
* Involves issuing more shares
* This is a long-term source of finance

**Advantages**

* Doesn’t have to be repaid
* No interest is payable

**Disadvantages**

* Profits will be paid out as dividends to more shareholders
* Ownership of the company could change hands

**5. Leasing**

* This method allows a business to obtain assets without the need to pay a large lump sum up front
* It is arranged through a finance company
* Leasing is like renting an asset
* It involves making set repayments
* This is a medium-term source of finance

**Advantages**

* Businesses can have the use of up to date equipment immediately
* Payments are spread over a period of time which is good for budgeting

**Disadvantages**

* Can be expensive
* The asset belongs to the finance company

**6. Hire Purchase**

* This method allows a business to obtain assets without the need to pay a large lump sum up front
* Involves paying an initial deposit and regular payments for a set period of time
* The main difference between hire purchase and leasing is that with hire purchase after all repayments have been made the business owns the asset
* This is a medium-term source of finance

**Advantages**

* Businesses can have the use of up to date equipment immediately
* Payments are spread over a period of time which is good for budgeting
* Once all repayments are made the business will own the asset

**Disadvantages**

* This is an expensive method compared to buying with cash

**7. Mortgage**

* This is a loan secured on property
* Repaid in instalments over a period of time typically 25 years
* The business will own the property once the final payment has been made
* This is a long-term source of finance

**Advantages**

* Business has the use of the property
* Payments are spread over a period of time which is good for budgeting
* Once all repayments are made the business will own the asset

**Disadvantages**

* This is an expensive method compared to buying with cash
* If business does not keep up with repayments the property could be repossessed

**8. Trade Credit**

* Trade credit is summed up by the phrase:

**“buy now pay later”**

* Typical trade credit period is 30 days
* This is a short-term source of finance

**Advantages**

* Business can sell the goods first and pay for them later
* Good for cash flow
* No interest charged if money is paid within agreed time

**Disadvantages**

* Discount given for cash payment would be lost
* Businesses need to carefully manage their cash flow to ensure they will have money available when the debt is due to be paid

**9. Government Grants**

* Government organisations such as Invest NI offer grants to businesses, both established and new
* Usually certain conditions apply, such as where the business has to locate

**Advantages**

* Don’t have to be repaid

**Disadvantages**

* Certain conditions may apply eg location
* Not all businesses may be eligible for a grant
  1. **PREPARATION OF BALANCE SHEETS**

Balance sheet is a list of the accounts having debit balance or credit balance in the ledger. On one side it shows the accounts that have a debit balance and on the other side the accounts that have a credit balance. The purpose of a balance sheet is to show a true and fair financial position of a business at a particular date.

**ASSETS** mean all the things and properties under the ownership of the business i.e. building, plant, furniture, machinery, stock, cash etc. Assets also include anything against which money or service will be received i.e.

**Types of assets:**

1. **Current assets:**

* It can be converted into cash within a short time frame (ie., 1 year or less).
* E.g., cash in hand, cash in bank, notes receivable, investment, Debtors, accounts receivable, funds in checking accounts.

1. **Fixed assets:**

* Fixed assets have relatively existence & are not readily converted into cash.
* Fixed assets are held for the purpose of earning income & they are not sold in the cause of trading.
* E.g., land, building, equipment & machinery, furniture.

1. **Other assets:**

* Do not fall under either current assets or fixed assets
* E.g., patents, copyrights, franchises, goodwill, investment in bond sinking funds.

**Liabilities** means our dues to others or anything against which we are to pay money or render

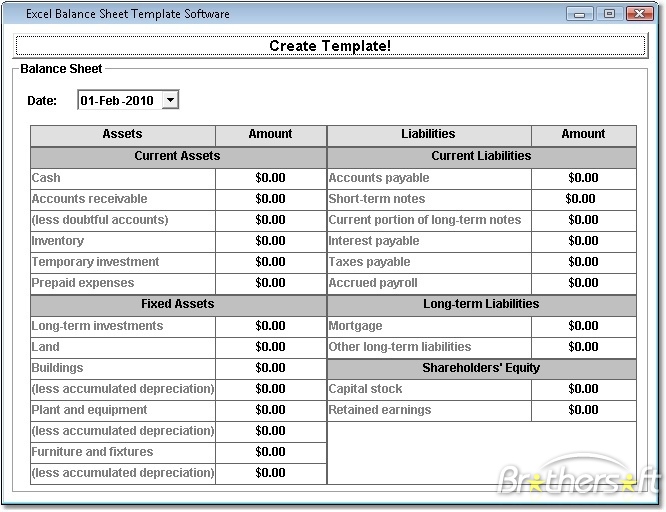
Service, i.e. creditors, outstanding expenses, amount payable to the owner of the business (capital)

**Types of Liabilities**

* **Fixed Liability:** the liability which is to be paid of at the time of dissolution of firm is called fixed liability. Examples are Capital, Reserve and Surplus.
* **Long-term liability:** The liability which is not payable within the next accounting period is called long-term liability. Examples are Debentures of a company, Mortgage Loan etc.
* **Current Liability:** The liability which is to be paid of in the next accounting period is current liability.. Examples: Sundry, creditors, Bills Payable and Bank overdraft etc.
* **Trade Liability:** Liability which is incurred for goods and services supplied or expenses incurred are called trade liability. Example; Bill payable and sundry period.
* **Financial liability:** Liability which is incurred for financial purposes is called financial liability. Example: Bank overdraft, load taken for a short period.
* **Contingent liability:** A contingent liability is one which is not an actual liability but which will become an actual one on the happening of some event which is uncertain. Examples: Bills discounted before maturity, Liability of a case pending in the court.

**PRO-FORMA OF A BALANCE SHEET IS AS FOLLOWS:**

**BALANCE SHEET OF ABC LTD AS ON 31ST DECEMBER 2005:**



## Fig 3.1 Balance Sheet

## Features of balance sheet:

Balance sheet has the following features:

1. It is the last stage of final accounts
2. It is prepared on the last day of an accounting year.
3. It is not an account under the double entry system - it is a statement only.
4. It has two sides - left hand side known as asset side and right hand side known as liabilities side.
5. The total of both sides are always equal.
6. The balances of all asset accounts and liability accounts are shown in it. No expense accounts and revenue accounts are shown here.
7. It discloses the financial position and solvency of the business.
8. It is prepared after the preparation of trading and profit and loss account because the net profit or net loss of a concern is included in it through capital account.

**3.4 PROFIT & LOSS STATEMENTS**

The account, through which annual net profit or loss of a business is ascertained, is called **profit and loss account**.

**Definition of Profit And Loss Account**

Profit and loss account is that part of [final account](http://www.svtuition.org/2010/07/introduction-to-final-acs.html) is made for calculating the [net profit](http://accountingcollege.blogspot.com/2010/06/net-profit.html) or net loss. In the debit side of this account, we show all indirect loss and expenses and in the credit side of this account, we show all indirect incomes. After matching debit and credit side of profit and loss account, we can find net profit or loss of business. If organisation is company, we transfer this balance to profit and loss appropriation account, otherwise, we transfer this balance to capital account.

**Explanation of Profit And Loss Account**

**A) Debit Side of Profit and loss account**

1. Gross loss transferred from trading

2. All indirect expenses like sale expenses, office expenses and legal expenses. If credit side is more than debit side, we show net profit in debit side

**B) Credit Side of Profit and Loss account**

1. Gross profit transferred from trading account

2. Indirect Incomes like rent, commission, discount received .If debit side is more than credit side, we show net loss in credit side.

**Items Comes Under Profit And Loss Account**

## Sequence of Expenses in Profit and Loss Account:

* + There is no hard and fast rule as to the order in which the items of expenses are shown in profit and loss account. Generally, the items of expenses are shown in the following sequence:

### Office and Administration Expenses:

* + These are the expenses with the management of the business e.g. salaries of manager, accountant and office clerks, office rent, office stationary, office electric charges, office telephone etc.

### Selling and Distribution Expenses:

* + These are the expenses which are directly or indirectly connected with the sale of goods. These expenses vary with the sales i.e. they increase or decrease with the increase or decrease of sale of goods. Examples are advertisements, carriage outward, salesmen's salaries and commission, discount allowed, traveling expenses, bad debts, packaging expenses, warehouse rent etc.

### Financial and Other Expenses:

* + All other expenses excepting those mentioned above are considered under this class.

## Features of Profit and Loss Account:

* This account is prepared on the last day of an account year in order to determine the net result of the business.
* It is second stage of the final accounts.
* Only indirect expenses and indirect revenues are shown in this account.
* It starts with the closing balance of the trading account i.e. gross profit or gross loss.
* All items of revenue concerning current year - whether received in cash or not - and all items of expenses - whether paid in cash or not - are considered in this account. But no item relating to past or next year is included in it.

**Profit and Loss Account for the year ended.....**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DEBIT |  |  | CREDIT |  |
|  | $ |  |  | $ |
| Trading A/C |  |  | Trading A/C |  |
| Gross loss (transferred) | ----- |  | Gross profit (transferred) | ----- |
| **Office and Administration Expenses:** | ----- |  | Interest received | ----- |
| Salaries | ----- |  | Rent received | ----- |
| Rent, rates, taxes | ----- |  | Discount received | ----- |
| Postage & telegrams | ----- |  | Dividend received | ----- |
| Office electric charges | ----- |  | Bad debts recovered | ----- |
| Telephone charges | ----- |  | Provision for discount on creditors | ----- |
| Printing and stationary | ----- |  | Miscellaneous revenue | ----- |
| **Selling and Distribution Expenses:** |  |  | Net loss - transferred to capital A/C | ----- |
| Carriage outward | ----- |  |  |  |
| Advertisement | ----- |  |  |  |
| Salesmen's salaries | ----- |  |  |  |
| Commission | ----- |  |  |  |
| Insurance | ----- |  |  |  |
| Traveling expenses | ----- |  |  |  |
| Bad debts | ----- |  |  |  |
| Packing expenses | ----- |  |  |  |
| **Financial and Other Expenses:** |  |  |  |  |
| Depreciation | ----- |  |  |  |
| Repair | ----- |  |  |  |
| Audit fee | ----- |  |  |  |
| Interest paid | ----- |  |  |  |
| Commission paid | ----- |  |  |  |
| Bank charges | ----- |  |  |  |
| Legal charges | ----- |  |  |  |
| Net profit - transferred to capital A/C | ----- |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| |  |  |  | | --- | --- | --- | | If credit side exceeds the debit side | = | Net profit | | If debit side exceeds the credit side | = | Net loss | | | | | |

**Uses of the Profit And Loss Account**:

* The main use is to monitor and measure profit. This assumes that the information recording is accurate. Significant problems can arise if the information is inaccurate, either through incompetence or deliberate fraud.
* Once the profit (loss) has been accurately calculated, this can then be used for comparison or judging how well the business is doing compared to itself in the past, compared to the managers’ plans and compared to other businesses.

**3.5 ACCOUNTING**

Accounting is the process of identifying, measuring, recording and communicating the economic events (business transactions) of an organization.

**Objectives of Accounting**

The following are the various objectives of accounting.

1. Maintenance of records of business.

2. Finding out the results of business activities during a period by preparing profit and loss account.

3. Knowing the financial position of the business as on a particular date by preparing the balance sheet.

4. Maintaining control over the assets.

5. Supplying information to the government agencies and tax authorities.

6. Deciding future plans in respect of cash by preparing cash budgets.

**3.5.1 TYPES OF ACCOUNTING**

Accounting has the following branches:

**1. Financial Accounting:** This is the branch of accounting which is related to preparation of profit and loss account and balance sheet.

**2. Cost Accounting:** This is the branch of accounting which is related to finding out the cost of a product or job or service.

**3. Management Accounting:** This is the branch of accounting which is related to supply information to the management for the purpose of planning, control and decision making.

**A. Financial Accounting**

[Financial](http://www.businessdictionary.com/definition/financial.html) accounting gathers and summarizes financial [data](http://www.businessdictionary.com/definition/data.html) to [prepare](http://www.businessdictionary.com/definition/prepare.html)[financial reports](http://www.businessdictionary.com/definition/financial-report.html) such as [balance sheet](http://www.businessdictionary.com/definition/balance-sheet.html) and [income statement](http://www.businessdictionary.com/definition/income-statement.html) for the [organization's](http://www.businessdictionary.com/definition/organization.html)[management](http://www.businessdictionary.com/definition/management.html), [investors](http://www.businessdictionary.com/definition/investor.html), [lenders](http://www.businessdictionary.com/definition/lender.html), [suppliers](http://www.businessdictionary.com/definition/supplier.html), [tax](http://www.businessdictionary.com/definition/tax.html)[authorities](http://www.businessdictionary.com/definition/authority.html), and other [stakeholders](http://www.businessdictionary.com/definition/stakeholder.html).

The art of recording, classifying & summarizing in a significant manner and in terms of money, transactions & events which are in part at least of a financial character & interpreting the results there of.

**Objectives / significance/ importances:**

* To know the results of the business
* To ascertain the financial position of the business
* To ensure control over the assets
* To facilitate proper management to cash
* To provide requisite information

**Functions of financial accounting:**

**(a) Book-Keeping Function**: Financial accounting is the scientific process of recording financial data of the business. Human memory is short; therefore it is not possible to remember the numerous transactions of the business. Accounting is supportive and supplementary to human memory. Business transactions are recorded in journal, subsidiary books and ledger.

**(b) Classification of Information:** The data of one particular type is classified into one segment. This is done in the form of ledger accounts. The transactions of different activities are collected in one place. Full information about specific items is shown under separate heads in the ledger.

**(c) Preparation of Financial Statements**: Business transactions are summarised by preparing the principal statements of the business i.e., profit and loss account and the balance sheet. These statements are the indicators of operational efficiency and financial position of an enterprise.

(**d) Segregating Financial Transactions:** The economic transactions relating to a business are measured in terms of money. Financial accounting is concerned with transactions which are measureable in monetary terms. Any information of the business which cannot be expressed in terms of money is not considered. It is a basic concept of accounting called ‘money measurement concept’.

**(e)Interpretation of Financial Data:** The management interprets the financial data for decision making. The various parties concerned with the enterprise such as shareholders, creditors, bankers and other agencies are facilitated because of the interpretation of financial data provided in various contexts and they may draw their own conclusions**.**

**(f) Reporting of Information:** Financial accounting not only records data but also communicates data by way of profit and loss account and the balance sheet to all concerned at frequent intervals.

**(g) Providing Accurate And Reliable Information:** Yet another important function of accounting is to provide accurate, reliable and useful information. This function is performed by following established accounting standards. Moreover the accounting policies are consistently practiced to maintain uniformity and accuracy.

**B. Cost accounting**

Cost accounting is a branch of accounting that determines the actual cost of operations that the company indulges in. For instance all the processes as well as products and departments and the analysis of the profitability and the social application of the funds of the company are determined by the cost [accountant](http://www.accountant-search.com/).

**Objectives of cost accounting:**

* To aid in the development of long range plans by providing cost data that acts as a basis for projecting data for planning.
* To ensure efficient cost control by communicating essential data costs at regular intervals and thus minimize the cost of manufacturing.
* Determine cost of products or activities, which is useful in the determination of selling price or quotation.
* To identify profitability of each product, process, department etc of the business
* To provide management with information in connection with various operational problems by comparing the actual cost with standard cost, this reveals the discrepancies or variances.

**Function of cost accounting*:***

**(1) Ascertaining Cost:** This is a basic function of coat accounting. The cost of products, processes, jobs and services is ascertained under each element of cost and for all the major activities of a firm.

**(2) Fixation of Selling Price:** Determining the selling price of products and services is of paramount importance. Cost accounting provides all the necessary coat and other related data and helps in fixing selling prices.

**(3) Cost Control:** Controlling costs is the most important function of cost accounting. Predetermined costs are developed through standards and budgets to achieve this objective. Managerial action based upon variances in performance from the standards or budgets results in cost control.

**(4)Cost Reduction:** Cost control aims at maintaining at a predetermined level. Cost reduction aims at reducing cost by means of reducing wastage, effective utilisation of labour time, reducing idle time, value analysis and fixation of standards.

**(5) Evaluation of Performance:** Cost accounting constantly evaluates performance as a part of cost control efforts. Actual performance is compared with predetermined performance. Any deviations are noted and analysed for causes. In this process individual performance is automatically assessed.

**C. Management Accounting:**

**(1) Providing Financial Information:** The main emphasis of management accounting is to provide financial information to management. The information is provided in a manner suitable to various levels of management for reviewing policies and decision making.

**(2) Cause and Effect Analysis:** Financial accounting confines itself to presentation of p&l account and balance sheet. Management accounting analyses the cause and effect of the facts and figures thereon. If there is loss causes for the losses are investigated. If there is profit the variable affecting the profit are also analyzed. The amount of profit is compared with expenditure, sales, capital employed, etc., to draw appropriate conclusions relating to the effect of those items on profit.

**(3) Use Of Special Techniques And Concepts:** Management accounting employs special techniques like standard costing, budgetary control, marginal costing, fund flow, cash flow, ratio analysis, responsibility accounting. Etc. To make accounting data more useful and helpful to the management. Each of these techniques or concepts is a useful tool for specific purpose in analysis and interpretation of data, establishing control over operations, etc.

**(4) Decision Making:** Main objective of management accounting is to provide relevant information to management to take various important decisions. Historical information provides a base on which the future impact is predicted, alternatives are developed and decisions are made to select to select the most beneficial course of action

**(5) No Fixed Conventions: Financial** accounting has various established principles and rules in preparing the financial accounts. Management accounting has no such fixed rules. The tools or techniques applied by the management accounting are same but application of these techniques various from concern to concern and situation to situation. Interpretation of analyzed data depends on the person using it the conclusions derived from application of a technique depend on the intelligence and experience of the management account. The presentation of information depends on the requirements of the concern. Every concern has its its own was of application of the techniques to suit its needs.

**(6) Achievement of Objectives:** Management accounting is helpful in realizing the enterprise objectives. Based on the historical information and with adjustments for predicate future changes, objectives are laid down. Actual performance is recorded. Comparison of actual with predetermined results is made. If there are deviations of actuals from the predetermined results, corrective action is taken predicted objectives are achieved. This becomes possible with the help of management accounting techniques of standard costing and budgetary control.

**(7) Improving Efficiency:** The purpose of accounting is to provide information to increase efficiency. The efficiency of departments and divisions can be improved by fixation of targets or goals for a specific period. The actual performance is compared with that of targets. Positive deviations are reviewed the negative deviations are probed to ascertain the causes. The ways and means tackle the causes are analyzed and targets are achieved. The process of fixing and achieving the targets leads to gradual improvement in overall efficiency.

**(8) Forecasting:** Management accounting is concerned with taking decisions for future implementation. This involves prediction and forecasting of future. It is helpful in planning and laying down of objectives.

**(9) Providing of Information and Not Decisions:** Management accounting provides financial information and not the decisions. That is why it is said that management accounting depends on the efficiency of the management in using information and taking effective decisions.

**Advantages of Management Accounting**:

1. It increases efficiency of business operations
2. It ensures efficient regulation of business activities
3. It ensures utilization of available resources and thereby increase the return on capital employed.
4. It ensures effective control of performance
5. It helps in evaluating the efficiency of the company’s business policies

**3.6 INTEREST FORMULAS AND THEIR APPLICATIONS**

## 3.6.1 Introduction

Interest rate is the rental value of money. It represents the growth of capital per unit period. The period may be a month, a quarter, semiannual or a year. An interest rate 15% compounded annually means that for every hundred rupees invested now, an amount of Rs. 15 will be added to the account at the end of the first year. So, the total amount at the end of the first year will be Rs. 115. At the end of the second year, again 15% of Rs. 115, i.e. Rs. 17.25 will be added to the account. Hence the total amount at the end of the second year will be Rs. 132.25. The process will continue thus till the specified number of years.

* + 1. **Time Value Of Money**

If an investor invests a sum of Rs. 100 in a fixed deposit for five years with an interest rate of 15% compounded annually, the accumulated amount at the end of every year will be as shown in Table 2.1.

|  |  |  |
| --- | --- | --- |
| **Table 3.1** | **Compound Amounts** | |
|  | **(amount of deposit = Rs. 100.00)** | |
|  |  |  |  |
| *Year end* | *Interest* | *Compound amount* |
|  | (Rs.) | (Rs.) |
|  |  |  |  |
| 0 |  | 100.00 |  |
| 1 | 15.00 | 115.00 |  |
| 2 | 17.25 | 132.25 |  |
| 3 | 19.84 | 152.09 |  |
| 4 | 22.81 | 174.90 |  |
| 5 | 26.24 | 201.14 |  |
|  |  |  |  |

The formula to find the future worth in the third column is



Where

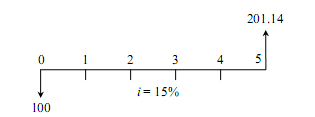
P = principal amount invested at time 0,

F = future amount,

i = interest rate compounded annually,

n = period of deposit.

The maturity value at the end of the fifth year is Rs. 201.14. This means that the amount Rs. 201.14 at the end of the fifth year is equivalent to Rs. 100.00 at time 0 (i.e. at present). This is diagrammatically shown in Fig. 3.2. This explanation assumes that the inflation is at zero percentage



**Fig. 3.2 Time value of money.**

Alternatively, the above concept may be discussed as follows: If we want Rs. 100.00 at the end of the nth year, what is the amount that we should deposit now at a given interest rate, say 15%? A detailed working is shown in Table 3.2.

**Table 3.2 Present worth Amounts (Rate of interest = 15%)**

|  |  |  |
| --- | --- | --- |
| *End of year* | *Present worth* | *Compound amount* |
| (*n*) |  | *after n year*(*s*) |
|  |  |  |
| 0 |  | 100 |
| 1 | 86.96 | 100 |
| 2 | 75.61 | 100 |
| 3 | 65.75 | 100 |
| 4 | 57.18 | 100 |
| 5 | 49.72 | 100 |
| 6 | 43.29 | 100 |
| 7 | 37.59 | 100 |
| 8 | 32.69 | 100 |
| 9 | 28.43 | 100 |
| 10 | 24.72 | 100 |
|  |  |  |

The formula to find the present worth in the second column is



From Table 2.2, it is clear that if we want Rs. 100 at the end of the fifth year, we should now deposit an amount of Rs. 49.72. Similarly, if we want Rs. 100.00 at the end of the 10th year, we should now deposit an amount of Rs. 24.72.

Also, this concept can be stated as follows:

A person has received a prize from a finance company during the recent festival contest. But the prize will be given in either of the following two modes:

1. Spot payment of Rs. 24.72 or
2. Rs. 100 after 10 years from now (this is based on 15% interest rate compounded annually).

If the prize winner has no better choice that can yield more than 15% interest rate compounded annually, and if 15% compounded annually is the common interest rate paid in all the finance companies, then it makes no difference whether he receives Rs. 24.72 now or Rs. 100 after 10 years.

On the other hand, let us assume that the prize winner has his own business wherein he can get a yield of 24% interest rate (more than 15%) compounded annually, it is better for him to receive the prize money of Rs. 24.72 at present and utilize it in his business. If this option is followed, the equivalent amount for Rs. 24.72 at the end of the 10th year is Rs. 212.45. This example clearly demonstrates the time value of money.

## 3.6.3 Interest Formulas

While making investment decisions, computations will be done in many ways. To simplify all these computations, it is extremely important to know how to use interest formulas more effectively. Before discussing the effective application of the interest formulas for investment-decision making, the various interest formulas are presented first.

Interest rate can be classified into *simple interest rate* and *compound interest rate*.

In simple interest, the interest is calculated, based on the initial deposit for every interest period. In this case, calculation of interest on interest is not applicable. In compound interest, the interest for the current period is computed based on the amount (principal plus interest up to the end of the previous period) at the beginning of the current period.

The notations which are used in various interest formulae are as follows:

*P* = principal amount

*n* = No. of interest periods

1. = interest rate (It may be compounded monthly, quarterly, semiannually or annually)

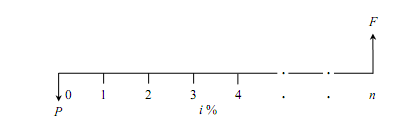
*F* = future amount at the end of year *n*

*A* = equal amount deposited at the end of every interest period

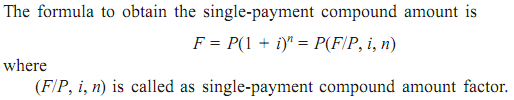
*G* = uniform amount which will be added/subtracted period after period to/from the amount of deposit A1 at the end of period 1

### 3.6.3.1 Single-Payment Compound Amount

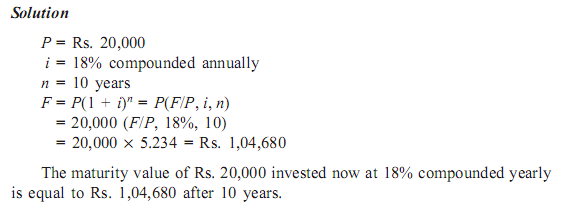
Here, the objective is to find the single future sum (*F*) of the initial payment (*P*) made at time 0 after *n* periods at an interest rate *i* compounded every period. The cash flow diagram of this situation is shown in Fig. 3.3.



**Fig. 3.3 Cash flow diagram of single-payment compound amount**

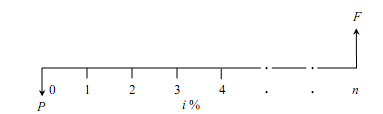


**Example:** A person deposits a sum of Rs. 20,000 at the interest rate of 18% compounded annually for 10 years. Find the maturity value after 10 years.

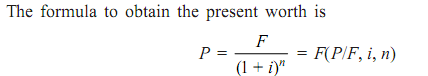


### 3.6.3.2 Single-Payment Present Worth Amount

Here, the objective is to find the present worth amount (P) of a single future sum (F) which will be received after n periods at an interest rate of i compounded at the end of every interest period. The corresponding cash flow diagram is shown in Fig. 2.3.



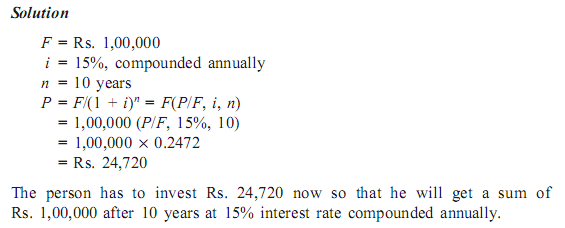
**Fig.3.3 Cash flow diagram of single-payment present worth amount**



Where (P/F, i, n) is termed as single-payment present worth factor.

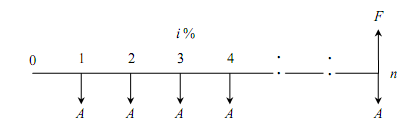
**Example**

A person wishes to have a future sum of Rs. 1,00,000 for his son’s education after 10 years from now. What is the single-payment that he should deposit now so that he gets the desired amount after 10 years? The bank gives 15% interest rate compounded annually



### 3.6.3.3 Equal-Payment Series Compound Amount

In this type of investment mode, the objective is to find the future worth of n equal payments which are made at the end of every interest period till the end of the nth interest period at an interest rate of i compounded at the end of each interest period. The corresponding cash flow diagram is shown in Fig. 3.4.



**Fig. 3.4 Cash flow diagram of equal-payment series compound amount**

In Fig. 2.4,

A = equal amount deposited at the end of each interest period

n = No. of interest periods

i = rate of interest

F = single future amount

The formula to get F is



Where (F/A, i, n) is termed as equal-payment series compound amount factor.

**Example**

A person who is now 35 years old is planning for his retiredlife. He plans to invest an equal sum of Rs. 10,000 at the end of every year forthe next 25 years starting from the end of the next year. The bank gives 20% interest rate, compounded annually. Find the maturity value of his account when he is 60 years old.

**Solution**

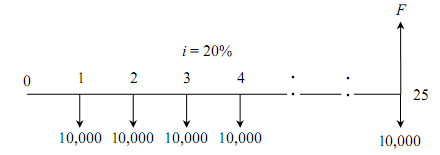
*A* = Rs. 10,000

*n* = 25 years

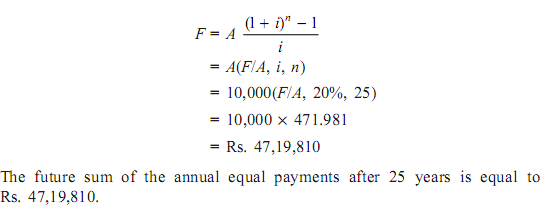
*i* = 20%

*F* = ?

The corresponding cash flow diagram is shown in Fig. 2.5.

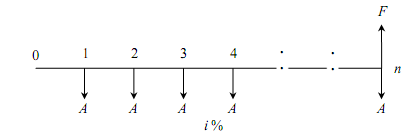


**Fig. 3.5 Cash flow diagram of equal-payment series compound amount.**



### 3.6.3.4 Equal-Payment Series Sinking Fund

In this type of investment mode, the objective is to find the equivalent amount (A) that should be deposited at the end of every interest period for n interest periods to realize a future sum (F) at the end of the nth interest period at an interest rate of i. The corresponding cash flow diagram is shown in Fig. 3.6.



**Fig 3.6 Cash flow diagram of equal-payment series sinking fund**

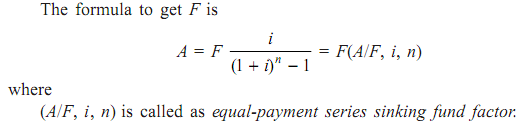
In Fig. 3.6,

*A* = equal amount to be deposited at the end of each interest period *n* = No. of interest periods

*i* = rate of interest

*F* = single future amount at the end of the *n*th period

The formula to get *F* is



**Company** has to replace a present facility after 15 years at an outlay of Rs. 5, 00,000. It plans to deposit an equal amount at the end of every year for the next 15 years at an interest rate of 18% compounded annually. Find the equivalent amount that must be deposited at the end of every year for the next 15 years.

**Solution**

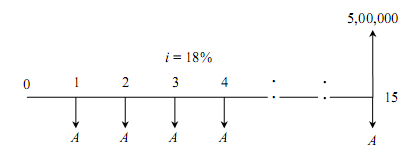
F = Rs. 5, 00,000

n = 15 years

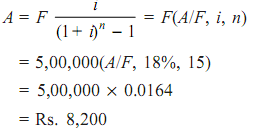
i = 18%

A =?

The corresponding cash flow diagram is shown in Fig.3.7.



**Fig. 3.7 Cash flow diagram of equal-payment series sinking fund**



The annual equal amount which must be deposited for 15 years is Rs. 8,200.

### 3.6.3.5 Equal-Payment Series Present Worth Amount

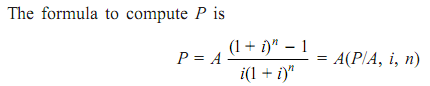
The objective of this mode of investment is to find the present worth of an equal payment made at the end of every interest period for n interest periods at an interest rate of i compounded at the end of every interest period. The corresponding cash flow diagram is shown in Fig. 2.8. Here,

P = present worth

A = annual equivalent payment

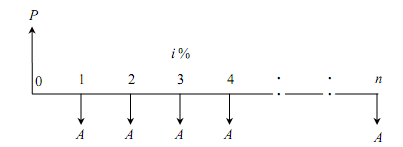
i = interest rate

n = No. of interest periods



Where

(P/A, i, n) is called equal-payment series present worth factor.



**Fig. 3.8 Cash flow diagram of equal-payment series present worth amount**

**Example:** A company wants to set up a reserve which will help the company to have an annual equivalent amount of Rs. 10,00,000 for the next 20 years towards its employees welfare measures. The reserve is assumed to grow at the rate of 15% annually. Find the single-payment that must be made now as the reserve amount.

**Solution**

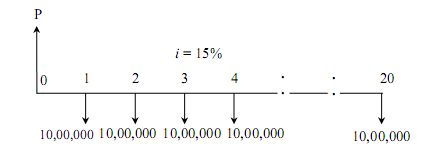
A = Rs. 10, 00,000

i = 15%

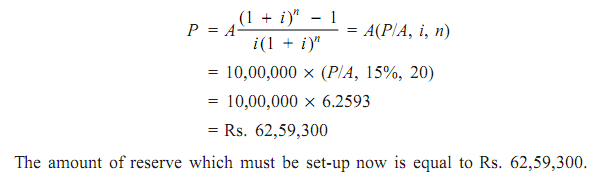
n = 20 years

P = ?

The corresponding cash flow diagram is illustrated in Fig. 3.9.

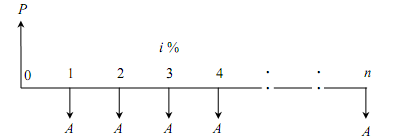


**Fig 3.9 Cash flow diagram of equal-payment series present worth amount**

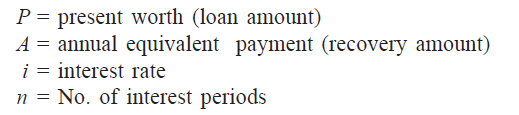


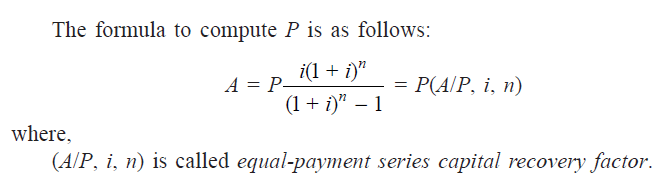
### 3.6.3.6 Equal-Payment Series Capital Recovery Amount

The objective of this mode of investment is to find the annual equivalent amount (A) which is to be recovered at the end of every interest period for n interest periods for a loan (P) which is sanctioned now at an interest rate of i compounded at the end of every interest period (see Fig. 2.10).



**Fig 3.10 Cash flow diagram of equal-payment series capital recovery amount**





**Example:**  A bank gives a loan to a company to purchase an equipment worth Rs.10,00,000 at an interest rate of 18% compounded annually. This amount should be repaid in 15 yearly equal installments. Find the installment amount that the company has to pay to the bank.

**Solution**

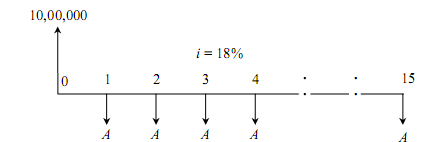
P = Rs. 10,00,000

i = 18%

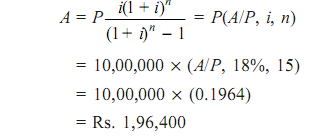
n = 15 years

A = ?

The corresponding cash flow diagram is shown in Fig. 3.11.



**Fig 3.11 Cash flow diagram of equal-payment series capital recovery amount**

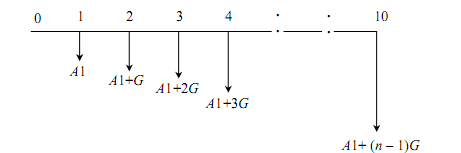


The annual equivalent installment to be paid by the company to the bank is Rs.1,96,400.

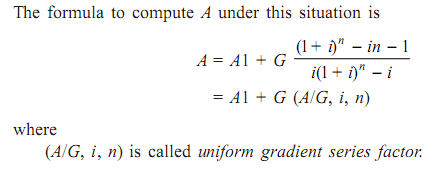
### 

### 3.6.3.7 Uniform Gradient Series Annual Equivalent Amount

The objective of this mode of investment is to find the annual equivalent amount of a series with an amount A1 at the end of the first year and with an equal increment (G) at the end of each of the following n – 1 years with an interest rate i compounded annually. The corresponding cash flow diagram is shown in Fig. 3.12.



**Fig. 3.12 Cash flow diagram of uniform gradient series annual equivalent amount**



**Example:** A person is planning for his retired life. He has 10 more year of service. He would like to deposit 20% of his salary, which is Rs. 4,000, at the end of the first year, and thereafter he wishes to deposit the amount with an annual increase of Rs. 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series.

**Solution** Here,

A1 = Rs. 4,000

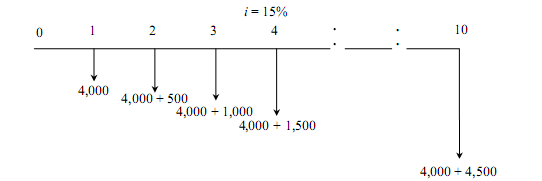
G = Rs. 500

i = 15%

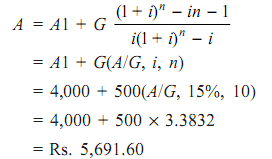
n = 10 years

A = ?& F = ?

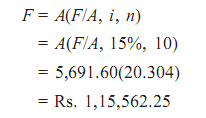
The cash flow diagram is shown in Fig. 3.13.



**Fig. 3.13 Cash flow diagram of uniform gradient series annual equivalent amount**



This is equivalent to paying an equivalent amount of Rs. 5,691.60 at the end of every year for the next 10 years. The future worth sum of this revised series at the end of the 10th year is obtained as follows:



At the end of the 10th year, the compound amount of all his payments will be Rs. 1,15,562.25.

**Example:** A person is planning for his retired life. He has 10 more years of service. He would like to deposit Rs. 8,500 at the end of the first year andthereafter he wishes to deposit the amount with an annual decrease of Rs. 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series.

Solution Here,

A1 = Rs. 8,500

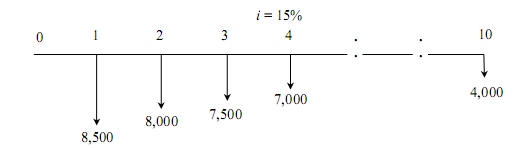
G = –Rs. 500

i = 15%

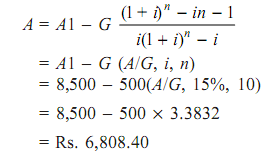
n = 10 years

A = ?& F = ?

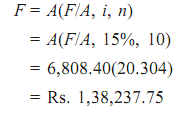
The cash flow diagram is shown in Fig. 3.14.



**Fig. 3.14 Cash flow diagram of uniform gradient series annual equivalent amount**



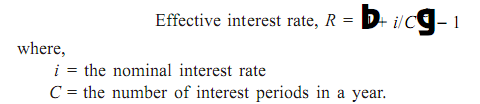
This is equivalent to paying an equivalent amount of Rs. 6,808.40 at the end of every year for the next 10 years. The future worth sum of this revised series at the end of the 10th year is obtained as follows:



At the end of the 10th year, the compound amount of all his payments is Rs. 1,38,237.75.

* + - 1. **Effective Interest Rate**

Let *i* be the nominal interest rate compounded annually. But, in practice, the compounding may occur less than a year. For example, compounding may be monthly, quarterly, or semi-annually. Compounding monthly means that the interest is computed at the end of every month. There are 12 interest periods in a year if the interest is compounded monthly. Under such situations, the formula to compute the effective interest rate, which is compounded annually, is



**Example*:*** A person invests a sum of Rs. 5,000 in a bank at a nominal interest rate of 12% for 10 years. The compounding is quarterly. Find the maturity amount of the deposit after 10 years.

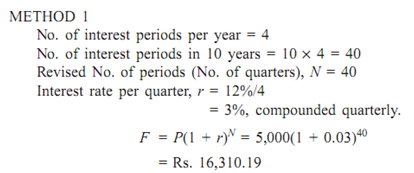
***Solution***

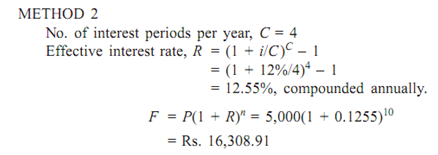
*P* = Rs. 5,000

*n* = 10 years

*i* = 12% (Nominal interest rate)

*F* = ?





**3.6.4 Bases for Comparison of Alternatives**

In most of the practical decision environments, executives will be forced to select the best alternative from a set of competing alternatives. Let us assume that an organization has a huge sum of money for potential investment and there are three different projects whose initial outlay and annual revenues during their lives are known. The executive has to select the best alternative among these three competing projects.

There are several bases for comparing the worthiness of the projects. These bases are:

1. Present worth method
2. Future worth method
3. Annual equivalent method
4. Rate of return method

# UNIT-IV

**METHODS OF DEPRECIATION**

# 4.1 DEPRECIATION

## 4.1.1 Introduction

Any equipment which is purchased today will not work for ever. This may be due to wear and tear of the equipment or obsolescence of technology. Hence, it is to be replaced at the proper time for continuance of any business. The replacement of the equipment at the end of its life involves money. This must be internally generated from the earnings of the equipment. The recovery of money from the earnings of equipment for its replacement purpose is called *depreciation fund* since we make an assumption that the value of the equipment decreases with the passage of time. Thus, the word “depreciation” means *decrease* in value of any physical asset with the passage of time.

## 4.1.2 Methods of Depreciation

There are several methods of accounting depreciation fund. These are as follows:

1. Straight line method of depreciation

2. Declining balance method of depreciation

3. Sum of the years—digits method of depreciation

4. Sinking-fund method of depreciation

5. Service output method of depreciation

## 4.2 STRAIGHT LINE METHOD OF DEPRECIATION

In this method of depreciation, a fixed sum is charged as the depreciation amount throughout the lifetime of an asset such that the accumulated sum at the end of the life of the asset is exactly equal to the purchase value of the asset.

Here, we make an important assumption that inflation is absent.

Let,

*P* = first cost of the asset,

*F* = salvage value of the asset,

*n* = life of the asset,

*Bt*= book value of the asset at the end of the period *t*,

*Dt*= depreciation amount for the period *t*.

The formulae for depreciation and book value are as follows:

*Dt*= (*P* – *F*)/*n*

*Bt*= *Bt*–1 – *Dt*= *P* – *t* \*[(*P* – *F*)/*n*]

### Example

### A company has purchased an equipment whose first cost is Rs. 1,00,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is Rs. 20,000. Determine the

depreciation charge and book value at the end of various years using the straight line method of depreciation.

***Solution***

*P* = Rs. 1,00,000

*F* = Rs. 20,000

*n* = 8 years

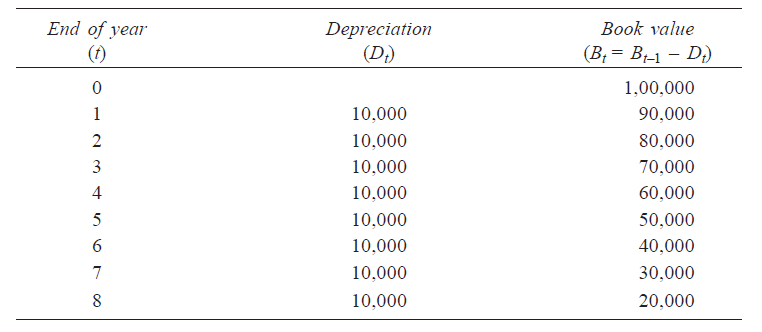
*Dt*= (*P* – *F*)/*n*

= (1,00,000 – 20,000)/8

= Rs. 10,000

In this method of depreciation, the value of *Dt*is the same for all the years. The calculations pertaining to *Bt*for different values of *t* are summarized in Table5.1.

**Table 4.1 *Dt* and *Bt* Values under Straight line Method of Depreciation**



If we are interested in computing *Dt*and *Bt*for a specific period (*t*), the formulae can be used. In this approach, it should be noted that the depreciation is the same for all the periods.

* 1. **DECLINING BALANCE METHOD OF DEPRECIATION**

In this method of depreciation, a constant percentage of the book value of the previous period of the asset will be charged as the depreciation amount for the current period. This approach is a more realistic approach, since the depreciation charge decreases with the life of the asset which matches with the earning potential of the asset. The book value at the end of the life of the asset may not be exactly equal to the salvage value of the asset. This is a major limitation of this approach.

Let,

*P* = first cost of the asset,

*F* = salvage value of the asset,

*n* = life of the asset,

*Bt*= book value of the asset at the end of the period *t*,

*K* = a fixed percentage, and

*Dt*= depreciation amount at the end of the period *t*.

The formulae for depreciation and book value are as follows:

*Dt*= *K* \**Bt*-1

*Bt*= *Bt*–1 – *Dt*= *Bt*–1 – *K* \**Bt*–1

= (1 – *K*) \**Bt*–1

The formulae for depreciation and book value in terms of *P* are as follows:

*Dt*= *K*(1 – *K*)*t*–1 \**P*

*Bt*= (1 – *K*)*t*\**P*

While availing income-tax exception for the depreciation amount paid in each year, the rate *K* is limited to at the most 2/*n*. If this rate is used, then the corresponding approach is called the double declining balance method of depreciation.

### 

### Example

### Consider Example 5.3.1 and demonstrate the calculations of the declining balance method of depreciation by assuming 0.2 for *K*.

***Solution***

*P* = Rs. 1,00,000

*F* = Rs. 20,000

*n* = 8 years

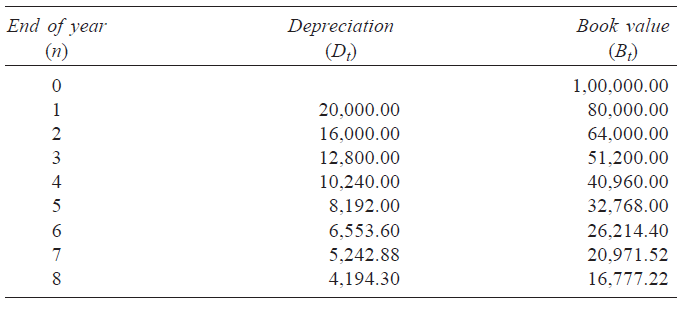
*K* = 0.2

The calculations pertaining to *Dt*and *Bt*for different values of *t* are summarized in Table using the following formulae:

*Dt*= *K* \**Bt*–1

*Bt*= *Bt*–1 – *Dt*

**Table 4.2 *DT and BT* according to Declining Balance Method of Depreciation**

**

If we are interested in computing *Dt*and *Bt*for a specific period *t*, the respective formulae can be used.

**4.****4 SUM-OF-THE-YEARS-DIGITS METHOD OF DEPRECIATION**

In this method of depreciation also, it is assumed that the book value of the asset decreases at a decreasing rate. If the asset has a life of eight years, first the sum of the years is computed as

Sum of the years = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8

= 36 = *n*(*n* + 1)/2

The rate of depreciation charge for the first year is assumed as the highest and then it decreases. The rates of depreciation for the years 1–8, respectively are as follows: 8/36, 7/36, 6/36, 5/36, 4/36, 3/36, 2/36, and 1/36. For any year, the depreciation is calculated by multiplying the corresponding rate of depreciation with (*P* – *F*).

*Dt*= Rate \*(*P* – *F*)

*Bt*= *Bt*–1 – *Dt*

The formulae for *Dt*and *Bt*for a specific year *t* are as follows:

*Dt = n-t+1 (P-F)*

n(n+1)/2

****

### Example

Consider Example 5.3.1 and demonstrate the calculations of the sum-of-the-years-digits method of depreciation.

***Solution***

*P* = Rs. 1,00,000

*F* = Rs. 20,000

*n* = 8 years

Sum = *n*(*n* + 1)/2 = 8 \*9/2 = 36

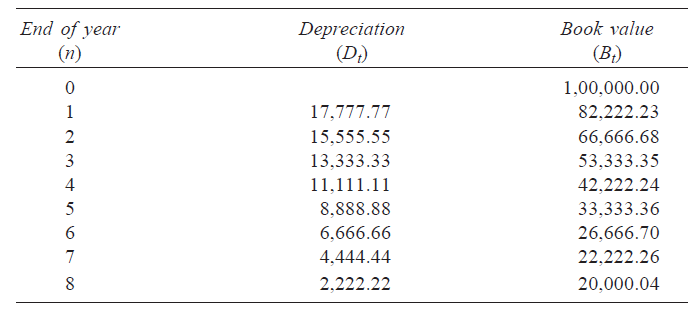
The rates for years 1–8, are respectively 8/36, 7/36, 6/36, 5/36, 4/36, 3/36, 2/36 and 1/36.

The calculations of *Dt* and *Bt* for different values of *t* are summarized in Table using the following formulae:

*Dt*= Rate \_ (*P* – *F*)

*Bt*= *Bt*–1 – *Dt*

**Table 4.3 Dt and *Bt* under Sum-of-the-years-digits Method of Depreciation**

****

If we are interested in calculating *Dt*and *Bt* for a specific *t*, then the usage of the formulae would be better.

**4.5 SINKING FUND METHOD OF DEPRECIATION**

In this method of depreciation, the book value decreases at increasing rates with respect to the life of the asset.

Let

*P* = first cost of the asset,

*F* = salvage value of the asset,

*n* = life of the asset,

*i* = rate of return compounded annually,

*A* = the annual equivalent amount,

*Bt*= the book value of the asset at the end of the period *t*, and

*Dt*= the depreciation amount at the end of the period *t*.

The loss in value of the asset (*P* – *F*) is made available an the form of cumulative depreciation amount at the end of the life of the asset by setting up an equal depreciation amount (*A*) at the end of each period during the lifetime of the asset.

*A* = (*P* – *F*) \* [*A*/*F*, *i*, *n*]

The fixed sum depreciated at the end of every time period earns an interest at the rate of *i*% compounded annually, and hence the actual depreciation amount will be in the increasing manner with respect to the time period. A generalized formula for *Dt*is

*Dt*= (*P* – *F*) \*(*A*/*F*, *i*, *n*) \* (*F*/*P*, *i*, *t* – 1)

The formula to calculate the book value at the end of period *t* is

*Bt*= *P* – (*P* – *F*) (*A*/*F*, *i*, *n*) (*F*/*A*, *i*, *t*)

The above two formulae are very useful if we have to calculate *Dt*and *Bt*for any specific period. If we calculate *Dt*and *Bt*for all the periods, then the tabular approach would be better.

* 1. **SERVICE OUTPUT METHOD OF DEPRECIATION**

In some situations, it may not be realistic to compute depreciation based on time period. In such cases, the depreciation is computed based on service rendered by an asset.

Let

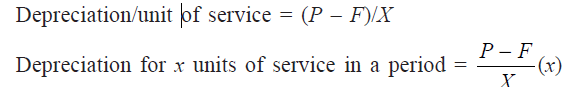
*P* = first cost of the asset

*F* = salvage value of the asset

*X* = maximum capacity of service of the asset during its lifetime

*x* = quantity of service rendered in a period.

Then, the depreciation is defined per unit of service rendered:



**Example**

The first coat of a road laying machine is Rs. 80,00,000. Its salvage value after five years is Rs. 50,000. The length of road that can be laid by the machine during its lifetime is 75,000 km.In its third year of operation, the length of road laid is 2,000 km. Find the depreciation of the equipment for that year.

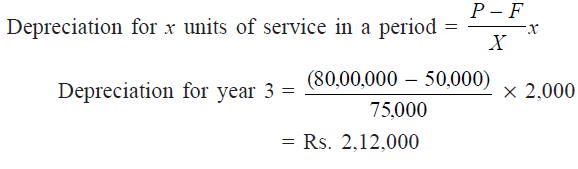
***Solution***

*P* = Rs. 80,00,000

*F* = Rs. 50,000

*X* = 75,000 km

*x* = 2,000 km



## 

**UNIT V**

**METHOD OF COMPARISON OF ALTERNATIVES**

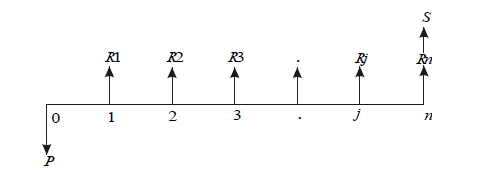
## 5.1 PRESENT WORTH METHOD

### 5.1.1 Introduction

In this method of comparison, the cash flows of each alternative will be reduced to time zero by assuming an interest rate *i*. Then, depending on the type of decision, the best alternative will be selected by comparing the present worth amounts of the alternatives. The sign of various amounts at different points in time in a cash flow diagram is to be decided based on the type of the decision problem. In a cost dominated cash flow diagram, the costs (outflows) will be assigned with positive sign and the profit, revenue, salvages value (all inflows), etc. will be assigned with negative sign. In a revenue/profit-dominated cash flow diagram, the profit, revenue, salvage value (all inflows to an organization) will be assigned with positive sign. The costs (outflows) will be assigned with negative sign. In case the decision is to select the alternative with the minimum cost, then the alternative with the least present worth amount will be selected. On the other hand, if the decision is to select the alternative with the maximum profit, then the alternative with the maximum present worth will be selected.

### 5.1.2 Revenue-Dominated Cash Flow Diagram

A generalized revenue-dominated cash flow diagram to demonstrate the present worth method of comparison is presented in Fig. 2.15



**Fig 5.1 Revenue-dominated cash flow diagram.**

In Fig. 5.1 *P* represents an initial investment and *Rj*the net revenue at the end of the *j*th year. The interest rate is *i*, compounded annually. *S* is the salvage value at the end of the *n*th year.

To find the present worth of the above cash flow diagram for a given interest rate, the formula is

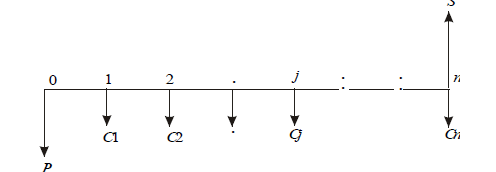
*PW*(*i*) = – *P* + *R*1[1/(1 + *i*)1] + *R*2[1/(1 + *i*)2] + ...

+ *Rj*[1/(1 + *i*) *j*] + *Rn*[1/(1 + *i*)*n*] + *S*[1/(1 + *i*)*n*]

In this formula, expenditure is assigned a negative sign and revenues are assigned a positive sign. If we have some more alternatives which are to be compared with this alternative, then the corresponding present worth amounts are to be computed and compared. Finally, the alternative with the maximum present worth amount should be selected as the best alternative.

### 5.1.3 Cost-Dominated Cash Flow Diagram

A generalized cost-dominated cash flow diagram to demonstrate the present worth method of comparison is presented in Fig. 5.2.



**Fig 5.2 Cost-dominated cash flow diagram**

In Fig. 2.16, *P* represents an initial investment, *Cj*the net cost of operation and maintenance at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. To compute the present worth amount of the above cash flow diagram for a given interest rate *i*, we have the formula

*PW*(*i*) = *P* + *C*1[1/(1 + *i*)1] + *C*2[1/(1 + *i*)2] + ... + *Cj*[1/(1 + *i*) *j*]

+ *Cn*[1/(1 + *i*)*n*] – *S*[1/(1 + *i*)*n*]

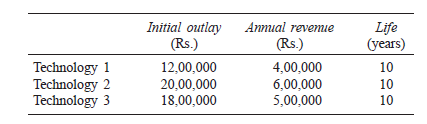
In the above formula, the expenditure is assigned a positive sign and the revenue a negative sign. If we have some more alternatives which are to be compared with this alternative, then the corresponding present worth amounts are to be computed and compared. Finally, the alternative with the minimum present worth amount should be selected as the best alternative.

### 5.2 EXAMPLES

In this section, the concept of present worth method of comparison applied to the selection of the best alternative is demonstrated with several illustrations.

Alpha Industry is planning to expand its production operation. It has identified three different technologies for meeting the goal. The initial outlay and annual revenues with respect to each of the technologies are summarized in Table 5.1. Suggest the best technology which is to be implemented based on the present worth method of comparison assuming 20% interest rate, compounded annually.

**Table 5.1**



***Solution:*** In all the technologies, the initial outlay is assigned a negative sign and the annual revenues are assigned a positive sign.

**Technology 1**

Initial outlay, *P* = Rs. 12,00,000

Annual revenue, *A* = Rs. 4,00,000

Interest rate, *i* = 20%, compounded annually

Life of this technology, *n* = 10 years

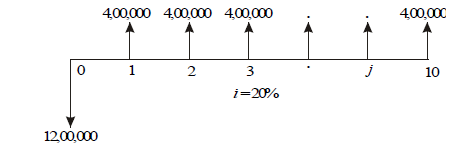
The present worth expression for this technology is

*PW*(20%)1 = –12,00,000 + 4,00,000 \* (*P*/*A*, 20%, 10)

= –12, 00,000 + 4, 00,000 \* (4.1925)

= –12, 00,000 + 16, 77,000

= Rs. 4, 77,000



**Fig 5.3 Cash flow diagram for technology 1**

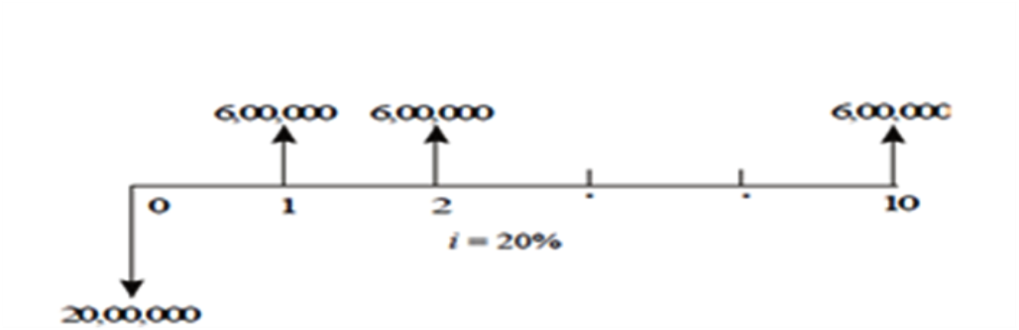
**Technology 2**

Initial outlay, *P* = Rs. 20, 00,000

Annual revenue, *A* = Rs. 6, 00,000

Interest rate, *i* = 20%, compounded annually

Life of this technology, *n* = 10 years



**Fig 5.4 Cash flow diagram for technology 2**

The present worth expression for this technology is

*PW*(20%)2 = – 20,00,000 + 6,00,000 \* (*P*/*A*, 20%, 10)

= – 20,00,000 + 6,00,000 \* (4.1925)

= – 20,00,000 + 25,15,500

= Rs. 5,15,500

**Technology 3**

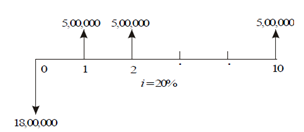
Initial outlay, *P* = Rs. 18,00,000

Annual revenue, *A* = Rs. 5,00,000

Interest rate, *i* = 20%, compounded annually

Life of this technology, *n* = 10 years

The cash flow diagram of this technology is shown in Fig. 2.19.

****

**Fig 5.5 Cash flow diagram for technology 3**

The present worth expression for this technology is

*PW*(20%)3 = –18,00,000 + 5,00,000 \* (*P*/*A*, 20%, 10)

= –18,00,000 + 5,00,000 \*(4.1925)

= –18,00,000 + 20,96,250

= Rs. 2,96,250

From the above calculations, it is clear that the present worth of technology 2 is the highest among all the technologies. Therefore, technology 2 is suggested for implementation to expand the production

## 5.3 FUTURE WORTH METHOD

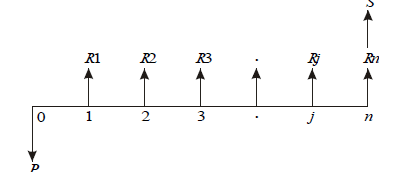
### 5.3.1 Introduction

In the future worth method of comparison of alternatives, the future worth of various alternatives will be computed. Then, the alternative with the maximum future worth of net revenue or with the minimum future worth of net cost will be selected as the best alternative for implementation.

### 

### 5.3.2 Revenue-Dominated Cash Flow Diagram

A generalized revenue-dominated cash flow diagram to demonstrate the future worth method of comparison is presented in Fig. 5.6



**Fig 5.6 Revenue-dominated cash flow diagram**

.

*P* represents an initial investment, *Rj*the net-revenue at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. The formula for the future worth of the above cash flow diagram for a given

interest rate, *i* is

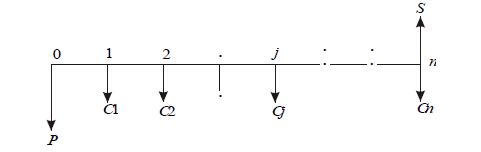
*FW*(*i*) = –*P*(1 + *i*)*n* + *R*1(1 + *i*)*n*–1 + *R*2(1 + i)*n*–2 + ...

+ *Rj*(1 + *i*)*n*–*j* + ... + *Rn*+ *S*

In the above formula, the expenditure is assigned with negative sign and the revenues are assigned with positive sign. If we have some more alternatives which are to be compared with this alternative, then the corresponding future worth amounts are to be computed and compared. Finally, the alternative with the maximum future worth amount should be selected as the best alternative.

### 5.3.3 Cost-Dominated Cash Flow Diagram

A generalized cost-dominated cash flow diagram to demonstrate the future worth method of comparison is given in Fig. 5.7.



**Fig 5.7 Cost-dominated cash flow diagram**

*P* represents an initial investment, *Cj* the net cost of operation and maintenance at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. The formula for the future worth of the above cash flow diagram for a given interest rate, *i* is

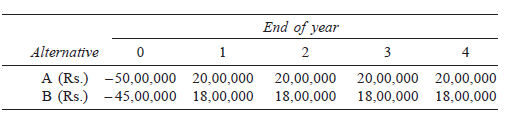
*FW*(*i*) = *P*(1 + *i*)*n* + *C*1(1 + *i* )*n*–1 + *C*2(1 + *i*)*n*–2 + ...

+ *Cj*(1 + *i*)*n–j* + ... + *Cn*– *S*

In this formula, the expenditures are assigned with positive sign and revenues with negative sign. If we have some more alternatives which are to be compared with this alternative, then the corresponding future worth amounts are to be computed and compared. Finally, the alternative with the minimum future worth amount should be selected as the best alternative.

### Example

### Consider the following two mutually exclusive alternatives:

**

At *i* = 18%, select the best alternative based on future worth method of comparison.

***Solution Alternative A***

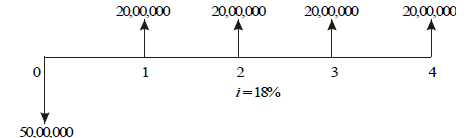
Initial investment, *P* = Rs. 50, 00,000

Annual equivalent revenue, *A* = Rs. 20, 00,000

Interest rate, *i* = 18%, compounded annually

Life of alternative A = 4 years

The cash flow diagram of alternative A is shown in Fig. 2.22



**Fig 5.8 Cash flow diagram for alternative A**

The future worth amount of alternative B is computed as

*FW*A(18%) = –50,00,000(*F*/*P*, 18%, 4) + 20,00,000(*F*/*A*, 18%, 4)

= –50,00,000(1.939) + 20,00,000(5.215)

= Rs. 7,35,000

***Alternative B***

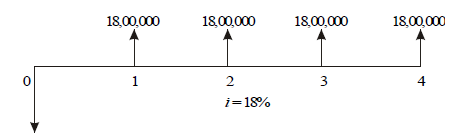
Initial investment, *P* = Rs. 45,00,000

Annual equivalent revenue, *A* = Rs. 18,00,000

Interest rate, *i* = 18%, compounded annually

Life of alternative B = 4 years

The cash flow diagram of alternative B is illustrated in Fig.2.23.



**Fig 5.9 Cash flow diagram of alternative B**

The future worth amount of alternative B is computed as

*FW*B(18%) = – 45,00,000(*F*/*P*, 18%, 4) + 18,00,000 (*F*/*A*, 18%, 4)

= –45,00,000(1.939) + 18,00,000(5.215)

= Rs. 6,61,500

The future worth of alternative A is greater than that of alternative B. Thus, alternative A should be selected.

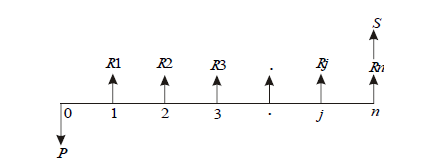
## 5.4 ANNUAL EQUIVALENT METHOD

### 5.4.1 Introduction

In the annual equivalent method of comparison, first the annual equivalent cost or the revenue of each alternative will be computed. Then the alternative with the maximum annual equivalent revenue in the case of revenue-based comparison or with the minimum annual equivalent cost in the case of cost based comparison will be selected as the best alternative.

### 5.4.2 Revenue-Dominated Cash Flow Diagram

A generalized revenue-dominated cash flow diagram to demonstrate the annual equivalent method of comparison is presented in Fig. 2.24.



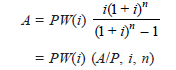
**Fig 5.10 Revenue-dominated cash flow diagram**

P represents an initial investment, *Rj* the net revenue at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. The first step is to find the net present worth of the cash flow diagram using the following expression for a given interest rate, *i*:

*PW*(*i*) = –*P* + *R*1/(1 + *i*)1 + *R*2/(1 + *i*)2 + ...

+ *Rj*/(1 + *i*) *j* + ... + *Rn*/(1 + *i*)*n* + *S*/(1 + *i*)*n*

In the above formula, the expenditure is assigned with a negative sign and the revenues are assigned with a positive sign. In the second step, the annual equivalent revenue is computed using the following formula:

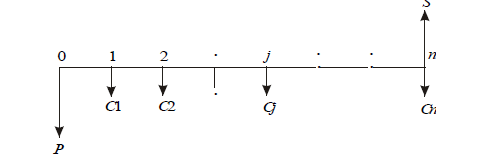
**

Where (*A*/*P*, *i*, *n*) is called *equal payment series capital recovery factor*.

If we have some more alternatives which are to be compared with this alternative, then the corresponding annual equivalent revenues are to be computed and compared. Finally, the alternative with the maximum annual equivalent revenue should be selected as the best alternative.

### 5.4.3 Cost-Dominated Cash Flow Diagram

A generalized cost-dominated cash flow diagram to demonstrate the annual equivalent method of comparison is illustrated in Fig. 2.25.



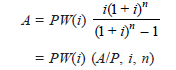
**Fig 5.11 Cost-dominated cash flow diagram.**

In Fig. 5.11, *P* represents an initial investment, *Cj* the net cost of operation and maintenance at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. The first step is to find the net present worth of the cash flow diagram using the following relation for a given interest rate, *i*.

*PW*(*i*) = *P* + *C*1/(1 + *i*)1 + *C*2/(1 + *i*)2 + ...

+ *Cj*/(1 + *i*) *j* + ... + *Cn*/(1 + *i*)*n* – *S*/(1 + *i*)*n*

In the above formula, each expenditure is assigned with positive sign and the salvage value with negative sign. Then, in the second step, the annual equivalent cost is computed using the following equation:

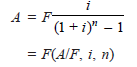
**

Where (*A*/*P*, *i*, *n*) is called as equal-payment series capital recovery factor

As in the previous case, if we have some more alternatives which are to be compared with this alternative, then the corresponding annual equivalent costs are to be computed and compared. Finally, the alternative with the minimum annual equivalent cost should be selected as the best alternative. If we have some non-standard cash flow diagram, then we will have to follow the general procedure for converting each and every transaction to time zero and then convert the net present worth into annual equivalent cost revenue depending on the type of the cash flow diagram. Such procedure is to be applied to all the alternatives and finally, the best alternative is to be selected.

**Alternate Approach**

Instead of first finding the present worth and then figuring out the annual equivalent cost/revenue, an alternate method which is as explained below can be used. In the first step, one can find the future worth of the cash flow diagram of each of the alternatives. Then, in the second step, the annual equivalent cost/revenue can be obtained by using the equation:

**

Where (*A*/*F*, *i*, *n*) is called *equal-payment series sinking fund factor.*

### Example:

A company provides a car to its chief executive. The owner of the company is concerned about the increasing cost of petrol. The cost per litre of petrol for the first year of operation is Rs. 21. He feels that the cost of petrol will be increasing by Re.1 every year. His experience with his company car indicates that it averages 9 km per litre of petrol. The executive expects to drive an average of 20,000 km each year for the next four years. What is the annual equivalent cost of fuel over this period of time?. If he is offered similar service with the same quality on rental basis at Rs. 60,000 per year, should the owner continue to provide company car for his executive or alternatively provide a rental car to his executive? Assume *i* = 18%. If the rental car is preferred, then the company car will find some other use within the company.

***Solution***

Average number of km run/year = 20,000 km

Number of km/litre of petrol = 9 km

Therefore,

Petrol consumption/year = 20,000/9 = 2222.2 litre

Cost/litre of petrol for the 1st year = Rs. 21

Cost/litre of petrol for the 2nd year = Rs. 21.00 + Re. 1.00

= Rs. 22.00

Cost/litre of petrol for the 3rd year = Rs. 22.00 + Re. 1.00

= Rs. 23.00

Cost/litre of petrol for the 4th year = Rs. 23.00 + Re. 1.00

= Rs. 24.00

Fuel expenditure for 1st year = 2222.2 \*21 = Rs. 46,666.20

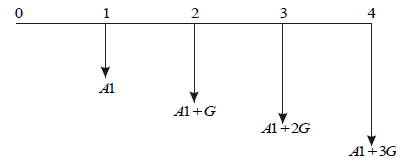
Fuel expenditure for 2nd year = 2222.2 \*22 = Rs. 48,888.40

Fuel expenditure for 3rd year = 2222.2 \*23 = Rs. 51,110.60

Fuel expenditure for 4th year = 2222.2 \*24 = Rs. 53,332.80

The annual equal increment of the above expenditures is Rs. 2,222.20 (*G*).

The cash flow diagram for this situation is depicted in Fig.2.26.



**Fig 5.12 Uniform gradient series cash flow diagram**.

In Fig. 5.12, *A*1 = Rs. 46,666.20 and *G* = Rs. 2,222.20

*A* = *A*1 + *G*(*A*/*G*, 18%, 4)

= 46,666.20 + 2222.2(1.2947)

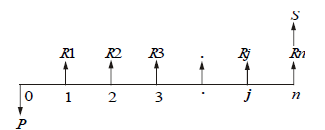
= Rs. 49,543.28

The proposal of using the company car by spending for petrol by the company will cost an annual equivalent amount of Rs. 49,543.28 for four years. This amount is less than the annual rental value of Rs. 60,000. Therefore, the company should continue to provide its own car to its executive.

## 5.5 Rate of Return Method

### 5.5.1 Introduction

The rate of return of a cash flow pattern is the interest rate at which the present worth of that cash flow pattern reduces to zero. In this method of comparison, the rate of return for each alternative is computed. Then the alternative which has the highest rate of return is selected as the best alternative. In this type of analysis, the expenditures are always assigned with a negative sign and the revenues/inflows are assigned with a positive sign. A generalized cash flow diagram to demonstrate the rate of return method of comparison is presented in Fig. 5.13.



**Fig 5.13 Generalized cash flow diagram**

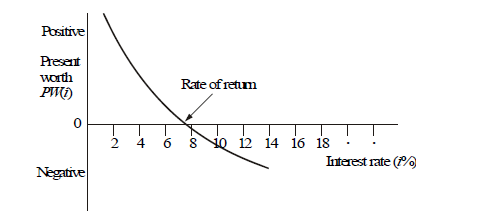
In the above cash flow diagram, *P* represents an initial investment, *Rj*the net revenue at the end of the *j*th year, and *S* the salvage value at the end of the *n*th year. The first step is to find the net present worth of the cash flow diagram using the following expression at a given interest rate, *i*.

*PW*(*i*) = – *P* + *R*1/(1 + *i*)1 + *R*2/(1 + *i*)2 + ...

+ *Rj*/(1 + *i*) *j* + ... + *Rn*/(1 + *i*)*n* + *S*/(1 + *i*)*n*

Now, the above function is to be evaluated for different values of *i* until the present worth function reduces to zero, as shown in Fig. 2.27.

In the figure, the present worth goes on decreasing when the interest rate is increased. The value of *i* at which the present worth curve cuts the *X*-axis is the rate of return of the given proposal/project. It will be very difficult to find the exact value of *i* at which the present worth function reduces to zero.

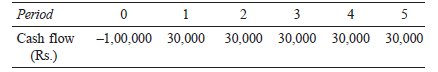


**Fig 5.14 Present worth function graph**

So, one has to start with an intuitive value of *i* and check whether the present worth function is positive. If so, increase the value of *i* until *PW*(*i*) becomes negative. Then, the rate of return is determined by interpolation method in the range of values of *i* for which the sign of the present worth function changes from positive to negative.

### Example

A person is planning a new business. The initial outlay and cash flow pattern for the new business are as listed below. The expected life of the business is five years. Find the rate of return for the new business.

**

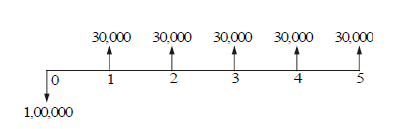
***Solution***

Initial investment = Rs. 1,00,000

Annual equal revenue = Rs. 30,000

Life = 5 years

The cash flow diagram for this situation is illustrated in Fig. 5.14.



**Fig 5.15 Cash flow diagram**

The present worth function for the business is

*PW*(*i*) = –1,00,000 + 30,000(*P*/*A*, *i*, 5)

When *i* = 10%,

*PW*(10%) = –1,00,000 + 30,000(*P*/*A*, 10%, 5)

= –1,00,000 + 30,000(3.7908)

= Rs. 13,724.

When *i* = 15%,

*PW*(15%) = –1,00,000 + 30,000(*P*/*A*, 15%, 5)

= –1,00,000 + 30,000(3.3522)

= Rs. 566.

When *i* = 18%,

*PW*(18%) = –1,00,000 + 30,000(*P*/*A*, 18%, 5)

= –1,00,000 + 30,000(3.1272)

= Rs. – 6,184

Therefore, the rate of return for the new business is 15.252%.