

CBCS SCHEME

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Fifth Semester B.E. Degree Examination, Feb./Mar. 2022

Management and Economics

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Discrete compound interest factors handbook tables is permitted.

Module-1

- 1 a. Define management and explain the function to be performed by managers to attain the set goals. (10 Marks)
b. Define planning and briefly discuss the steps involved in planning. (10 Marks)

OR

- 2 a. Discuss the functional areas of management. (12 Marks)
b. Explain the steps involved in rotational decision making. (08 Marks)

Module-2

- 3 a. Write a note on principle of organization. (12 Marks)
b. Explain Marsha's need hierarchy theory in brief. (08 Marks)

OR

- 4 a. Explain the terms MBO and MBE. (10 Marks)
b. What is controlling and explain the steps in control process. (10 Marks)

Module-3

- 5 a. Explain the law of demand and law of supply with suitable examples. (08 Marks)
b. Explain the 72 rule of present worth. (04 Marks)
c. A man wishes to have a future sum of Rs.50 lakhs for his daughters education for 10 years from now. What is the single payment that he should deposit so that he gets the desired amount after 10 years. The bank offers 12% rate of interest, compounded annually. (08 Marks)

OR

- 6 a. Define engineering economics and briefly explain microeconomics and macroeconomics. (10 Marks)
b. A man is planning to build his house. He plans to invest Rs.40,000 per year for the next 10 years. The bank offers 12% interest rate compounded annually. Find the maturity value of his account after 10 years. (10 Marks)

Module-4

- 7 a. Explain future worth method of comparison. (06 Marks)
b. Explain IRR (Internal Rate of Return) and MARR (Minimum Acceptable rate of Return). (06 Marks)
c. Following are the estimates of two alternate investment made in two different machines in an industry. Find out which machine has the fastest payback period.

	Particulars	Machine A	Machine B
1	Initial investment	30,000	42,000
2	Annual receipts	20,000	26,000
3	Annual expenditures	5,500	7,000
4	Economics life	4 years	4 years

(08 Marks)

OR

- 8 a. Rs.10 crores was generated by the management of an engineering college for the construction of its new mechanical science block. Annual maintenance of the block is estimated to be Rs.10 lakh. In addition Rs.12 lakh will be needed every 10 years for painting and Hoyer repairs. If the budget granted has to take care of perpetual maintenance, how much of the amount can be used for initial construction costs? Deposited funds can earn 6% rate of interest compounded annually. Assume that taxes and inflation do not come into picture. (12 Marks)
- b. What are the various method of comparing the worthiness of engineering projects. Explain any one method. (08 Marks)

Module-5

- 9 a. What are the various components/causes of depreciation? (05 Marks)
- b. Explain how selling price is fixed for a product and show all the components of cost. (05 Marks)
- c. An investment of Rs.8,000 is made by Suresh for his manually operated pen machine. Its salvage value after 5 years is Rs.1000. Find straight line depreciation expense? Find the book value at the end for each year and also. Find the depreciation fund collected at the end of 4th year. (10 Marks)

OR

- 10 a. Differentiate between estimation and testing. (05 Marks)
- b. Explain briefly the objectives of costing. (05 Marks)
- c. A cost iron component, as shown in figure below is to be manufactured. Estimate the selling price per piece from the following data :
- Density of material = 7.2gm/cc
 Cost of molten metal = Rs. 20/kg
 Process scrap = 20% of net weight
 Scrap return value = Rs.6/kg
 Administrative overheads = Rs.30/hour
 Sales overheads = 20% of factory cost
 Profit = 20% of factory cost
 Other expenditures are as follow :

Operation	Time/piece minutes	Labour cost per hour is Rs.	Shot overheads Rs./hour
Moulding and paring	15	20	60
Shot blasting	5	10	40
Fettling and inspections	6	10	40

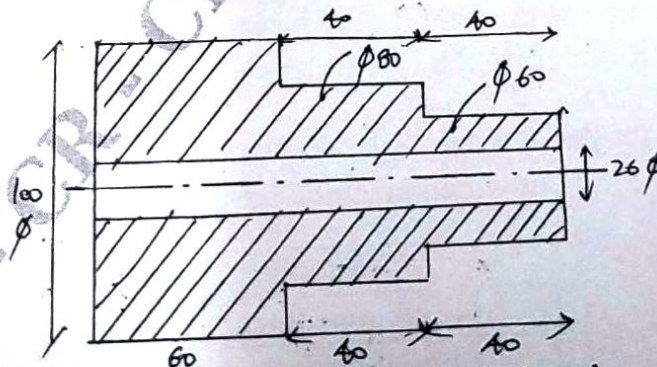


Fig.Q10(c) All dimensions are in 'mm'

(10 Marks)

(x) **Office Management:** Any manufacturing concern should be well supported by organized documentation of all its activities. It is the office which consists of clerks, accountants, cashier and others who perform all these supportive activities. The office manager is responsible for planning and controlling all office work including maintaining and keeping records.

FUNCTIONS OF MANAGEMENT

1 a). The basic aim of Management is to attain the goals of the organization. The most important goal of any business organization would be to maximize the profits or minimize the losses. The desired goals can be attained by performing certain basic management functions (or the functions, of a Manager). They are:

- (1) Forecasting
- (2) Planning
- (3) Organizing
- (4) Staffing
- (5) Directing and Motivating
- (6) Controlling
- (7) Co-ordinating
- (8) Communication
- (9) Leadership
- (10) Decision Making.

Although many of the above functions will be elaborated in later chapters, a brief introduction of all the functions are given below:

- (1) **Forecasting:** Forecasting is nothing but the estimation of future events. For a business organization forecasting is done with respect to its future sales since majority of the activities depend upon it. Forecasting involves not only estimation of quantity of future sales but also as to when it should be available, where it should be available and at what quality level. Sales forecast is usually followed by production forecast and forecasts for costs, finance, purchase, profit or loss etc.
- (2) **Planning:** After forecasting the future sales demand, it is now time to plan. Planning is nothing but thinking before doing. In other words it is the preparation for action. In a business organization planning is all about deciding what, where, when, why, who and how each activity should be done.

Planning formulates the policies and procedures so that the objectives of the organization can be attained most efficiently. It anticipates and analyses all the difficulties that are encountered in running the business and decides in advance how these difficulties can be overcome.

- (3) **Organizing:** When complete planning is done, the next step is to arrange money, material, machinery, men etc. for actual execution of work.

The process of organizing involves the following steps:

- (i) Determining all activities required to achieve company objectives.
- (ii) Division or grouping of all these activities.

- (iii) Selecting people for particular jobs and defining their responsibilities.
- (iv) Giving people enough authority (delegation of authority) to carryout their responsibilities.

In other words, organizing means establishing relationship between people, work and resources and co-ordinating these factors in such a way that maximum output is obtained with minimum total cost.

It is to be noted here that while **planning** refers to what management wants to do, **organizing** means providing the right platform to achieve the plan.

(4) **Staffing:** In order to run the organization people are required. Staffing means filling up the positions in the organization by appointing competent and qualified persons for the jobs. Staffing involves:

- (i) Recruitment
- (ii) Selection
- (iii) Placement
- (iv) Training
- (v) Development of personnel
- (vi) Developing system for salary structure
- (vii) Evaluating employee performance (appraisal).

The Board of directors of a company selects the Chief Executive who in turn performs these functions on various department heads. The departmental heads select, train and appraise their assistants and so on.

Staffing is very important and has to be done with great care because generally people differ in their intelligence, knowledge, skills, experience, physical attributes, age and attitudes. With so much of diversity, the task of the management is therefore to understand the sociological and psychological structure of the work force and select the right man for the right job.

(5) **Directing:** After getting recruited to the company, the employees need direction from their bosses. Directing involves guiding and supervising the subordinates in their activities. Directing does not mean only giving orders but also involves motivating and helping the subordinates in their work. In fact, the directing ability of the manager in the organization determines its effectiveness.

Motivating: Motivating means inspiring people to increase their desire to perform their duties effectively and co-operate for the achievement of company goals.

Motivating is nothing but the mental preparation of an individual to do a specific job and is one of the key factors for successful management of any enterprise. Motivation assumes unique importance in modern Business administration. Management in fact depends heavily on motivation levels of its employees and this is mostly achieved through financial and non- financial incentives.

(6) **Controlling:** After giving direction and motivation to the employees, it is necessary to control their work. This is essential in order to ensure that every activity is carried out according to the plan.

Controlling actually means setting standards, measuring actual performance and taking corrective action if necessary. Checks and examinations are required on a periodic basis to ensure that all things are proceeding as per plan. Control is also necessary to ensure that orders are not misunderstood, rules are not violated and objectives are not shifted. Controlling is a continuous process which measures the progress of operations.

(7) **Co-ordinating:** In an organization, there may be many departments and a large number of workers working at various levels and at various work centers. In this situation there is a need to co-ordinate the individual efforts of all workers towards common goals. Co-ordination, therefore, is the orderly arrangement of group effort to provide unity of action.

Co-ordination can be best achieved with the help of following tools:

(i) Clear cut objectives

(ii) Clear cut Authority and Responsibility for every sub-ordinate so that he knows his specific duties and obligations.

(iii) Effective communication between the executive and his subordinates, supervisors and workers.

(iv) Good human relationship of the managers with their subordinates.

(v) Co-operation amongst the subordinates and between the executive and the subordinates.

(8) **Communication:** Communication is the process by which instructions are transmitted, received and understood by people working in the organizations. Communication of ideas, thoughts or information play an important role in the working atmosphere of any organization. A good communication system therefore avoids confusion, misunderstanding and any kind of 'communication gap'.

(9) **Leadership:** Leadership is the quality of the behavior of a manager where he inspires confidence and trust in his subordinates, gets maximum cooperation from them and guides them towards company goals. Leadership can be more than just personal ability and skill.

(10) **Decision Making:** A decision is defined as a course of action chosen from available alternatives for the purpose of a desired result. If there is one activity which can be considered the most important among all other activities at higher levels of management, it is decision making. Every decision taken in the organization, affects in some way or the other, the future prospects of the organization. The following are considered as stages in effective decision making:

(a) Define the problem

(b) Grade the objectives and identify the problem environment

(c) Identify all alternatives.

(that is, if management shares profit!), LMS, and so on. They also develop a broader mentality and think of achieving organizational goals more than concentrating on personal goals.

STEPS IN PLANNING

16)

Any planning process goes through the following general steps:

Step 1: To establish objectives which are verifiable

The first step in the planning process is to identify the goals of the organization, which should be verifiable in nature. Before setting the objectives, the internal and external environment prevailing should be thoroughly studied. The internal environment means - the financial position of the company, human resources available, manufacturing facility, company image, creditworthiness of the company, etc. The external environment means - Government rules and regulation, socio-economic condition of the society, competition level, suppliers' reliability etc. The objectives that are so derived must also indicate who, when, where and how they are to be achieved.

Step 2: To establish planning premises

The second step in planning is to establish the planning premises. Planning premises are basically assumptions of future market conditions which become the basis for current planning process. In other words, to establish planning premises means to forecast future business conditions under which a plan is to operate. Planning premises usually relate to cost and availability of raw materials, labour, power, product demands, population trends, technological growth, government policies etc. But it is also to be noted here that some of these factors could be within the control of the organization, and some may be out of their control. Automakers around the world would be planning the premises of future automobile production given the present energy crisis, for example.

Step 3: To determine alternative courses of action

The next step in planning is to determine various alternative courses of action. One has to search for and list all possible alternatives in order to be compared and analytically evaluated. In the present Global village concept, resources can come from anywhere in the world while the market for the products can also exist anywhere in the world. Therefore there would be hardly any dearth for alternatives.

Step 4: To evaluate the alternatives and select the best

After identifying the possible sources of action, the next step is to evaluate them and select the most suitable and the best course of action. All the alternatives have to be compared and evaluated with respect to their expected contribution to the organizational objectives and with respect to their other pros and cons. Evaluation and selection is often done with the help of quantitative techniques and Operations Research.

Step 5: To formulate derivative plans

After selecting the best course of action, the management has to formulate derivative plans or secondary plans to support the basic plan. Derivative plans are nothing but sub-plans or departmental plans. They are required in order to translate the broad overall plan of the organization into day-to-day operations. For example, if the production plan of TATA MOTORS is to produce a million Nano's in the next five years, the derivative plans would be nothing but plans for various departments like fabrication, forging, casting purchase, assembly etc.

Step 6: To secure co-operation and participation of all employees

The successful execution of a plan depends to a large extent, on the whole-hearted co-operation of all employees. If the management involves its employees in the planning process, the co-operation and participation of employees would be definitely better. Participation in planning enables employees to give their best to plans. They are also motivated to carry out the plan to the best of their ability. Even after the planning process is over, continuous suggestions, complaints and criticisms must be solicited from the employees.

branches including Placement, Sports etc., while the lower management is made of all faculty like lecturers, Assistant Professors, Professors etc.

(iii) Management as a Class or Elite

Managers constitute a class of professionals who are considered elite all over the world, but even more prominently in a country like India. Sociologists view management as a distinct class in society having its own value system. The managerial class has become very important in modern organizations owing to its contribution to business success. It has also become very important in a hierarchy - conscious society owing to its superior status. A Manager, in the most general sense, is a person who has people working under him, and that could be in any sphere of activity.

2a) Scope of management in various areas of work (or) Functional areas of management

Over the years, the field of management has branched out into several functional areas catering to different needs and aiming at specialization. Its scope is now extended to the following important areas of life.

- (i) Production / Operations Management:** It is nothing but the management of all production activities in an industry. The term '**Operation Management**' is now used to indicate both production as well as service organizations. Operations Management includes work analysis, planning, scheduling, routing, quality control, inventory control and work study.
- (ii) Financial Management:** Financial Management basically deals with how an organization obtains funds and how it uses them to run the organization. In other words, financial management refers to the application of skills in the manipulation, expenditure and control of funds. It includes economic forecasting, cost accounting, budgeting, insurance and financial statistics.
- (iii) Personnel Management or Human Resources Development:** Personnel management is a very important and growing field of management which takes care of recruitment, placement, training, transfer, promotion, safety, health, welfare services etc., of the employees.
- (iv) Marketing Management:** A marketing manager once said, '*any fool can manufacture a product, but it takes a wise man to sell it!* Although this might be an exaggeration, it indicates nevertheless the importance of marketing in the current world. Marketing can be defined as the performance of the business activities that direct the flow of goods and services from the producer to the consumer. It is the process of getting the right product to the right place in the right quantity at the right price and at the right time.
- (v) Maintenance Management:** Maintenance can be defined as a combination of actions carried out to replace, repair or service all the components in a manufacturing plant so that it will continue to operate at a required level for a specified time. Maintenance management, therefore, is concerned with the direction and organization of resources in order to keep the buildings, equipment and other service facilities in the working condition.

(vi) **Materials Management & Purchasing:** In any manufacturing organization, the most important inputs are Men, Machines and Materials (the 3 M's of production). If investments on Men and Machines are more or less considered fixed costs, it the handling of materials which more often affect the profitability of any manufacturing concern. It is observed that irrespective of the size of an enterprise, the expenditure on materials is a major item of the budget. The cost of materials in different industries may range from 50 to 85% of the production cost. Therefore, management of materials and their movement becomes very important to cut costs and has become, in recent years, a specialization of its own.

Materials Management, therefore, can be defined as the planning, directing, controlling and co-ordinating all activities which are concerned with materials which act as an input to any manufacturing process at all stages. In other words, it involves the management of both raw materials as well as in-process inventory.

Purchase is the first phase of materials management. Purchasing or **Procurement** is nothing but getting the materials, supplies and equipment of right quality, in the right quantities from the right source, at the right prices and at the right time. These are popularly known as the 5 R's of the art of efficient purchasing.

- (vii) **Transport Management:** Very often it is noticed that the costs incurred in transporting goods far exceed their production and raw material costs! This is especially true while transporting construction materials like sand, stone, bricks etc., Transportation costs play an important role for many products especially in a vast country like India. Therefore transportation of raw materials as well as finished goods needs to be professionally managed to keep the costs down and be competitive in the market. Transport management includes studies on transportation by rail, road, air and water, packing and warehousing etc.,
- (viii) **Systems Management:** There is a growing need the world over for professionals who can manage software projects from start to finish. These are Systems Managers who break the project into modules, delegate duties to different groups, following up periodically, communicate with clients on the progress of the project, integrate all the modules, test the software and are generally responsible for the meeting the deadline for the project completion. These activities requires managerial skills quite separate from software skills.
- (ix) **Rural Management:** More than two-thirds of Indians live in villages and the Indian economy is still dominated by agrarian or agricultural economy, despite the vast industrialization going on in the country. Management of rural resources and all rural related issues efficiently present a considerable challenge to leaders who are in-charge of rural development. Water resources management, forest and forest product management, crop management, cattle management, rural man-power management, rural transportation management, rural Co-operatives and Guilds management etc., are some of the functions of a Rural Development Manager.

Indian Institute of Rural Development at Anand, Gujarat is one of few Institutes in India which offers specialization in Rural Management.

General features of a budget are:

- (i) It is a statement in terms of money or some quantity or both.
- (ii) It is prepared for a definite future period.
- (iii) It is prepared in advance.
- (iv) It gives an overall view of the business in terms of sales, production & expenditure.
- (v) It helps in anticipation and control of financial requirements of different branches of business.

2b). **DECISION MAKING**

Decision making is the most important part of business process. What the Top Management does all the time in an organization is to take decisions. Decisions taken at every business turn affects the future and the fortunes of the company. In any organization, decisions are routinely taken in operations, marketing, maintenance, R&D, transportation, finance, human resources etc. Decision making is so important that it can make or break a company and the people who are dependent on it.

Characteristics of Decision Making

The important characteristics of decision-making are:

1. Decision-making is goal oriented

Decision-making is a goal-oriented process. Decisions are usually taken to achieve some purpose or goal. The intention of decision-making is to move towards a desired end state.

2. Decision-making involves alternatives

The question of decision-making comes into picture only when there are alternatives. In other words, when there is no choice of action, no decision is required.

3. Decision-making is an analytical intellectual process

Decision-making is an thoroughly analytical-intellectual process. To take a decision without sound reasoning and judgement would mean a lottery. Any body could do that. A decision therefore represents a judgement, and also a commitment to action made in the face of uncertainty, complexity, and even irrationality.

4. Decision-making is a continuous activity

Decision-making is a continuous process. Decisions are necessary on numerous issues and problems in each area of business.

5. Decision-making is an all pervasive function

Decision-making is all pervasive in the sense that all levels of managers take decisions, though their impact and scope may vary.

6. Decision-making is situational and dynamic

Decision-making is always related to a situation. It may vary from situation to situation and may also vary at different times for same situations.

The Decision-making process

Decision making using scientific and analytical methods involve a systematic step- by-step procedure as follows:

1. To define the problem and parameters influencing it

The first step is to clearly define the problem and all variables (both controllable and non-controllable) which affect it. It is often better to find the root cause of the problem and find a permanent solution to it, if possible. Careful definition of the problem is crucial because if a problem is defined too narrowly, relevant variables will be omitted and if a problem is defined too broadly there would be confusion and no focus.

2. To establish the criteria for decision making

Decisions which are eventually taken are dependent on certain important criteria. Grading the criteria according to their importance (as seen by the top management) will greatly help decision making. Different criteria for decision making could be profit maximization, loss minimization, employee welfare, market share, greater publicity, good of the society and so on.

3. To formulate a model considering all decision variables

A model is an approximation of the reality. Models describe the relationship between the problem and the variables. Therefore, formulation of a model lies at the heart of scientific decision making process. Some of the models which are widely used are:

- (i) **Physical model:** e.g .., an architects idea of a building, an engineer's design of an automobile.
- (ii) **Computer model:** e.g .., an architect can explain the facilities of a new building through a virtual walk- through, a CAD model of cars and machines etc.
- (iii) **Mathematical models:** Forecasting model, simplex model, transportation model etc.
- (iv) **Verbal models:** Words and description.

4. To generate alternatives solution by varying parameters

By using any of the different types of models listed above, one can vary the values of the parameters and obtain several alternatives for decision-making Mathematical, statistical and computer models are particularly suitable for generating alternatives because they are so easily modified.

3a) **PRINCIPLES OF ORGANIZATION**

Success of any organization depends to some extent on the organizational structure. The following are some of the important principles to be followed for developing a sound and efficient organization structure:

1. Principle of **U**nity of Objectives
2. Principle of **A**uthority and Responsibility
3. Principle of **S**pan of control
4. Principle of dividing and **G**rouping of activities
5. Principle of **D**elegation
6. Principle of **C**o-ordination
7. Principle of **C**ommunication
8. Principle of **L**ine and staff relationship
9. Principle of **B**alance
10. Principle of **F**lexibility
11. Principle of **S**implicity
12. Principle of **P**roductivity

Try a mnemonic for the list of Principles of Objectives, building on the highlighted letter in each:

BUGS-FCD-SCALP
(Not in the same order)

1. Principle of Unity of Objectives

The objectives of an enterprise have an influence on the structure of the organization. Therefore the objectives must be clearly defined for the entire enterprise, for each department and for each position in order to evolve an appropriate structure for the organization. There must be a unity among the objectives laid down for all levels so that all efforts can be concentrated on achieving the same goal.

2. Principle of Authority and Responsibility

Everybody in the organization beginning downwards from top level should be given some authority to get work done and at the same time be responsible for it. The organization should take care to see that the superiors should not delegate all the authority to their subordinates in order to avoid responsibility. Every superior should be in fact responsible for all the acts of his juniors.

3. Principle of Span of Control

The number of persons who directly report to an executive is called span of control. Span of control normally varies from 2 to 20 persons depending upon the situation in the business enterprise. (also see page no. 69)

4. Principle of Dividing and Grouping of Activities

All the activities of the organization are divided and grouped as various departments where employees of common skills work together. Dividing and grouping of activities lead to specialization. Specialization can be in terms of product specialization, process specialization, labour specialization etc., Specialization is essential for attaining familiarity and proficiency within a particular area of activity. A worker specializing in one area understands his job thoroughly and is in a better position to do and further improve his work.

5. Principle of Delegation

Delegation means authorizing somebody to do the work. Effective delegation exists when a manager instead of doing all the decision-making himself passes down to his sub-ordinates some tasks where they can take their own decisions. By doing so, the manager provides an opportunity to his sub-ordinates to think and develop in their work areas. It also gives the manager more time to manage other responsibilities.

6. Principle of Co-ordination

The organization structure should be such that different departments should co-ordinate with each other effectively so as to achieve common goals. Effective co-ordination is necessary to integrate all the activities across different departments in an organization.

7. Principle of Communication

A good communication system is necessary in an organization for smooth flow of information. Communication could be inter-personal, inter-departmental or intra departmental. For best results there should be a free two-way communication at all levels.

8. Principle of Line and staff relationship

All activities in an organization can be broadly classified into two main categories.

(a) Primary or Line activities

(b) Supportive or staff activities.

Line activities are those which contribute directly to the profit of the organization.

e.g., Production activities, sales activities.

Staff activities are those which contribute indirectly or in other words support the main activities.

e.g., Accounting, administration, maintenance activities.

The above concepts of line and staff activities and their inter-relationships are important in an organization structure.

9. Principle of Balance

There should be a proper balance among all elements of the organization. Every department should be developed in proportion to its contribution to the overall success of the organization. The principle of balance refers to the following elements of the organization:

- (a) Balance between authority & responsibility.
- (b) Balance between centralization and decentralization.
- (c) Balance between standard procedures and flexible procedures.
- (d) Balance among activities and size of various departments.
- (e) Balance between wide and limited spans of control.
- (f) Balance between profits earned and facilities extended to the employees.

10. Principle of Flexibility

The organizational structure should be flexible enough to incorporate alterations in their product line in order to meet changing demands. The structure should also allow for expansion and diversification plans for further growth of the organization.

11. Principle of Simplicity

The organizational structure should be simple with minimum number of levels. If the organization structure has a large number of levels, there can be problems in the areas of co-ordination, control and communication.

12. Principle of Productivity

Productivity is defined as the ratio of output to input. In other words productivity is a measure of how much input is required to produce a given output. So productivity refers to the efficient utilization of the resources.

When we consider an organization as a whole, the productivity can be expressed in terms of the ratio between the value of the goods and services produced to the value of the resources utilized for this production.

$$\text{Productivity} = \frac{\text{Value of goods and services produced}}{\text{Value of resources utilised for this production}}$$

It is obvious that a sound organization leads to higher productivity and thus higher profitability.

FORMAL AND INFORMAL ORGANIZATION

dissatisfaction of an individual.

THEORIES OF HUMAN MOTIVATION

There are several theories of motivation based on different structures of human needs and motivations. Some of them are,

Maslow's Hierarchy of Needs Theory

2. McClelland's Three Need Model

Hawthorne Experiments.

3b) 1. Maslow's Hierarchy of Needs Theory

Abraham Maslow's Need-Hierarchy theory, published in 1943, is one of the most popular theories of motivation. According to him, the behaviour of an individual is determined by his greatest need at a particular moment. Needs that are not satisfied influence his behaviour. But needs once satisfied do not serve as a motivator. According to Maslow, all human needs can be arranged in an order of priority. In other words, human needs have an hierarchy and they are satisfied from the lowest level moving in the ascending order.

Figure 2.6 Shows Maslow's hierarchy of needs as five ascending levels.

Physiological Needs: *Includes food, shelter, clothing, water, sleep, sex & other bodily needs.*

The physiological needs are the basic needs in life. These are essential for everybody to remain alive. These needs motivate the person to work and earn sufficient amount of money to fulfill them.

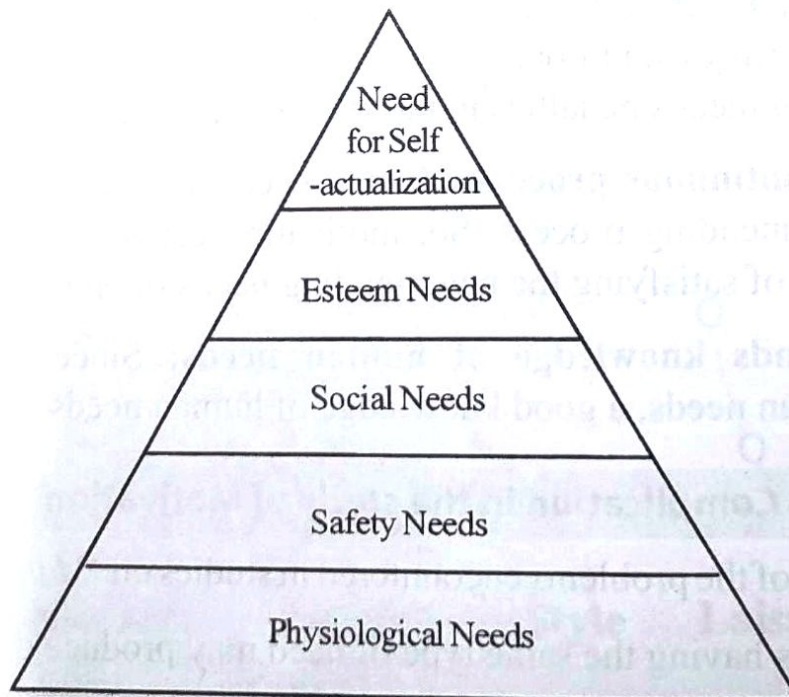


Fig. 2.6: Maslow's Hierarchy of Needs Theory

- (2) **Safety Needs:** *Includes security and protection from physical, emotional and economical harm.*

Once the physiological needs are satisfied, the safety needs or security needs become predominant. Physical safety may be protection from fire and accidents. Economical security may be in terms of job security, health and insurance programme, retirement plan etc.. Emotional needs may be the necessity to be happy and be free from mental disturbances.

- (3) **Social Needs :** *Includes affection, belongingness, acceptance and friendship.*

Social needs come into the picture when the primary needs are taken care of. Since man is a social animal, he has to interact with the society, and live with respect in society. He desires to love and be loved; accept others and be accepted; show affection and be shown affection and so on. Social needs make his work enjoyable.

- (4) **Esteem Needs :** *Includes self-respect, autonomy, status, recognition, responsibility, attention, achievement, prestige, etc.,*

Esteem needs represent an individual's concern for feeling important and be respected by others. These needs are primarily satisfied by the individuals themselves. However, the management may create a proper climate to help individuals to fulfill these needs.

- (5) **Self-Actualization Needs :** *Includes Self-advancement, self-fulfillment, self-development, self-realization etc.,*

Self-actualization is the highest level need in Maslow's hierarchy. It is the desire to become what one is capable of becoming. It is the desire to realize one's own potential. In an organization, a person attempting to satisfy these needs seeks challenging work and looks for opportunities for personal growth.

According to Maslow, if a lower level need is satisfied, a higher level need emerges. This goes on till the highest level needs are satisfied. This theory of human motivation by Maslow has been a landmark in the field of Management. However, it has been also criticized on the following grounds:

- (i) Needs of every person may not follow Maslow's hierarchy.
- (ii) Most of the human needs are recurring and are never satisfied fully indeed.
- (iii) Most of the needs co-exist and there is no such hierarchy whatsoever.
- (iv) Boundaries between different levels of needs may be hazy and overlapping.
- (v) Although behaviour depends on need, or the lack of it, it may not be fully dependent.
- (vi) The concept of self-actualization is theoretical and academic. No person can ever know his maximum or best potential.

(4)	It is better to follow centralization if the lower level managers are not particularly interested in having their say in the decision-making process.	It is better to follow decentralization if the lower level managers are keen in taking part in the decision-making process.
(5)	Centralization is needed if the decisions to be taken are significant and far-reaching.	Decentralization is better if the decisions taken are insignificant and relatively minor ones.
(6)	Organizations tend to be centralized if the environment is threatening and distrustful.	Organizations tend to be decentralized if the environment is free and friendly.
(7)	Centralization is better in vertical organizational structure.	Decentralization is better if it is more horizontal in structure.
(8)	Centralization is better in single location facilities.	Decentralization is better in multilocation facilities.
(9)	If the mindset of top management is more autocratic, it leads to more centralization.	If the mindset of top management is more democratic it leads to decentralization.

RECENT TRENDS IN MANAGEMENT

The field of management has grown over the years into a huge branch of knowledge enlisting the experiences and inputs from practising managers from all over the world. It has always been the endeavour of management to save time in taking decisions and in the process many management concepts have converged into some key areas of specific action. Top level management often practice the following management concepts in going through their work.

- (1) Management by Objectives
- (2) Management by Exception
- (3) Management of Change
- (4) Management of Conflict.

4a) 1. Management by Objectives (MBO)

The concept of 'Management by Objectives' was first proposed by Peter Drucker in 1954 and was improved later by several others. They all felt that in order to obtain the best results, the management must be driven by clearcut objectives from the highest level to the lowest level in the organization.

Objectives are nothing but the desired end results of the management. Objectives are the targets of the organization. They are the end-points towards which all management activities are directed. Objectives are in fact the reason for the existence of the organization.

The performance of all employees in an organization are measured directly against the achievement of these objectives. In other words the actual results achieved are measured against the expected results which each manager is responsible for. In fact,

'Management by Objectives' is a result-oriented approach to management and therefore is also called as 'Management by Results'.

In short MBO is a process wherein the superior and subordinate managers of an organization come together to jointly:

- (i) identify the common goals
- (ii) define each individual's responsibility and the results expected of him, and
- (iii) assess the contribution of each member as against the expected results and analyse the reason for any failure.

Types, Basis and Hierarchy of Objectives

Types: Objectives may be of the following nature:

- (1) **Short-term objectives:** Those which are to be achieved by the organization in the immediate future
eg., work which is running behind schedule.
- (2) **Long-term objectives:** These are aimed to be achieved over a long period of time say 5 to 10 years
eg., diversification plans to other projects.
- (3) **Tangible objectives:** Objectives which can be quantified in numbers are tangible objectives
eg., Number of cars rolling out of the plant.
- (4) **Intangible objectives :** Objectives which cannot be quantified but are qualitative in nature are called intangible objectives.
eg., Satisfaction level of customers in a Bank.

2. Management by Exception

The Principal of 'Management by Exception' was first proposed by F. W. Taylor in 1919. According to this principle, only unusual and exceptional deviation in the daily routines of the factory should be brought to the managements notice. All normal work going on as per schedule and as per plans need not be brought to the manager's attention since no corrective action or follow-up action is necessary. But if there is a major deviation from the standard, it should be reported to the manager. Thus management by exception is a systematic approach to handle the problems in such a way that the manger is relieved from the demands of the routine work which can be handled by his subordinates. It thus enables him to devote more time for more important efforts directed towards improving overall efficiency of the organization

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7. Co-ordination by special co-ordinators

If a manager in an organization has very less time to address issues of co-ordination, he may hire an assistant or a 'Special co-ordinator' to do the job for him. This man's job is to collect information regarding problems, analyze them, list various alternatives available, and suggests steps to be taken to the manager.

8. Co-ordination through sound leadership

Sound leadership of top management is the surest means of achieving co-ordination. Good leaders may persuade and convince their subordinates to place company interests above their personal interests. They may even inspire self-coordination within a group.

CONTROLLING

Meaning

4b).

Some definitions of the term 'Control' with respect to an organization are:

"Control is checking current performance against pre-determined standards contained in the plans, in order to ensure adequate progress and satisfactory performance".

- E.F.L. Brech

"Control consists in verifying whether everything occurs in conformity with the plans, instructions and principles established"

- Henry Fayol

"Control is the process of regulating organizational activities so that actual performance conforms to expected organizational standards and goals."

- New Man

From the above definitions, we can follow that controlling functions involves-

- (i) developing appropriate standards
- (ii) compare on-going performance against those standards.
- (iii) take steps to ensure that corrective actions are taken when necessary

It should also to be noted here that a good controlling system is actually designed to keep things from going wrong, and not just to correct them afterwards. It is more about '*prevention is better than cure*' than about '*Crying over spilt milk*'! Its about '*preventive maintenance*' rather than '*breakdown maintenance*'.

The general features of controlling functions are:

1. Controlling is a positive force.
2. Controlling is a dynamic and continuous process.
3. Controlling is goal-oriented.
4. Control is forward-looking
5. Control process is universal
6. Control is based on planning
7. Delegation is key to control.

STEPS IN CONTROLLING

The various steps that are involved in the process of controlling are as follows:

Step 1: Setting of standards

The first step in the control process is to establish standards. Standards are the targets against which actual performance will be compared. Standards are nothing but criteria of performance. They serve as benchmarks as they specify acceptable levels of performance.

Control standards are broadly divided into two types.

- (i) **Quantitative standards** : These are standards which can be quantified.
Eg: Production level, rejection level, labour-hours, speed of service, sales volume, profit, expenses etc.
- (ii) **Qualitative standards** : These are standards which cannot be quantified i.e., they are qualitative in nature.
Eg: Employee morale, brand image, company image, goodwill, industrial relations etc.

Step 2: Measurement of actual performance

The second step in the control process is to measure actual performances of various individuals, teams and departments in the background of established standards. Wherever quantitative measurement is applicable, it is easy to measure, while qualitative standards are difficult to measure. Tests, surveys, employee appraisals, exit interviews, media reports, open forums etc., are some of the ways employed to measure qualitative standards.

To make any measurement process effective, the following three aspects have to be kept in mind:

- (i) **Completion** : The actual performance measurement has to be complete in all respects. In other words, all aspects of the job should be measured and not just the ones that are more evident.
- (ii) **Objective** : Performances at work should be measured in an objective manner without fear, favour or bias. Only then measurement can be effective.
- (iii) **Responsiveness** : The management of any performance should support the belief that effort and performance lead to improvement, both from the personal and organizational point of view.

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Step 3: Comparison of actual performance with standards

The third step in the control process is to compare the actual performances with established standards and ascertaining the causes of deviation. The causes of deviation may be machine-dependent, process-dependent, plan-dependent, manpower-dependent etc. Whatever may the reason, deviation are thoroughly analyzed and properly presented. Statistical methods are usually adopted to look at deviation from a broader perspective.

Step 4: Taking corrective measures

The final step in the, control process consists of taking remedial actions so that deviation may not occur again in future. Corrective steps are initiated so that any defects in the actual performance may be rectified.

Corrective actions may include the following activities.

1. Change in methods, rules, procedures strategies etc.
2. Introduce training programs
3. Job redesign
4. Replacement of personnel
5. Re-establishing budgets and standards
6. Better compensation packages to employees
7. Changing machinery and processes
8. Identifying recurring bottle necks and avoiding them
9. Trying to understand the competition better.
10. Looking at raw material resources and suppliers.

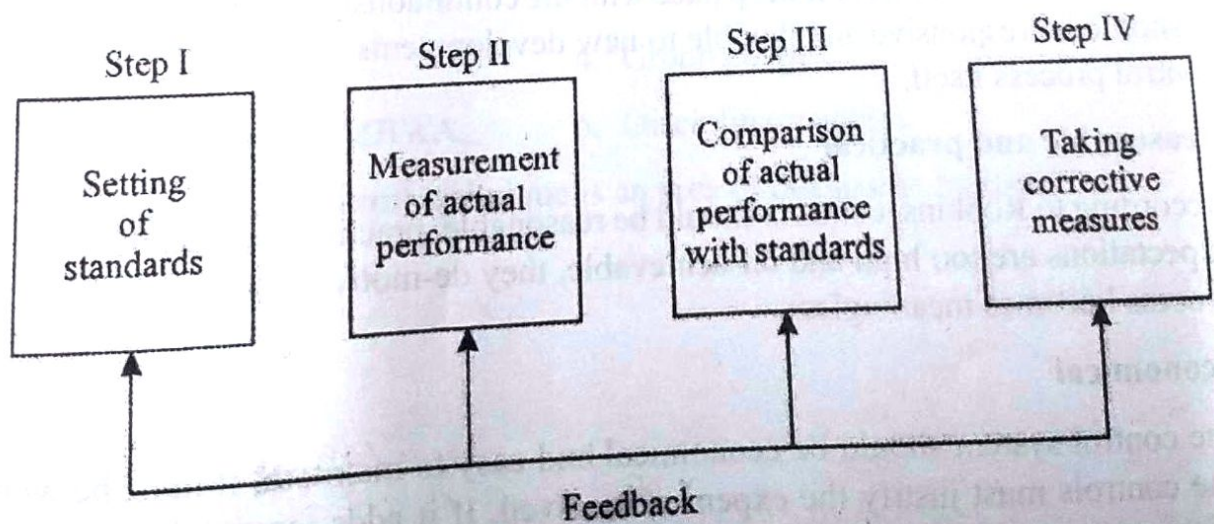


Fig: 2.7: The Control Process

- (v) From these activities, usually a prediction (or a forecast) emerges. This can be considered a possible solution to the decision problem.
- (vi) Thus prediction is subjected to verification in the real world for its practical usage. If it gives desired results, then the problem is solved.
- (vii) If not, the cycle is repeated with valuable feedback from previous approach adding to data.

5a). **LAW OF DEMAND AND SUPPLY**

Demand may be defined as the desire to possess a thing coupled with the means of purchasing it and the willingness to use the means for buying. In other words, demand refers to the amount of a commodity which people are willing to buy at that price. Demand cannot be defined without a price to attached to it.

Supply refers to the quantity of a commodity which is offered for sale at a particular price. Like demand, supply always comes at a price. Here supply has to be distinguished from Stock. The stock is the quantity of goods that could be sold whereas the supply is the quantity of goods that would be sold at a given price. It is obvious that supply cannot exceed stock.

It is an interesting aspect of economy to note that the demand and supply of a product are dependent on each other and are sensitive to the price of that product. The interrelationship between them are shown in figure.

Law of demand

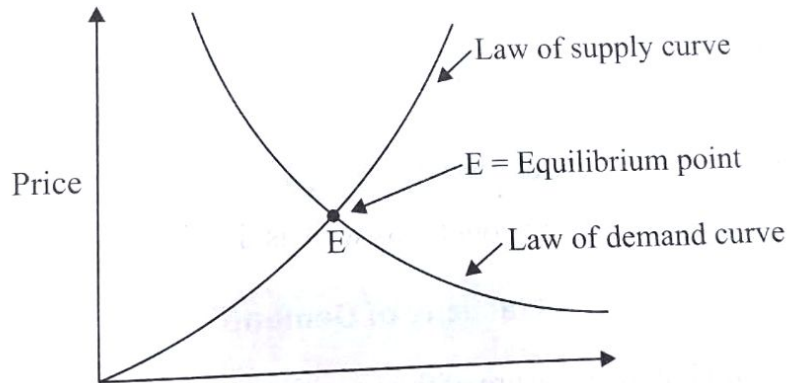


Fig.3.2 Price Vs Demand/supply

The Law of demand states that *“the demand for a commodity increases when its price decreases and vice-versa, all other things remaining the same”*. When we observe the demand curve it is clear that as prices fall, demand increases. Conversely, for the same curve, we can understand that as prices increase, demand falls. Thus, demand is inversely proportional to its price.

Law of supply

The law of supply states that, *“the supply of a commodity increases when its price increases and vice-versa, all other things remaining the same”*. When we observe the supply curve, it is clear

$$\therefore P_g = \frac{4,00,000}{(1+0.1)} \left[\frac{1 - 0.01818(1+0.01818)^{30}}{0.01818} \right]$$

$$\therefore P_g = ₹ 83,51,505$$

This is the present amount for the geometric series.

If $i = g = 0.12$, then

$$\text{We have } P_g = A_1 \left[\frac{n}{1+g} \right]$$

$$= 4,00,000 \left[\frac{30}{1+0.12} \right]$$

$$\therefore P_g = ₹ 107,14,285$$

This is the present worth if both i and g are the same.

Some More Worked Examples

1. Explain Present Worth by "72 Rule".

Solution

We know that the present worth of money in future goes on decreasing with time. In other words, further the money in future and higher the rates of interest, its present value goes on

decreasing. We know that, the present value of a future sum F is given by $P = F \left[\frac{1}{(1+i)^n} \right]$

From the formula, we can see that PW decreases with increase in i and n . But the pattern decrease in the value of PW of all future sums is shown by '72 Rule' which is a thumb-rule. The '72 Rule' indicates the approximate number of years n^* at which the PW is half of future sum at an annually compounded rate of interest i . At the same time, n^* represents the number of years required to double an amount, at the rate of interest i . Basically, '72 Rule' is a formula to quickly tell you the duration required to double your money given rate of interest.

$$\therefore \text{72 Rule : } n^* = \frac{72}{(i)(100)}$$

now ... compound amount 15 years from

Solution

In the formula $F = A \left[\frac{(1+i)^n - 1}{i} \right]$, i and n have to be altered

59.

Annual Rate of Interest = 11%

Monthly rate of interest = $\frac{11}{12} = 0.916\% = 0.00916$

Number of interest periods per year = 12

Number of interest periods for 15 years, $n = 12 \times 15 = 180$

$$\therefore F = 2500 \left[\frac{(1 + 0.00916)^{180} - 1}{0.00916} \right]$$

$$F = ₹ 11,35,875$$

This is the amount the person receives if he save ₹2500/- every month and invests at a rate of interest 11% compounded monthly for the next 15 years. The person may go for it.

4. Equal Payment Series Sinking Fund $F(A/F, i, n)$

In this, the objective is to find the equivalent amount (A) that should be deposited at the interest period for n interest periods to realize a future sum (F) at the end of n”

Solution

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1. Why do this at all ?

This is the fundamental of all questions. The *raison d'être* (reason for existence) has to be established first before thinking any further. Additional questions asked in this domain are: Why should the proposed new activity be undertaken? Why not an existing activity be expanded, contracted or abandoned? Why not modify existing Standards and Operating Procedures ?

2. Why do it now ?

Questions asked here would be : Shall we build now a plant of excess capacity in expectation of higher demand or with only sufficient capacity to satisfy current demand ? Are the costs of capital and other business conditions favorable to a present development ? Shall we postpone all decisions so that things become more clear and decision making easier ?

3. Why do it this way ?

Shall we abandon the old method and look for a totally different approach? Shall we adopt traditional methods or go for modern techniques ?

Engineering economics deals with principles and techniques that are useful in securing rational answers to all the above questions. The following general questions are representative of those that an engineer might encounter.

- Which body design to be selected for the new car among the several proposed?
- Is it time to replace the UTM with a new one in the M.T. Lab ?
- With limited capital available, which production expenditures should be given preference ?
- Would it be preferable to pursue a conservative course of action to get less returns or follow a riskier one that offers higher potential returns ?
- What is the minimum volume of production needed to cover costs and begin profit?
- Are the benefits expected from the river networking project large enough to make its implementation costs acceptable ?
- Is it better to sell on credit basis and generate larger demand or sell against cash payment only and have reduced demand ?

Two characteristics stand out among all the above questions. First, each deals with choice among alternatives ; Second, all involve economic considerations. These and other considerations brings us to the most important set of duties of Engineering Economists.

- (i) Identify alternative uses for limited resources and obtain appropriate data.
- (ii) Analyze the data to determine the preferred alternative.

amount can be used for interest, compounded annually. Assume that
 picture.

Solution

Given: Capitalized cost = ₹ 10 Crores

Annual Maintenance Costs = ₹ 10 Lakhs Per Year

Painting Costs = ₹ 12 Lakhs/10 years (to be annualized)

Rate of interest, $i = 6\%$ (Compounded annually)

Service life, $n = \infty$

Initial investment or first cost $P = ?$

$$\text{Capitalized cost} = \text{Initial Investment} + \frac{\text{Total Annual costs}}{\text{Rate of interest}}$$

$$\text{or Initial construction cost} = \text{Capitalized cost} - \frac{\text{TAC}}{i}$$

We have, Total annual costs = Annual Maintenance cost + Annual repair and Painting cost

But repair and painting costs are given for every 10 years which have to be annualized. For that, equal payment series sinking fund formula, i.e., $F(A/F, i, n)$ is used

Therefore, in this problem

$$A = F \left[\frac{i}{(1+i)^n - 1} \right]$$

Where, $A = \text{Annual amount} = ?$

$F = \text{Sum at the } n^{\text{th}} \text{ period} = 1200000$

$n = \text{number of years} = 10 \text{ years}$

$i = \text{Rate of interest (Compounded annually)} = 6\%$

$$A = 1200000 \left[\frac{0.06}{(1+0.06)^{10} - 1} \right]$$

$$= ₹ 91041$$

Total annual costs = $1000000 + 91041$

$$\text{AC} = 1091041$$

$$\begin{aligned} \therefore \text{Initial cost} &= \text{Capitalized cost} - \frac{TAC}{i} \\ &= 1000000000 - \frac{1091041}{0.06} \\ &= 1000000000 - 18184025 \end{aligned}$$

Initial construction cost = ₹ 8,18,15,974

∴ Funds to be deposited to earn interest for the sake of maintenance = ₹ 18184025.

79)

FUTURE WORTH COMPARISONS

Future worth comparison is the opposite of present worth comparison. While present worth comparison gives the current worth of all future transactions, future worth project all transactions in certain period to a time in future. In other words, in future worth methods of comparison alternatives the future value of various alternatives will be computed. Then the alternative with minimum future value of revenue or with minimum future worth of cost will be selected as

7a)

FUTURE WORTH COMPARISONS

Future worth comparison is the opposite of present worth comparison. While present worth comparison gives the current worth of all future transactions, future worth project all transactions during a certain period to a time in future. In other words, in future worth methods of comparison of alternatives the future value of various alternatives will be computed. Then the alternative with the maximum future worth of revenue or with minimum future worth of cost will be selected as the best alternative for implementation.

RATE OF RETURN

7b)

Rate of Return is a general term associated with rate of interest. It is nothing but a percentage that indicates the relative yield on different uses of capital. In other words, the rate of return is the rate at which investments made gives returns to the investors.

Three rates of return appear frequently in engineering economic studies :

- i. The Minimum Acceptable Rate of Return (MARR)
- ii. The Internal Rate of Return (IRR)
- iii. The External Rate of Return (ERR)

I. MINIMUM ACCEPTABLE RATE OF RETURN (MARR)

This is rate of interest set by an organization to designate the lowest level of return that makes an investment acceptable. In other words, a minimum acceptable rate of return is the lowest rate of interest at which an independent business alternative is still attractive. For example, a businessman may decide 20% returns is minimum that he expects from business, otherwise he may withdraw. Here MARR is 20%.

Also known as the minimum attractive rate of return, MARR is the lower limit for investment acceptability set by organizations or individuals. It is a device designed to make the most possible use of a limited resource, for example money. Minimum acceptable rates of return vary very widely according to the type of organization and may even vary within the same organization that required for R & D projects in which there is less certainty about prospective cash flows.

one receives pension from the age of retirement until death (or even continued to be given to dependents) after having made saving when in service.

Therefore annuity contract is an after retirement plan for a guaranteed income.

An annuity contract can also be considered as essentially the reverse of a life insurance policy. In the insurance policy, the company pays a stipulated sum to heirs based on the amount of payments made during the policy holders lifetime. In annuity contracts, an individual pays a stipulated sum, or a number of payments, to the company and then receives regular income payments, starting a designated time and continuing for life.

Varieties of annuity contracts are available. A straight life annuity is one where, income payments terminate with the death of the annuitant (receiver). An extended annuity is one where, companies offer to continue to make pension payments even in case of early death of the annuitant. There are annuity plans which may have variable rates that are linked to indexes, gold prices, or foreign currencies. Annuity plans are indexed to any one or several of these quantities in order to conserve the buying power of annuity income. The major objective of any annuity buyer would be to balance risks against returns.

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INTERNAL RATE OF RETURN (IRR)

The Internal Rate of Return is nothing but the rate of interest i at which all costs of a business is equal to all its revenues. In other words, IRR represents the rate of interest at which all outflows equals all inflows in a cash flow diagram. This basically means that for a given CFD there exists a value of i at which there is no loss or no profit, which is nothing but IRR. Internal rate of Return is also known as *Time-Rate of Return* or *Return on Investment (ROI)* or *Profitability Index (PI)*. Actually *Interest Rate* and *Rate of Return* indicate the same thing. Interest Rate is what you borrow for and Rate of Return is what you invest for.

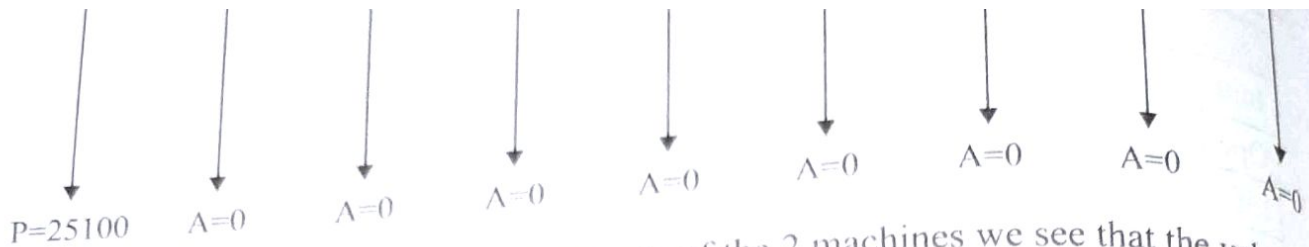
In order to find the IRR of a CFD we have to equate the PW or FW or AE of its revenues with the PW or FW of its costs respectively. In this chapter, present worths have been equated, although the students could use FW or AE too.

$$\text{i.e. PW (Revenues) = PW (Costs)}$$

$$\text{PW (Revenues) - PW (Costs) = 0}$$

In a given problem which asks for IRR to be found, all values of costs and revenues would be given along with service life. We may make use of compound interest formulae or tables in order to solve for i , which is done by trial and error. Interpolation is normally used to get the value of i .

(a) Microeconomics	Macroeconomics
The branch of economics that studies the behavior of an individual consumer, firm, family is known as <i>Microeconomics</i> .	The branch of economics that studies the behavior of the whole economy, (both national and international) is known as <i>Macroeconomics</i> .
Individual economic variables	Aggregate economic variables
Applied to operational or internal issues	Environment and external issues
Covers various issues like demand, supply, product pricing, factor pricing, production, consumption, economic welfare, etc.	Covers various issues like, national income, general price level, distribution, employment, GDP, imports/exports etc.
It is a bottom-up approach to economy	It is a top-down approach to economy



Comparing the Annual equivalent costs of the 2 machines we see that the value is less for type 2 machine so select TYPE 2 MACHINE.

8b) **Conditions for Present Worth Comparison**

All present worth Comparisons that are made have a common background. In other words, before making present worth comparison, it is necessary to follow some basic assumptions as follows:

1. **Cash flows are know:** While doing present worth calculation we assume that all future estimates of revenues and costs are known.
2. **Inflation is not considered:** Present Worth calculations do not consider inflation which brings down the value of money with time.
3. **Interest rates are known:** Interest rates at any given point of time is a complex function of the economy of the country. Present Worth calculations are made assuming that interest rates do not change with time.
4. **Comparisons are made prior to tax:** All revenues and expenditures in any business are subject to various taxes of the state. These taxes vary with magnitude of revenue or expenditure. Present Worth comparisons, at an elementary level, are made without taking taxes into consideration.
5. **Comparisons do not consider intangible factors:** Intangible factors are those which are non quantifiable. In other words, factors like brand image, good will of the company, ecological friendliness, management strength and attitude, quality of workforce, etc., are not considered in present worth comparisons, although they all are of considerable value to the company.
6. **Comparison are made assuming constant availability of funds:** Availability of capital (especially liquid cash) for any expenditures in future is assumed as and when required to get economical benefit. But this is seldom easy, in reality.

If the budget granted has to take care of perpetual maintenance, how much of the amount can be used for initial construction costs? Deposited funds can earn 6% rate of interest, compounded annually. Assume that taxes and inflation do not come into picture.

Solution

Given: Capitalized cost = ₹ 10 Crores

- 8a) . Annual Maintenance Costs = ₹ 10 Lakhs Per Year
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 Rate of interest, $i = 6\%$ (Compounded annually)
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$$A = 1200000 \left[\frac{0.06}{(1+0.06)^{10} - 1} \right]$$

$A = ₹ 91041$

$\therefore \text{Total annual costs} = 1000000 + 91041$

$\text{TAC} = 1091041$