

PART-1*Functions of Management.***Questions-Answers****Long Answer Type and Medium Answer Type Questions**

Que 2.1. Define management and discuss its essential characteristics.

OR

What do you mean by management ?

Answer

A. **Management :** It is the process of planning, organizing, leading and controlling the efforts of organization members and of using all other organization resources to achieve stated organizational goal.

B. Characteristics of Management :**a. Management as an Activity :**

1. The management uses systematically human and material resources.
2. It receives and gives information to their subordinates as well as supervisors.
3. The manager should solve their social and psychological problems. They should provide them opportunities for growth and advancement so that they may realise that they are also contributing towards organizational objectives.

b. Management as a Process :

1. A series of action is called process which is utilized in the function of management. Thus management process moves towards an objective for an enterprise to get it achieved by taking several steps.
2. These steps are planning, organizing, staffing, directing and controlling and are used to reach to organization goals. Thus, the process has the following two aspects :
 - i. Management is an inter-related process.
 - ii. Management is a continuous process.

c. Management as a Group :

1. The top management of the concern determines the goal by strategic planning, making appropriate policy and finally controlling the overall activities of the organization.

2. It includes all the managers and executives together with the board of directors and chairman of the board.

Que 2.2. What are the functions of management ?

OR

Describe the functions of management.

Answer

The essential functions/elements/components of management are as follows :

a. Planning :

1. Planning is the primary function of management.
2. It involves determination of a course of action to achieve desired results/objectives.
3. It is the starting point of management process and all other functions of management are related to and dependent on planning function.
4. It is the key to success, stability and prosperity in business.

b. Organizing :

1. It means to bring the resources (men, materials, machines, etc.) together and use them properly for achieving the objectives.
2. Organizing means arranging ways and means for the execution of a business plan.

c. Staffing :

1. Staffing refers to manpower required for the execution of a business plan.
2. Every business unit needs efficient, stable and cooperative staff for the management of business activities.
3. Manpower is the most important asset of a business unit. 'Right man for the right job' is the basic principle in staffing.

d. Directing (Leading) :

1. It deals with guiding and instructing people to do the work in the right manner.
2. Directing/leading is the responsibility of managers at all levels. They have to work as leaders of their subordinates.
3. Clear plans and sound organization set the stage but it requires a manager to direct and lead his men for achieving the objectives.

e. Coordinating :

1. Effective coordination and also integration of activities of different departments are essential for orderly working of an Organization.
2. A manager must coordinate the work for which he is accountable.

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f. Controlling :

1. Controlling is necessary in the case of individuals and departments so as to avoid wrong actions and activities.
2. Controlling involves three broad aspects :
 - i. Establishing standards of performance,
 - ii. Measuring work in progress and interpreting results achieved, and
 - iii. Taking corrective actions, if required.
3. Business plans do not give positive results automatically. Managers have to exercise effective control in order to bring success to a business plan.

g. Motivating :

1. It is a managerial function in which a manager motivates his men to give their best to the organization.
2. Motivation is actually inspiring and encouraging people to work more and contribute more to achieve organizational objectives.
3. It is a psychological process of great significance.

h. Communicating :

1. Communication (written or oral) is necessary for the exchange of facts, opinions, ideas and information between individual's and departments.
2. In an organization, communication is useful for giving information, guidance and instructions.
3. Managers should be good communicators.
4. They have to use major portion of their time on communication in order to direct, motivate and co-ordinate activities of their subordinates.

PART-2

Taylor's Scientific Management Theory.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 2.3. Explain in detail the "Scientific approach" to management and how it is helpful for organization ?

AKTU 2017-18, Marks 10

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Answer

1. Scientific management is a theory of management that analyzes and synthesizes workflows. F.W Taylor is referred as the father of scientific management.
2. Its main objective is improving economic efficiency, especially labour productivity.
3. It was one of the earliest attempts to apply science to the engineering of processes and to management.

A. Four Principles of Scientific Management :

- i. Replace working by "rule of thumb," or simple habit and common sense, and instead use the scientific method to study work and determine the most efficient way to perform specific tasks.
- ii. Rather than simply assign workers to just any job, match workers to their jobs based on capability and motivation, and train them to work at maximum efficiency.
- iii. Monitor worker performance, and provide instructions and supervision to ensure that they are using the most efficient ways of working.
- iv. There must be equal division of work between the managers and the workers. Allocate the work between managers and workers so that the managers spend their time planning and training, allowing the workers to perform their tasks efficiently.

B. Scientific approach to management or scientific management is helpful for organization in following ways :

1. **Reduction in the Cost of Production :** It increases production with the help of mechanization and latest technology used in producing the goods. On account of large scale production, per unit cost of production is considerably reduced.
2. **Better Quality Products :** By resorting to the measures of standardization and effective supervision, better quality products are ensured.
3. **Benefits of Division of Labour :** The principle of specialization adopted under scientific management ensures the benefits derived from the division of labour. The work is simplified and is carried out in most economical and efficient manner.

4. **Avoidance of Disputes between Labour and Management :** Scientific management is instrumental in developing healthy cooperation between the management and the labour thereby encouraging cordial and harmonious relations between the two. This leads to reduction in industrial disputes and provides of industrial peace.

5. **Increased Wages :** Scientific management aims at higher productivity and the workers get increased wages. Relating wage payments to the efficiency of the workers, i.e., giving wages at the higher rates to the efficient workers.

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6. **Gains to Owners/Investors** : Increased productivity and large scale production leads to more turnovers and enhanced profits for the investor.
7. **Proper Methods of Selection and Training of Workers** : One of the main principles of scientific management is that it undertakes scientific selection, placement and training of industrial workers. In this manner, right type of man is selected for the right type of job.
8. **Provision of Better Working Conditions** : Scientific management provides a proper working hours followed by rest pauses, adequate lighting, ventilation, ensuring proper safety, provision of many other amenities etc., are ensured to workers.
9. **Instructions to Workers** : Under scientific management detailed instructions and guidance is provided to workers in order to carry out the work in accordance with the plans prepared in advance.
10. **Lesser Production Time** : Scientific management leads to the accomplishment of the work in lesser time. Production operations are pre-established and this results in lesser production delays.
11. **Better Utilization of Resources** : Scientific management techniques ensure optimum utilization of available resources viz., materials, machines, equipment, money and workers etc. It removes the wastage and inefficiency of every kind.
12. **Gains to Consumers** : Consumers get better quality products, paying lesser prices and attaining higher living standards.
13. **Beneficial to the Nation** : Scientific management provides many advantages to a nation in the form industrial peace and harmony, increased production and lesser cost of production, higher standard of living for every section of society, higher national income, rapid industrial development etc.

Que 2.4. Who is referred as the father of scientific management?

What are the principles and goal of scientific management?

AKTU 2016-17, Marks 15

Answer

F.W. Taylor is referred as the father of scientific management.

- A. **Four Principles of Scientific Management** : Refer Q. 2.3, Page 2-4Y, Unit-2.
- B. **Goal of Scientific Management** :
 - a. **Increased Production** : Increase in the rate of production by use of standardized tools, equipment and methods.
 - b. **Quality Control** : Improvement in the quality of the output by research and quality control inspection devices.
 - c. **Cost Reduction** : Reduction in the cost of production by rational planning and regulation, and cost control techniques.

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- d. **Elimination of Wastes** : Elimination of wastes in the use of resources and methods of production.
- e. **Right Men for Right Work** : Placement of right persons on the right jobs through scientific selection and training.
- f. **Incentive Wages** : Payment of wages to workers according to their efficiency.

PART-3

Fayol's Principles of Management.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 2.5. What do you think about management? Elaborate fourteen 'principles of management' by Sir Henry Fayol.

AKTU 2013-14, Marks 10

OR

Describe the principles of management.

Answer

- A. **Management** : Refer Q. 2.1, Page 2-2Y, Unit-2.
- B. A principle is a basic statement that provides understanding and guide to thinking and action. Henry Fayol listed fourteen principles of management. They are :
 1. **Division of Work** : Dividing the work among different workers so that a particular work is assigned to the perfect worker. Division of work leads to satisfaction. The main advantage of this principle is to improve the quality of the work.
 2. **Authority and Responsibility** : If a person has full authority in his area, he can perform in much better way and complete his responsibility.
 3. **Discipline** : Discipline is necessary for proper functioning of all the departments.
 4. **Unity of command** : The employees should receive orders and instructions from only one direction (boss).
 5. **Unity of Direction** : This implies that there should be one plan and one head for each group of activities having the same object.
 6. **Unbiasing Among Employees** : The interests of an individual person should not be permitted to supersede upon the general interests of the enterprise.

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7. **Remuneration** : Remuneration should be given to the employees to bring maximum satisfaction. It can be fair wages or other monetary benefits.
8. **Authority Centralization** : The top management or authority should be centralized for the best overall performance of the organization.
9. **Smooth Leveling of Management** : There should be an unbroken line of authority and command through all levels from top level managers to lowest ranked employee (clerk).
10. **Order** : Everything in an enterprise should be in proper order. That may be materials or man. Everyone should have own specific place in the organization.
11. **Equity of Treatment** : The manager of the organization should deal with the subordinates with equality and respect.
12. **Stability** : An employee is able to deliver better when he is secure in his job. It is the duty of the management to offer job security to their employee along with a promise of growth.
13. **Initiative** : Initiative is one of the keenest satisfactions for an intelligent employee.
14. **Team Spirit** : There should be team work among employees for the overall growth of enterprise and the employees.

PART-4

Social Responsibilities of Management.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 2.6. Define social responsibility. What are the different kinds of social responsibilities of business enterprises ?

Answer

1. Social responsibility denotes differentiating right from wrong and doing the right thing.
2. Social responsibility is management's obligation to make choices and take actions that contributes to the well-being and interests of society as well as the organization.
3. The obligation that every management is subjected to can be divided into four responsibilities :

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- i. **Economic Responsibility** : In an economic responsibility, business is expected to produce goods and services that are beneficial for society and society which wants and sell them at a profit.
- ii. **Legal Responsibility** : Every business enterprise is expected to operate within the legal frame work of our society. A law abiding enterprise gets no interference of government and is considered as a socially responsible enterprise.
- iii. **Ethical Responsibility** : Ethics is much more than law, while behaving ethically businessmen should not be involved in adulteration, black marketing, etc.
- iv. **Discretionary Responsibility** : This responsibility is purely voluntary. This includes contribution in charity. Participation in social service projects, setting up educational and training institutions etc., helping people affected by flood, earthquake etc.

Que 2.7. What are the social responsibilities of an enterprise towards different section / group in the society ?

Answer

The social responsibilities of an enterprise for different section/group of the society can be classified as :

- i. **Responsibilities Towards Consumers** :
 - a. Production of safe items by maintaining quality standards.
 - b. Being truthful in advertising.
 - c. To follow fair trade practices.
- ii. **Responsibilities Towards Employee** :
 - a. Providing fair compensation and benefits.
 - b. Providing good and safe working conditions.
 - c. To give them opportunities to participate in decision making.
- iii. **Responsibilities Towards the Owners / Shareholders / Investors** :
 - a. To ensure safety of investment.
 - b. To ensure fair and regular return on investment.
 - c. To ensure appreciation of investment by proper utilization of resources.
- iv. **Responsibilities Towards the Government** :
 - a. To abide by rules, regulations and laws.
 - b. To pay taxes and duties on time.
 - c. To help in solving social problem.
- v. **Responsibilities Towards the Community** :
 - a. To protect the environment from all types of pollution.
 - b. To provide more employment opportunities.

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- c. To help the weaker section of the society.
- vi. Responsibilities Towards Suppliers :**
 - a. To ensure regular payment to the supplier.
 - b. To adopt fair dealing with the suppliers.
 - c. To protect and assist small scale suppliers by placing order with them.
- vii. Responsibilities Towards Competitors :**
 - a. To have a healthy competitive spirit.
 - b. To not use unfair means to succeed in business.
 - c. To not harm or defame the competitors.
 - d. To not copy competitors strategy.

Que 2.8.- What is the role of business in protecting the environment ?

Answer

- It is the social responsibility of every business to take steps not only to check all sorts of pollution but also to protect environmental resources.
- i. A definite commitment by top management of the enterprise to create, maintain and develop work culture for environmental protection and pollution prevention.
 - ii. Ensuring that commitment to environmental protection is shared throughout the enterprise by all divisions and employees.
 - iii. Developing clear-cut policies and programmes for purchasing good quality raw materials, employing superior technology, using scientific techniques of disposal and treatment of wastes and developing employee skills for the purpose of pollution control.
 - iv. Complying with the laws and regulations enacted by the government for prevention of pollution.
 - v. Participation in government programmes relating to management of hazardous substances, clearing up of polluted rivers, plantation of trees, and checking deforestation.
 - vi. Periodical assessment of pollution control programmes in terms of costs and benefits so as to increase the progress with respect to environmental protection.
 - vii. Arranging educational workshops and training materials to share technical information and experience with suppliers, dealers and customers to get them actively involved in pollution control programmes.

PART-5*Human Resource Management.***Industrial Management****2-11 Y (Sem-6)****Questions-Answers****Long Answer Type and Medium Answer Type Questions**

Que 2.9. What is human resource ? What is human resource management and what are its objectives ?

Answer

- Human resources are the people who work for an organization in jobs that produce the products or services of the business or organization.
1. Human resource management is a process, which consists of four main activities namely, acquisition, development, motivation, as well as maintenance of human resources.
 2. HRM focuses on the function of people within the business, ensuring best work practices are in place at all times.
 3. **Objectives :** The specific objectives of human resource management are as follows :
 - i. To ensure effective utilization of human resources, all other organizational resources will be efficiently utilized by the human resources.
 - ii. To establish and maintain an adequate organizational structure of relationship among all the members of an organization by dividing of organization tasks into functions, positions and jobs, and by defining clearly the responsibility, accountability, authority for each job and its relation with other jobs in the organization.
 - iii. To generate maximum development of human resources within the organization by offering opportunities for advancement to employees through training and education.
 - iv. To ensure respect for human beings by providing various services and welfare facilities to the personnel.
 - v. To ensure reconciliation of individual/group goals with those of the organization in such a manner that the personnel feel a sense of commitment and loyalty towards it.
 - vi. To identify and satisfy the needs of individuals by offering various monetary and non-monetary rewards.

Que 2.10. Explain the nature of human resource management.

Answer

Human Resource Management is a process of bringing people and organizations together so that the goals of each are met. The various features or nature of HRM include :

1. It is pervasive in nature as it is present in all enterprises.

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2. Its focus is on results rather than on rules.
3. It tries to help employees develop their potential fully.
4. It encourages employees to give their best to the organization.
5. It is all about people at work, both as individuals and groups.
6. It tries to put people on assigned jobs in order to produce good results.
7. It helps an organization meet its goals in the future by providing for competent and well-motivated employees.
8. It tries to build and maintain cordial relations between people working at various levels in the organization.
9. It is a multi-disciplinary activity, utilizing knowledge and inputs drawn from psychology, economics, etc.

Que 2.11. Discuss the functions of human resource management.

Answer

The main functions of human resource management are classified into two categories :

- a. **Managerial Functions** : Following are the managerial functions of human resources management :
 1. **Planning** : The planning function of human resource department pertains to the steps taken in determining in advance personnel requirements, personnel programmes, policies etc. After determining how many and what type of people are required, a personnel manager has to devise ways and means to motivate them.
 2. **Organization** : Under organization, the human resource manager has to organise the operative functions by designing structure of relationship among jobs, personnel and physical factors in such a way so as to have maximum contribution towards organizational objectives. In this way a personnel manager performs following functions :-
 - a. preparation of task force;
 - b. allocation of work to individuals;
 - c. integration of the efforts of the task force;
 - d. coordination of work of individual with that of the department.
 3. **Directing** : Directing is concerned with initiation of organized action and stimulating the people to work. A personnel manager guides and motivates the staff of the organization to follow the path laid down in advance.
 4. **Controlling** : It provides basic data for establishing standards, makes job analysis and performance appraisal, etc. All these techniques assist in effective control of the qualities, time and efforts of workers.
- b. **Operative Functions** : The following are the operative functions of human resource management :
 1. **Procurement of Personnel** : It is concerned with the obtaining of the proper kind and number of personnel necessary to accomplish organization goals. It deals specifically with manpower requirements, their recruitment, selecting, placement and orientation, etc.

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2. **Development of Personnel** : Development has to do with the increase through training, skill that is necessary for proper job performance. In this process various techniques of training are used to develop the employees.
3. **Compensation to Personnel** : Compensation means determination of adequate and equitable remuneration of personnel for their contribution to organization objectives. It also assists the organization for adopting the suitable wages and salaries, policy and payment of wages and salaries in right time.
4. **Maintaining Good Industrial Relation** : Human Resource Management covers a wide field. It is intended to reduce strife's, promote industrial peace, provide fair deal to workers and establish industrial democracy.
5. **Record Keeping** : In record keeping the personnel manager collects and maintains information concerned with the staff of the organization. It is essential for every organization because it assists the management in decision making such as in promotions.
6. **Personnel Planning and Evaluation** : Under this system different type of activities are evaluated such as evaluation of performance, personnel policy of an organization and its practices, personnel audit, morale, survey and performance appraisal, etc.

Que 2.12. Describe the importance of HRM.

Answer

The role of human resource management is very important in an organization and it should not be undermined especially in large scale enterprises. Because of the following reasons human resource management holds a place of importance :

1. It helps management in the preparation adoption and continuing evolution of personnel programmes and policies.
2. It supplies skilled workers through scientific selection process.
3. It ensures maximum benefit out of the expenditure on training and development and appreciates the human assets.
4. It prepares workers according to the changing needs of industry and environment.
5. It motivates workers and upgrades them so as to enable them to accomplish the organization goals.
6. Through innovation and experimentation in the fields of personnel, it helps in reducing costs and helps in increasing productivity.
7. It contributes a lot in restoring the industrial harmony and healthy employer-employee relations.
8. It establishes mechanism for the administration of personnel services that are delegated to the personnel department.





Work Study and Inventory Control

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EOQ, ABC, VED

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Work Study and Inventory Control

PART- 1

Work Study : Introduction, Definition, Objectives, Steps in Work Study.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 3.1. Define Work Study. State its objectives and advantages.

Answer

- A. **Work Study :** It is a technique used to examine the activities done by human being and investigate those factors that affect the accuracy and efficiency of the workers. Work study helps to complete a particular work or job in the best possible way.
- B. **Objectives of Work Study :** The following are the objectives of work study :
- Increased efficiency.
 - Better product quality.
 - To choose the fastest method to do a job.
 - To improve the working process.
 - Less fatigue to operators and workers.
 - Effective labour control.
 - Effective utilization of resources.
 - To decide equipment requirements.
 - To pay fair wages.
 - To aid in calculating exact delivery.
 - To formulate realistic labour budgeting.
 - To decide the required manpower to do a job.
- C. **Advantages of Work Study:** The advantages of work study are as follows :
- Work study ensures higher productivity.
 - Better working conditions with less fatigue.
 - Higher wages to workers.
 - Uniform production flow.
 - Job satisfaction and job security to workers.

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6. Reduction in unit cost of production.
7. Quality products to consumers.
8. Fast delivery schedule.
9. Harmonious employer-employee relation.
10. Better service to customers.

Que 3.2. What are the steps in work study?

Answer

The steps of work study are as follows :

1. It selects the jobs which are to be studied.
2. It examines critically the recorded facts which are already done.
3. It records from direct observations all the matters which are happened.
4. It defines new method.
5. It also installs the new method.
6. It also maintains the new standard.
7. It develops most economic and appropriate methods.
8. It measures the work content in the method that is selected and compute a standard time.

Que 3.3. Define 'work study' and state its objectives. Differentiate between 'method study' and 'work measurement'.

AKTU 2014-15, 2016-17; Marks 10

Answer

- A. **Work Study and Its Objectives :** Refer Q. 3.1, Page 3-2Y, Unit-3.
 B. **Difference Between Method Study and Work Measurement :**

S. No.	Method Study	Work Measurement
1.	Examine the facts.	Analyze the facts.
2.	Install the new method.	Compile the standard time.
3.	Improve factory, office and workplace layout.	Improve method of doing work.
4.	Also known as work simplification.	Also known as time study.
5.	It ensures safety in all activities.	It ensures correct loading of labour and machinery.

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Method Study : Definition, Objectives, Steps of Method Study.

Questions-Answers**Long Answer Type and Medium Answer Type Questions**

Que 3.4. Define method study. What are its objective and steps ?

Answer

A. **Method Study :** Method study is the systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing costs. It is a systematic procedure to analyze the work to eliminate unnecessary operations.

B. **Objective of Method Study :** The following are the objectives of method study :

1. It improves the proper utilization of manpower, machine and materials.
2. It also improves the factory layout, work place, etc.
3. It also improves the process and procedure.
4. It develops better physical working environment.
5. It reduces undesirable fatigue.

C. **Steps of Method Study :** The steps of method study are :

1. At first select the proper work which is to be studied.
2. Record all the facts of existing method.
3. Examine the facts very critically.
4. Develop the most practical, economic, and effective method.
5. Install the method and the same should be maintained.

Que 3.5. Write short note on Motion Study.

AKTU 2013-14, Marks 05

Answer**A. Motion Study :**

1. The movement of a worker is very important for manufacturing of the products.
2. Motion study is the science of eliminating unused or waste material from useful material.
3. It is a systematic and scientific method of the motions of unnecessary waste and undesired motions.

B. Steps of Motion Study : The steps of motion study are :

1. Select the job.
2. Collect the data or facts related to the work.
3. Examine the facts collected.
4. Develop the latest and improved method.
5. Install the new method.

C. Objectives of Motion Study : The following are the objectives of motion study :

1. Removal of unwanted motions.
2. Increase the efficiency of all activities.
3. Improve the proper motion of activities.
4. Enhancing the material handling process.
5. Ensure the smooth and safe running of the activities.

PART-3

Work Measurement : Purpose, Types of Study, Stop Watch Methods, Steps Allowances, Standard Time Calculations, Work Sampling.

Questions-Answers**Long Answer Type and Medium Answer Type Questions**

Que 3.6. What is the role of 'Time Study' in production ?

AKTU 2013-14, Marks 10

Answer

1. When a customer wants to purchase some products, then he usually compares the prices with those of similar products, which are being manufactured by other producers.
2. Therefore, to give competitive quotations, estimation of accurate labour cost is very essential as it has got large effect on the price.
3. Secondly, whenever a customer contracts for the purchase of certain products then he desires that the products should reach to him at a promised date which is only possible when manufacturer is aware of the time to be taken by the product during manufacture.
4. Therefore, to find the correct manufacturing time for product, time study is performed.
5. Time study also helps in analysis of work and standardization of methods.

Que 3.7. Explain the steps required in making time study ?

AKTU 2015-16, Marks 10

Answer

Following are the steps required in making time study :

Step I : Define objective of the study. This involves statement of the use of the result, the precision desired, and the required level of confidence in the estimated time standards.

Step II : Verify that the standard method and conditions exist for the operation and the operator is properly trained.

Step III : Select operator to be studied if there are more than one operator doing the same task.

Step IV : Record information about the standard method, operation, operator, product, equipment, and conditions on the time study observation sheet.

Step V : Divide the operation into reasonably small elements, and record them on the time study observation sheet.

Step VI : Time the operator for each of the elements. Record the data for a few numbers of cycles on the time study observation sheet. Use the data to estimate the total number of observations to be taken.

Step VII : Collect and record the data of required number of cycles by timing and rating the operator.

Step VIII : Calculate the representative watch time for each element of operation. Multiply it by the rating factor to get normal time.

Normal time = Observed time × Rating factor

Calculate the normal time for the whole operation by adding the normal time of its various elements.

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Step IX : Determine allowances for fatigue and various delays.
Step X : Determine standard time of operation.
 Standard time = Normal time + Allowances

Que 3.8. Define stopwatch methods of work measurement ? Explain its importance.

Answer

- A. **Stopwatch Method of Work Measurement :**
- Definition :** Stopwatch time study measures how long it takes an average worker to complete a task at a normal pace.
 - Methods of timing using Stopwatch :** There are two methods of timing using a stop watch. They are :

a. Fly Back Method :

- Here the stopwatch is started at the beginning of the first element. At the end of the element the reading is noted in the study sheet.
- At the same time, the stopwatch hand is snapped back to zero. This is done by pressing down the knob, immediately the knob is released.
- The hand starts moving from zero for timing the next element. Thus the timing for each element found is called observed time.

b. Continuous Method :

- Here the stopwatch is started at the beginning of the first element. The watch runs continuously throughout the study.
- At the end of each element the watch readings are recorded on the study sheet. The time for each element is calculated by successive subtraction.
- The final reading of the stopwatch gives the total time known as observed time.

B. **Importance :** The importance and uses of stopwatch time study can be stated as under:

- Determining schedules and planning work.
- Determining standard costs and as an aid in preparing budgets.
- Estimating the costs of a product before manufacturing it. Such information is of value in preparing bids and determining selling price.
- Determining machine effectiveness, the number of machines which one person can operate, and as an aid in balancing assembly lines and work done on a conveyor.
- Determining time standards to be used as a basis for labour cost control.
- Helps to know the labour productivity, labour efficiency, labour performance and overall time required to perform the task.
- Helps to improve the process of operation.

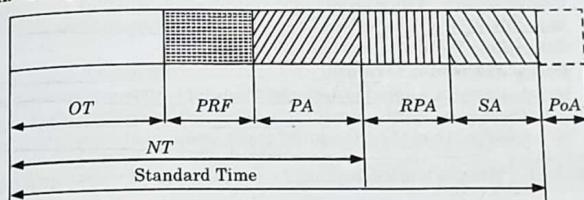
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Work Study and Inventory Control

Que 3.9. Explain standard time calculation.

Answer

- Definition :** Standard time is the time allowed to an operator to carry out the specified task under specified conditions and defined level of performance.
- The various allowances are added to the normal time as applicable to get the standard time "Components standard time".
 Standard time = Normal time + Allowances
- Standard Time Calculation :** The basic constituents of standard time are :
 - Elemental (observed time).
 - Performance rating to compensate for difference in pace of working.
 - Relaxation allowance.
 - Interference and contingency allowance.
 - Policy allowance.
- Components Standard Time :**



- | | | |
|-----|---|------------------------------|
| OT | - | Observed Time |
| PRF | - | Performance Rating Factor |
| NT | - | Normal Time |
| PA | - | Process Allowances |
| RPA | - | Rest and Personal Allowances |
| SA | - | Special Allowances |
| PoA | - | Policy Allowances |

Que 3.10. What are allowances ? Explain various allowances in calculating standard time ?

Answer

A. Allowances :

- It is impossible to work throughout the day even though the most practicable, effective method has been developed.

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2. Allowances must be made to enable the worker to attend to his personal needs.
- B. Various Allowances in Calculating Standard Time are :**
1. **Relaxation allowance :** Relaxation allowances are calculated so as to allow the worker to recover from fatigue.
 - a. **Fixed Allowances :**
 - i. **Personal Needs Allowance :** It is intended to compensate the operator for the time necessary to attend to personal needs like drinking water, smoking, washing hands.
 - ii. **Allowances For Basic Fatigue :** This allowance is given to compensate for energy expended during working.
 - b. **Variable Allowances :** The variable fatigue allowance is added to the fixed allowance to an operator who is engaged on medium and heavy work and working under abnormal conditions that cannot be improved.
 2. **Interference Allowance :** This allowance is applicable for machine or process controlled jobs to compensate the operator for the unavoidable loss of production due to simultaneous stoppage of two or more machines being operated by him.
 3. **Contingency Allowance :** This allowance provides for small unavoidable delays as well as for occasional minor extra work.
- Examples :** Power failures of small duration.
4. **Policy Allowance :** The policy allowance is an increment, other than bonus increment, applied to a standard time (or to some constituent part of it, for example, work content) to provide a satisfactory level of earnings for a specified level of performance under exceptional circumstances.

Que 3.11. What is work sampling? Give the steps of work sampling.

Answer**A. Work Sampling :****i. Definition :**

1. Work sampling (also sometimes called ratio delay study) is a technique of getting facts about utilization of machines or human beings through a large number of instantaneous observations taken at random time intervals.
2. The ratio of observations of a given activity to the total observations approximates the percentage of time that the process is in that state of activity.
- ii. **Use of Work Sampling for Standard Time Determination :** Work sampling can be very useful for establishing time standards on both direct and indirect labour jobs.

B. Steps of Work Sampling :

Step 1 : Define the problem.

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1. Describe the job for which the standard time is to be determined.
2. Unambiguously state what are the activities of job that would entitle him to be in 'working' state and any activity other than those would entitle him to be in "not working" state.

Step 2 : Design the sampling plan :

1. Estimate satisfactory number of observations to be made.
2. Decide on the period of study, for example, two days, one week, etc.
3. Prepare detailed plan for taking the observations.

Step 3 : Contact the persons concerned and take them in confidence regarding conduct of the study.

Step 4 : Make the observations at the pre-decided random times about the working / not working state of the operator. When operator is in working state, determine his performance rating. Record both on the observation sheet.

Step 5 : Obtain and record other information. This includes operator's starting time and quitting time of the day and total number of parts of acceptable quality produced during the day.

Step 6 : Calculate the standard time per piece.

Que 3.12. Differentiate between motion and time study.

Answer

S. No.	Basis of Comparison	Motion Study	Time Study
1.	Meaning	It relates to watching and recording the movements of workers.	It involves careful measurement of time required to do the different parts of a job.
2.	Nature	Motion study is concerned with minimization of movement of operators.	Time study is concerned with increasing the productivity to labour.
3.	Purpose	The purpose of motion study is to determine the best way of doing a job.	The purpose of time study is to determine fair day's work.
4.	Technique	Motion study is conducted with a moving camera.	Time study is conducted with a stopwatch.

PART-4*Production Planning and Control.***Questions-Answers****Long Answer Type and Medium Answer Type Questions****Que 3.13. What is production planning ?****AKTU 2013-14, Marks 10****OR**

Define production planning and state its objectives. What are the various steps in production planning ? **AKTU 2015-16, Marks 10**

OR

Define the term production planning. State its objectives. What are the various steps involved in production planning and control ?

AKTU 2016-17, 2017-18; Marks 10**OR**

Define the term production planning. State its objectives. What are the various steps in production planning ?

AKTU 2014-15, Marks 10**Answer****A. Production Planning :**

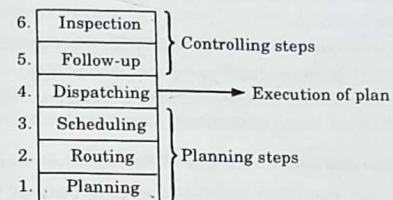
1. Production Planning is concerned with the determination, acquisition and arrangement of all facilities necessary for future operations.
2. Production planning means to fix the production goals and to estimate the resources which are required to achieve these goals.
3. It prepares a detailed plan for achieving the production goals economically, efficiently and in time.

B. Objectives of Production Planning :

1. Effective utilization of resources.
2. Steady flow of production.
3. Estimate the resources.
4. Ensures optimum inventory.

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5. Coordinates activities of departments.
6. Minimize wastage of raw materials.
7. Improves the labour productivity.
8. Reduces the production costs.

**C. Steps in production planning and control are as follows :****i. Planning :**

1. For planning of productive operations in detail, the planning department will receive full information from management about the quantity to be produced and the dates when delivery has been promised to customers.
2. The planning department will also get the necessary engineering and drawing specifications from the engineering department.

ii. Routing :

1. The objective of routing is to find out the best and the cheapest sequence of operations.
2. While preparing the route card, it must be kept in mind that machines in the plant are operated at their full capacity; and manpower and other facilities are best utilized.

iii. Scheduling :

1. Scheduling involves the preparation of a time-table, indicating the total time needed for the manufacture of a product as also the time expected to be spent at each machine and process.
2. In preparing schedules, the persons concerned will have to take into consideration the various types of orders on hand and the dates by which their completion has been promised.

iv. Dispatching :

1. Procurement of necessary tools, jigs and fixtures etc., before they are actually required by the workmen.
2. Giving workers the necessary work orders, instructions, drawings etc., for initiating the work.

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v. Follow-Up (or Checking the Progress) :

1. Fellow-up is the control aspect of production planning and control.
 2. It involves taking steps to check up whether work proceeds according to plans and how far there are variances from standards; and also taking necessary corrective steps to set things in order.
- #### vi. Inspection :
1. Inspection is the quality control aspect of production planning and control.
 2. It ensures that goods produced are of the right quality.
 3. The inspectors may inspect materials, semi-finished and finished products either at the work bench or in special laboratories or testing rooms.

Que 3.14. State and explain the objective, importance of production planning. Do you consider outsourcing is a part of production planning? Explain.

AKTU 2015-16, Marks 10

Answer

A. Objectives of Production Planning :

1. **Effective Utilization of Resources :** Production planning results in effective utilization of resources, plant capacity and equipment. This results in low-cost and high returns for the organization.
2. **Steady Flow of Production :** Production planning ensures a regular and steady flow of production. Here, all the machines are put to maximum use. This results in a regular production, which helps to give a routine supply to customers.
3. **Estimate the Resources :** Production planning helps to estimate the resources like men, materials, etc. The estimate is made based on sales forecast.
4. **Ensures Optimum Inventory :** Production planning ensures optimum inventory. Stock of raw material is maintained at a proper level in order to meet the production demands. Stock of finished goods is also maintained to meet regular demands from customers.
5. **Coordinates Activities of Departments :** Production planning helps to coordinate the activities of different departments.
6. **Minimize Wastage of Raw Materials :** Production planning ensures proper inventory of raw materials and materials handling. This helps to minimize wastage of raw material.
7. **Improves the Labour Productivity :** There is maximum utilization of manpower. Training is provided to the workers. The profits are shared with the workers in form of increased wages and other incentives. Workers are motivated to perform their best. This results in improved labour efficiency.

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B. Reduces the Production Costs : Production planning makes optimum utilization of resources, and it minimizes wastage. It also maintains optimum size of inventories. All this reduces the production costs.

B. Importance / Advantage of Production Planning :

1. Continuous production
2. Cost-control and profit-maximization
3. Customer satisfaction
4. Planning of resource requirements and inventory control
5. Minimum material handling and storage costs
6. Economy in production time
7. Equipment utilization

C. Outsourcing as Part of Production Planning :

1. Instead of employing expensive specialists that might not be kept busy at all times it could be cheaper to 'buy in' specialist services or products as and when needed.
2. Outsourcing firms may be cheaper because they benefit from economies of scale, as they may provide similar services to a large number of other businesses.
3. By removing departments from the staff payroll and buying in services when needed, fixed costs are converted into variable costs.
4. Additional capacity can be obtained from outsourcing only when needed and contracts can be cancelled if demand falls much more quickly than closing down whole factories owned by the business.

Que 3.15. Is production management different from operation management? Describe the intermittent and continuous production system.

AKTU 2016-17, 2017-18; Marks 05

Answer

1. The primary objective of production and operations management is to effectively manage and utilize those resources of the firm that are essential for the production of goods and services.
2. Production management refers to the management of activities related to the production of goods.
3. Operations management is the administration of business operations by the managers of the organization.
4. Production and operations management are so closely intertwined, that it is quite difficult to differentiate the two.
5. Production management covers and administers all the activities which are involved in the process of production.
6. On the other hand, operations management entails all the activities involved in the production of goods and delivery of services such as

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material management, quality management, maintenance management, process management, process design, product design and so on.
Intermittent and Continuous Production System : Refer Q. 1.13, Page 1-9Y, Unit-1.

PART-5

Inventory Control : Inventory, Cost, Models of Inventory Control : EOQ, ABC, VED.

Questions-Answers**Long Answer Type and Medium Answer Type Questions**

Que 3.16. Define inventory. What is direct and indirect inventory?

What are the different costs associated with inventory?

AKTU 2014-15, Marks 10

Answer

A. **Inventory :** Inventory is an accounting term that refers to goods that are in various stages of being made ready for sale, including:
 Finished goods (that are available to be sold)
 Work-in-progress (meaning in the process of being made)
 Raw materials (to be used to produce more finished goods)

B. Types of Inventory :

1. Raw material inventory
2. Work in progress (WIP)/Semi-finished inventory
3. Finished goods inventory

C. **Classification of Inventory :** Inventory can be broadly divided into two main categories:

i. **Direct Inventories :** These are the inventories that are an integral part of the finished product. Important feature of direct inventories is that you can assign the stock to specific physical units. The different types of direct inventories are:

a. **Raw Materials :** These are goods which are to be used in the manufacturing process to produce final goods. They are the goods in their raw or natural form. For example, sugarcane is the raw material in a sugar factory.

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- b. **Semi-Finished Goods :** These are also known as work-in-progress. Some further work has to be done before they can be sold. For example in a toy factory, toys that are molded but still have to be painted will be semi-finished goods.
- c. **Finished Goods :** These are fully completed goods ready for sale, but not yet sold.
- ii. **Indirect Inventories :** Indirect inventories comprise of stock items that are necessary for the manufacturing of goods but are not a direct component of such goods.
Example : Petrol or lubricants used in production are indirect inventories. And office supplies used in administration also fall under the category of indirect inventories.
- D. **Costs Associated with Inventories :** There are three types of costs associated with inventory:
 - i. **Holding/Carrying Cost :** They are expenses such as storage, handling, insurance, taxes, obsolescence, theft, and interest on funds financing the goods.
 - ii. **Ordering Cost :** Ordering costs are those fees associated with placing an order, including expenses related to personnel in purchasing department, communications, and the handling of related paper work.
 - iii. **Stock-out Cost :** They include sales that are lost, both short and long term, when a desired item is not available; the costs associated with back ordering the missing item; or expenses related to stopping the production line because a component part has not arrived.

Que 3.17. Define inventory control with its objectives and importance.

Answer

A. **Inventory Control :** It is the technique of maintaining the size of the inventory at some desired level keeping in view the best economic interests of an organization. It is the process of deciding what and how much of various items are to be kept in stock.

B. Objectives of Inventory Control :

1. To maintain the overall investment at the lowest level, consistent with operating requirements.
2. To supply the product, raw material, sub-assemblies, semi-finished goods etc. to its users as per their requirements at right time and at right price.
3. To keep inactive, waste, surplus, scrap and obsolete items at the minimum level.

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4. To minimize holding, replacement and shortage costs of inventories and maximize the efficiency in production and distribution.
5. To treat inventory as investment which is risky.
6. To protect against inflation since the prices of materials are constantly increasing.
7. To avail quantity discounts on bulk purchases.

C. Importance of Inventory Control :

1. It improves the liquidity position of the firm by reducing unnecessary tying up of capital in excess inventories.
2. It ensures smooth production operations by maintaining reasonable stocks of materials.
3. It facilitates regular and timely supply to customers through adequate stocks of finished products.
4. It protects the firm against variations in raw materials delivery time.
5. It facilitates production scheduling, avoids shortage of materials and duplicate ordering.
6. It helps to minimize loss by obsolescence, deterioration, damage, etc.
7. It enables the firms to take advantage of price fluctuations through economic lot buying when prices are low.

Que 3.18. What are the different costs associated with inventories ?

AKTU 2013-14, Marks 10

OR

Explain classification, need and various costs involved with inventory.

AKTU 2015-16, Marks 7.5

OR

Explain the different costs involved in inventory models ?

AKTU 2017-18, Marks 10

OR

Write short note on inventory costs.

AKTU 2013-14, Marks 05

Answer

Different Costs Involved in Inventory Models are :

- i. **Holding/Carrying Cost:** Inventory storage and maintenance involves various types of costs namely;

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Work Study and Inventory Control

3-18 Y (Sem-6)

a. Inventory Storage Cost :

1. Inventory storage costs typically include cost of building rental and facility maintenance and related costs. Cost of material handling equipments, IT hardware and applications, including cost of purchase, depreciation or rental or lease as the case may be.
2. Further costs include operational costs, consumables, communication costs and utilities, besides the cost of human resources employed in operations as well as management.

b. Cost of Capital :

1. Includes the costs of investments, interest on working capital, taxes on inventory paid, insurance costs and other costs associate with legal liabilities.
2. The inventory storage costs as well as cost of capital is dependent upon and varies with the decision of the management to manage inventory in house or through outsourced vendors and third party service providers.

Ordering Costs :

- i. **Cost of procurement and inbound logistics costs form a part of ordering cost.**
2. Ordering cost is dependant and varies based on two factors: (a) the cost of ordering excess and (b) the cost of ordering too less. Both these factors move in opposite directions to each other.
3. Ordering excess quantity will result in carrying cost of inventory, whereas ordering less will result in increase of replenishment cost and ordering costs.
4. **The functional analysis and cost implications form the basis of determining the inventory procurement decision by answering the two basic fundamental questions - How Much to Order and When to Order.** How much to order is determined by arriving at the Economic Order Quantity (EOQ).

- ii. **Stock-out Costs :** They include sales that are lost, both short and long term, when a desired item is not available; the costs associated with back ordering the missing item; or expenses related to stopping the production line because a component part has not arrived. Failing to understand these expenses can lead management to maintain higher inventory levels than customer requirements may justify.

Que 3.19. What do you understand by Economic Order Quantity ?

How do you calculate EOQ ? Explain.

AKTU 2014-15, Marks 10

OR

Define inventory control with its objectives and importance. Explain quantitative technique with EOQ model. How economic order quantity (EOQ) is derived ?

AKTU 2015-16, Marks 10

OR
Explain the different costs involved in inventory models ? Derive the expression for economic order quantity, when the demand of items is uniform model, the production rate is infinite and no stock-outs are allowed.

AKTU 2017-18, Marks 10

- Answer**
- A. **Inventory Control with Its Objectives and Importance :**
 Refer Q. 3.17, Page 3-16Y, Unit-3.
- B. **Costs :** Refer Q. 3.18, Page 3-17Y, Unit-3.
- C. **EOQ :**
- By the 'order quantity' we mean the quantity produced or procured during one production cycle.
 - When the size of order increases, the ordering costs (cost of purchasing, inspection etc.) will decrease whereas the inventory carrying costs (cost of storage, insurance, etc.) will increase.
 - Thus in the production process there are two opposite costs, one encourages the increase in the order size and the other discourages.
 - Economic Order Quantity (EOQ) is that size of order which minimizes total annual costs of carrying inventory and cost of ordering.
 - The two opposite costs can be shown graphically by plotting them against the order size.
 - It is evident from Fig. 3.19.1 that the minimum total cost occurs at the point where the ordering costs and inventory carrying costs are equal.

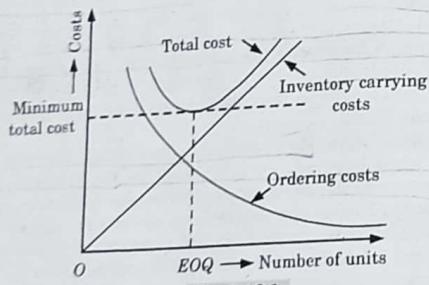


Fig. 3.19.1.

C. Formula for EOQ :

Inventory costs are :

- a.
$$\text{Ordering cost} = \frac{\text{Total annual demand}}{\text{Quantity order each time}} \times \text{Ordering cost per order}$$
- $$= \frac{D}{Q} \times S$$

- b. Carrying cost = Average units in inventory \times Carrying cost per unit

$$= \frac{Q}{2} \times H$$

The total cost is minimum at a point where ordering cost equals carrying cost

$$\frac{D}{Q} \times S = \frac{Q}{2} \times H$$

Therefore, Economic order quantity EOQ is

$$EOQ = \sqrt{\frac{2DS}{H}}$$

EOQ is the economic order quantity (units).

D is demand per year,

S cost per order, and

H cost of holding per unit of inventory.

Que 3.20. | The material DX is used uniformly throughout the year.

The data about annual requirement, ordering cost and holding cost of this material is given below :

Annual requirement : 2,400 units

Ordering cost : Rs 100 per order

Holding cost : Rs 3 per unit

Determine the Economic Order Quantity (EOQ), of material DX number of orders per year, ordering cost, holding cost and combine cost using above data.

Answer

Given : D = 2400 units, S = 100/order, H = 3/unit.

To Find : i. EOQ of material. ii. Number of orders per year. iii. Ordering cost. iv. Holding cost and v. Combine cost.

1. We know that,

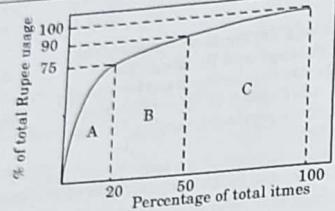
$$EOQ = \sqrt{\frac{2DS}{H}}$$

$$EOQ = \sqrt{\frac{2 \times 2400 \times 100}{3}}$$

$$EOQ = \sqrt{\frac{480000}{3}}$$

$$EOQ = \sqrt{160000}$$

$$EOQ = 400$$

**ii. Just In Time (JIT) Method :**

1. In just in time method of inventory control, the company keeps only as much inventory as it needs during the production process.
2. With no excess inventory in hand, the company saves the cost of storage and insurance.
3. The company orders further inventory when the old stock of inventory is close to replenishment.
4. This method requires proper planning so that new orders can be timely placed.

iii. Material Requirements Planning (MRP) Method :

1. MRP system integrates data from various areas of the business where inventory is utilized.
2. Based on the data and demand in the market, order for new inventory is placed with the material suppliers.

iv. Economic Order Quantity (EOQ) Model :

1. Economic Order Quantity technique focuses on taking a decision regarding how much quantity of inventory should the company order at any point of time and when should they place the order.
2. In this model, inventory is reordered when it reaches the minimum level.
3. EOQ model helps to save the ordering cost and carrying costs incurred while placing the order.

v. Minimum Safety Stocks :

1. The minimum safety stock is the level of inventory which an organization maintains to avoid stock out situation.
2. It is the level at which the new order is placed before the existing inventory is over.

vi. VED Analysis :

1. VED analysis attempts to classify the items used into three broad categories namely, Vital, Essential, and Desirable.
2. The analysis classifies items on the basis of their criticality for the industry or company.

Vital: Vital category items are those items without which the production activities or any other activity of the company, would come to a halt, or at least be drastically affected.

Essential: Essential items are those items whose stock - out cost is very high for the company.

Desirable: Desirable items are those items whose stock-out or shortage causes only a minor disruption for a short duration in the production schedule. The cost incurred is very nominal.

VED analysis is very useful to categorize items of spare parts and components

vii. Fast, Slow and Non-Moving (FSN) Method :

1. All the items of inventory are not used in the same order; some are required frequently, while some are not required at all.
2. So this method classifies inventory into three categories, fast moving inventory, slow-moving inventory and non-moving inventory.
3. The order for new inventory is placed based on the utilization of inventory.

Que 3.24. What is ABC analysis ? What are its advantages and disadvantages ?

Answer

A. **ABC Analysis :** Refer Q. 3.23, Page 3-22Y, Unit-3.

B. **Advantages of ABC analysis :**

1. **Reduction in Investment :** Under ABC analysis, the materials from group 'A' are purchased in lower quantities as much as possible. With this, the effort to reduce the delivery period is also made. These in-turn help to reduce the investment in material.

2. **Strict Control :** Under ABC analysis, strict control can be exercised to the materials in group 'A' that have higher value.

3. **Minimum Storage Cost :** Since, the material from group 'A' are purchased in lower quantities as much as possible, it reduces the storage cost as well.

4. **Saving in Time :** Since a significant effort is made for management of the material from group 'A', it helps to save time as well.

5. **Economy :** This method is economical, since equal time and labour is not needed for all types of materials.

C. Disadvantage of ABC Analysis :

1. ABC analysis will not be effective if the materials are not classified into the groups properly.
2. It is not suitable for the organization where the costs of materials do not vary significantly.
3. There is no scientific base for the classification of material under ABC analysis.

4. The classification of the materials into different groups may lead to extra cost. Hence, it may not be suitable for small organization.

Que 3.25. Brief any one method of inventory management.

AKTU 2013-14, Marks 10

Answer

Refer Q. 3.23, Page 3-22Y and Q. 3.24, Page 3-24Y, Unit-3.

Que 3.26. Describe the basic model of inventory control with its assumptions.

AKTU 2016-17, Marks 10

Answer

- A. Basic Model of Inventory Control : Refer Q. 3.19, Page 3-18Y, Unit-3.
 - B. Assumption for EOQ Model : Following are the assumptions for the EOQ model.
 - 1. The cost of the ordering remains constant.
 - 2. The demand rate for the year is known and evenly spread throughout the year.
 - 3. The lead time is not fluctuating (lead time is the latency time it takes a process to initiate and complete).
 - 4. No cash or settlement discounts are available, and the purchase price is constant for every item.
 - 5. The optimal plan is calculated for only one product.
 - 6. There is no delay in the replenishment of the stock, and the order is delivered in the quantity that was demanded, i.e., in whole batch.
- If basic assumptions of the model are met, the graph of inventory consumption and restocking looks as follows :

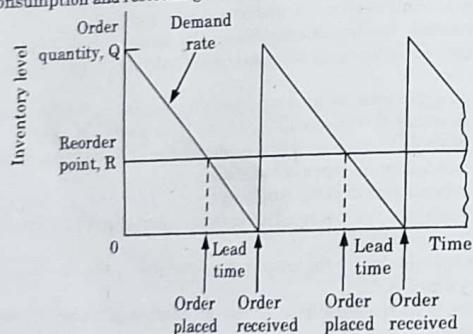
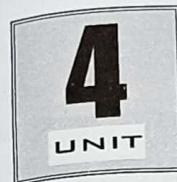


Fig. 3.26.1. Basic inventory model.



Quality Control

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