(*i*) Materials which cannot be allocated but can be apportioned to or absorbed by cost centres or cost units e.g., cotton waste for cleaning the machinery, lubricants for oiling the machinery, diesel oil for generating power etc.

(*ii*) Material which are used in such a small quantity that it is not possible to ascertain their per unit cost exactly e.g., cost of thread and nails used in shoe-making.

4.2. MEANING OF MATERIAL CONTROL

In an average manufacturing concern, the cost of material constitutes a large proportion of the total product cost and as such there should be a proper system of material control to ensure economy in the cost of production. No system of costing can be said to be complete without proper system of material control. Material control may be defined as safeguarding of company's property in the form of inventory and maintaining it at the optimum level, considering the operating requirements and financial resources of the business. Material control is a system which ensures the provision of the required quantity of materials of the required quality at the required time with the minimum amount of capital investment. The functions of a good system of material control include scheduling the requirements, purchasing, receiving, inspecting, maintaining stock records and stock control. Material control, in practice, is exercised through periodical reports and records relating to purchasing, receiving, inspecting and issuing of direct as well as indirect materials.

4.3. OBJECTS OF MATERIAL CONTROL

The main objects of material control may be given as follows :

(*i*) To Ensure Un-interrupted Production : The first object of material control is to ensure smooth production by making available all types of required materials in required quantity at the right time. Un-interrupted supply of materials is essential for smooth flow of production which is important for the success of any business.

(*ii*) To Provide for Required Quality of Materials : The second object of material control is to ensure the availability of all types of materials of required quality. If the quality of the materials is not proper, it will affect the quality of the product, which in its turn is bound to affect the reputation and sale of the business concern.

(*iii*) To Minimise Wastages and Losses of Materials : Material control system also aims at controlling or minimising all types of wastages and losses of materials which may arise due to carelessness in the storing, issuing and handling of materials.

(*iv*) To Control Investment in Stock of Materials : Material control system also aims at minimising the capital investment in the stock of materials. Materials are purchased and stored before the actual production commences. A large amount of capital may be locked up in materials which may not be required at that time. Similarly, sometimes there my be under-investment in materials leading to interruptions in production due to non-availability of the required quantity of materials. Efficient material control system helps in ensuring optimum investment of capital in the purchase of materials.

ADVANTAGES OF MATERIAL CONTROL SYSTEM

The main advantages of a good system of material control may be summarised as follows :

1. It helps in preventing production delays due to lack of materials by ensuring regular supply of proper quantities of materials at the right time.
2. It helps in ensuring production of proper quality by ensuring the purchase of materials of proper quality.
3. It helps in eliminating wastage in the use of materials..
4. It reduces the risk of loss from fraud and theft.
5. It reduces the cost involved in the storing and issuing of materials.
6. It minimises the capital investment in the stock of materials.
7. It furnishes quickly and accurately the value of materials used in various departments.
8. It helps in keeping perpetual inventory and other records to facilitate the preparation of accurate material reports.

FUNDAMENTAL PRINCIPLES

OR

BASIC REQUIREMENTS OF MATERIAL CONTROL

As we already know that the functions of a good system of material control include scheduling of the requirements, purchasing, receiving, inspecting, maintaining stock records etc. To ensure effective and efficient working of the material control system, the following principles should be observed :

(*i*) There should be proper co-ordination among various departments particularly, production department, purchases department, inspection department, stores department, cost department, etc.

(*ii*) There should be centralised purchasing set up under the authority of an experienced and competent Purchase Manger.

(*iii*) Standard printed forms should be in use for making requisitions, placing orders, receiving materials, inspection of materials, issue of materials for consumption etc.

(*iv*) There should be a proper system for classification, codification and standardisation of materials.

(*v*) There should be an efficient arrangement for storing of materials in order to avoid the possibility of deterioration of quality, theft, wastage etc.

(*vi*) There should be an effective system of internal check for every aspect so that there is proper control over transactions at every stage. Each transaction in respect of materials must be approved by proper authority.

(*vii*) Different stock levels (*e.g.* maximum level, re-order level, minimum level etc.) should be fixed for each item of material in the stores.

CLASSIFICATION OF MATERIALS :

'Classification' refers to the systematic division grouping or categorisation of materials or store items with reference to some common characteristic. Classification of materials can be made on different bases namely nature, manufacturing process, value, purpose etc. The important basis of classification of materials may be given as follows :

ON THE BASIS OF NATURE :

On the basis of nature, materials may be divided into :

(*i*) Direct Materials : Direct materials are those items of material which can be identified with a product or a group of products in a manufacturing concern and can be easily measured and charged directly to the product. Such materials form the part of the finished product *e.g.*, timber in furniture, cloth in garments, bricks, sand and cement in building, yarn in cloth etc.

(*ii*) Indirect Materials : These are the materials which cannot be traced to a specific product and cannot be charged directly to the various products. These materials do no form part of the product. Examples of indirect materials are – repair and maintenance stores, lubricating oils, cleaning materials, cotton rags, etc.

ON THE BASIS OF MANUFACTURING PROCESS :

On the basis of the manufacturing process, stores are divided into –

(*i*) Pre-process Stock : These are the items of stores which are yet to be taken into the manufacturing process and are obtained prior to the commencement of the manufacturing process or production. These include raw materials, bought-out parts and assemblies, and stock in pipeline of materials in transit.

(*ii*) Intermediate Stock : Intermediate stock comprises the parts or assemblies which are manufactured within the factory for use in the final product.

(*iii*) Finished Goods or Finished Products : As the name indicates, finished goods are the items which have been duly manufactured in the factory and are ready for shipment or sale to the customers.

ON THE BASIS OF VALUE :

On the basis of the value, the stores items may be divided into –

(*i*) Category 'A' : Category 'A' consists of materials which constitute 5% to 10% of the total items in the stores and represent 70% to 85% of the total stores value.

(*ii*) Category 'B' : This category consist of materials which constitute 10% to 20% of the total items in the stores and also represent 10% to 20% of the total stores value.

(*iii*) Category 'C' : This category consist of cheap materials which constitute 70% to 85% of the total items in the stores and represent 5% to 10% of the total stores value.

Category 'A' items constitute costly items calling for greater degree of control for preserving them. A reasonable degree of care may be taken to control category 'B' items while a routine type of care may be applied to control 'C' category or residuary items.

ON THE BASIS OF MOVEMENT OF STORES :

On the basis of the movement or rate of consumption, stores items may be divided into :

I. Minimum Level : A minimum stock level is that level of an item of material, below which the actual stock should not normally be allowed to fall. In other words, it refers to the minimum quantity of a particular item of material which must be kept in the stores at all times. The fixation of this level acts as a safety measure and hence, it is also known as 'Safety Stock' or 'Buffer Stock'. In case the actual stock falls below this level, there is a danger of stoppage in production and the management has to give top priority to the acquisition of fresh supplies. The main objective of fixing the minimum level of materials is to ensure that the required quantity of each item is available in stores at all times. The main factors which are taken into account in fixing the minimum level are :

(*a*) The average rate of consumption of materials.

(*b*) The time required to obtain fresh supplies under top priority conditions.

(*c*) Re-order level

(*d*) The production requirements as to materials.

(*e*) The minimum quantity of materials which could be procured advantageously.

The minimum stock level can be determined by applying the following formula :

Minimum Stock Level = Re-order Level – (Normal consumption × Normal delivery time).

Following example can be taken to understand the calculation of minimum stock level :

Normal consumption = 300 units per week

Normal delivery time = 7 weeks

Re-order level = 2,400 units.

The minimum stock level will be equal to

Re-order level – (Normal consumption × Normal delivery time).

$= 2,400 - (300 \times 7) = 2,400 - 2,100$

$= 300$ units

It may be pointed out here that 'Normal delivery time' is taken as the average of maximum and minimum time taken for delivery.

II. Re-order Level or Ordering Level : The re-order or re-ordering level is the stock level fixed between maximum and minimum stock levels, at which an order for the replenishment of stock should be placed. In other words, it is that level of inventory at which purchase order should be placed. The re-order level is generally higher than the minimum level to cover any emergency which may arise as a result of abnormal usage of materials or unexpected delay in obtaining fresh supplies. The factors which are taken into account in fixing the re-order level are :

(*a*) The consumption rate of material.

(*b*) The margin of safety.

(c) The time that would elapse between the date of placing the order and the date of the arrival of supplies, or in other words, the normal delivery time or lead time.

(d) The minimum level decided to be maintained.

(e) Cost of storage and interest on capital employed in materials.

(f) Provision for emergencies such as delay in supply and abnormal wastage, etc.

The reordering stock level is calculated by applying following formula :

Re-order Level = Maximum consumption × Maximum delivery time

Another formula :

Re-order Level = Maximum stock + Average consumption during normal delivery time.

The application of formula depends upon the information supplied in a problem.

The re-order level is revised from time to time by taking into consideration factors which are likely to change supply and demand for goods.

Following example is given to understand the calculation of re-ordering level :

Maximum consumption = 15,000 units per week

Maximum delivery time = 10 weeks

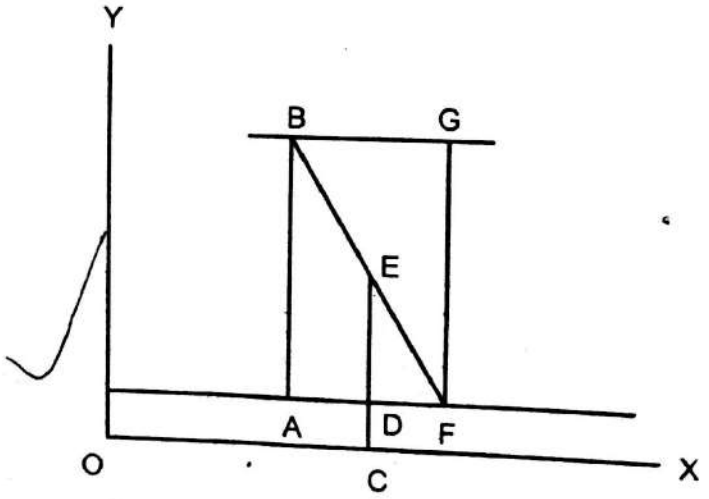
So, Re-order Level = Maximum consumption × Maximum delivery time

= 1,50,000 units.

The application of second formula has been illustrated further in solved problem for calculating maximum stock level.

Certain accountants do not make any distinction between 'ordering level' and 'minimum stock level' and regard ordering level as equivalent to minimum stock level, but others make a distinction between the two. The latter is lower, since in its fixation no allowance is made for the margin of safety.

The concepts of 'ordering level and 'minimum stock level' can be illustrated by means of the following diagram :



Where :

CD = Minimum Stock or Safety Stock.

E = Re-order Point.

DE = Lead time usage (consumption of materials during the time to obtain fresh supplies).

AB = Economic Order Quantity, which is ordered when stock falls to point E. When stock level falls to point F, next shipment arrives, raising stock to point to G.

III. Maximum Level : Maximum Level is the upper limit of stock above which the stock should not be allowed to exceed under normal circumstances without the prior sanction of the management. The main object for fixing up the maximum stock level is to avoid undue investment of capital leading to loss of interest, obsolescence of materials and additional overheads in the form of higher rents, etc. The maximum stock level is determined by taking into account the following factors :

(*a*) Normal consumption rate of material.

(*b*) Time required to obtain new supplies.

(*c*) Amount of working capital available.

(*d*) Availability of storage space.

(*e*) Economic order quantity.

(*f*) Cost of carrying inventory or cost of storage.

(*g*) Risk of deterioration in quality and obsolescence of materials.

(*h*) Seasonal considerations as to priee and availability of material.

(*i*) Incidence of insurance costs which may be very important in case of certain type of costly materials.

(*j*) Inherent risks attached with materials and any restrictions imposed by the government in this regard.

The *maximum stock level* can be determined by applying the following formula :

Maximum Stock level = Re-order Level + Re-order Quantity
– Minimum consumption × Minimum time required for delivery.

It can be represented yet by another formula :

Maximum Level = Re-order Level – Consumption during the time required to get supplies at minimum rate + Economic order size.

DANGER LEVEL

Some firms also use the danger level in respect of materials. Danger level is fixed at a point below the minimum level and represents the limit at which special steps must be taken to obtain emergent supplies of material *i.e.*, sending a man personally to bring the required materials. When the stock of a particular item of materials reaches danger level, no further issues are made by the storekeeper except on the special requisition approved by the works manager. The danger level can be determined by applying the following formula :

Danger Level = Normal Consumption per day/per week/per month etc.
× Time required to obtain emergent supplies.

Illustration 1.

In manufacturing concern, material 'X' is used as follows :

Maximum consumption : 9,000 units per week

Minimum consumption : 3,000 units per week

Normal consumption : 6,000 units per week

Re-order quantity : 36,000 units

Time required for delivery : 4 to 6 weeks

(Lead period)

Time required for emergent supplies : 1 week

Calculate : (*a*) Re-order level, (*b*) minimum level, (*c*) maximum level, (*d*) danger level and (*e*) Average stock level.

Solution :

(*a*) Re-order Level = Maximum consumption per week × Maximum time required to obtain supplies.

= 9,000 units × 6 weeks

= 54,000 units.

(*b*) Minimum Level = Re-order level – (Normal consumption per week × Average period required to obtain supplies).

= 54,000 units – (6,000 units × 5 weeks)

= 24,000 units.

Note : Average period required to obtain supplies has been ascertained as follows :

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

$$= \frac{\text{4 weeks + 6 weeks}}{2}$$

= 5 weeks.

(*c*) Maximum Level = Re-order level + Re-order quantity – (Minimum consumption per week × Minimum time required to obtain supplies.

= 54,000 units + 36,000 units – (3,000 units × 4 weeks)

= 78,000 units.

(*d*) Danger Level = Normal consumption per week × Time required to obtain emergent supplies.

= 6,000 units × 1 week

= 6,000 units.

(*e*) Average Stock Level = $\frac{1}{2}$ (Minimum Level + Maximum Level)

$= \frac{1}{2}$ (24,000 units + 78,000 units)

= 51,000 unit.

Alternatively, it can be calculated as follows :–

Average Stock Level = Minimum Stock level + $\frac{1}{2}$ (Re-order Quantity)

= 24,000 units + $\frac{1}{2}$ (36,000 units)

= 42,000 units

Illustration 2.

. Calculate maximum level, minimum level and reordering level from the following data :

Reorder quantity	1,500 units
Reorder period.	4 to 6 weeks
Maximum consumption	400 units per week
Normal consumption	300 units per week
Minimum consumption	250 units per week

(P.U. B.Com. Sept., 1999)

Solution :

(i) Re-order Level = Maximum consumption × Maximum re-order period

= 400 × 6 = 2400 units

(ii) Maximum Level = Re-order-level – Minimum consumption in Minimum Re-order period + Re-order Quantity

= 2400 – (250 × 4) + 1500

= 2900 units

(iii) Minimum level = Re-order level – Normal consumption in normal re-order period

= 2400 – (300 × 5) = 900 units.

Illustration 3.

In a manufacturing concern, two items of materials 'X' and 'Y' are used as follows:

Normal usage :	300 units per week each article.
Minimum usage :	150 units per week each article.
Maximum usage :	450 units per week each article.
Re-order Quantity :	X – 1,800 units
	Y – 2,500 units
Re-order Period :	X – 3 to 5 weeks
	Y – 2 to 4 weeks

Calculate (*a*) Re-order level, (*b*) Maximum level, (*c*) Minimum level, and (*d*) Average level.

(Pbi.Uni. B.Com. April., 2006)

Solution.

(a) Re-order Level :

= Maximum consumption per week × Maximum time required to obtain supplies.

Material 'X' = 450 units × 5 weeks = 2,250 units.

Material 'Y' = 450 units × 4 weeks = 1,800 units.

(b) Maximum Level :

= Reorder Level + Re-order Quantity – (Minimum consumption per week × Minimum time required to obtain supplies).

Material 'X' = 2,250 units + 1,800 units – (150 units × 3 weeks)

= 4,050 units – 450 units = 3,600 units.

Material 'Y' = 1,800 units + 2,500 units – (150 units × 2 weeks)

= 4,300 units – 300 units = 4,000 units.

(c) Minimum Level :

= Re-order Level – (Normal consumption per week × Average time required to obtain supplies).

Material 'X' = 2,250 units – (300 units × 4 weeks)

= 2,250 units – 1,200 units =1,050 units.

Material 'Y' = 1,800 units – (300 units × 3 weeks)

= 1,800 units – 900 units = 900 units.

(d) Average Stock Level :

$$= \frac{1}{2} \text{ (Minimum Level + Maximum Level)}$$

Material X $= \frac{1}{2}$ (1,050 units + 3,600 units)

$= \frac{1}{2}$ (4,650 units)

= 2,325 units.

Material Y $= \frac{1}{2}$ (900 units + 4,000 units)

$= \frac{1}{2}$ (4,900 units)

= 2,450 units.

2 Marks

ECONOMIC ORDER QUANTITY (OR ECONOMIC ORDER SIZE)

This concept relates to the quantity of materials to be purchased by the purchasing department. Economic order quantity is that size of the order which gives maximum economy in purchasing any item of material. In order to determine the economic or

optimum order quantity, an analysis of the various costs associated with the ordering quantity is made. These costs may be divided into two parts :

(*a*) Material acquisition costs, and

(*b*) Material carrying costs.

Material acquisition costs arise an account of having to process an order. A part of the wages and operating expenses for departments like production control, purchasing, receiving and stores is incurred for purchasing and possessing the materials. **Materials carrying costs** include interest charges on investment in materials, insurance costs, storage costs etc. These two types of costs behave quite differently.

The material acquistion costs are related to the number of orders placed during a given period. On the other hand, carrying costs, which are variable or semi-variable in nature, tend to change nearly in direct proportion to the level of stock carried in the manufacturing concern.

Purchasing or buying in large quantities implies low acquistion or purchasing costs (number of purchase orders placed with the suppliers being small) and high carrying costs on account of the amount of stock carried during this period being more. On the other hand, purchasing in small quantities implies high purchasing or acquisition costs and low carrying costs.

The most advantageous or economic quantity will be at a point where the acquisition costs and the costs of carrying stock are equal *i.e.*, where total costs to order and to carry material are minimum.

The other terms used for Economic Order Quantity are 'Economic Lot Quantity' and, 'Economic Buying Quantity.'

Calculation of Economic Order Quantity :

The economic order quantity is ascertained by the following formula :

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

Where,

'EOQ' stands for Economic Order Quantity.

'C' stands for annual consumption of material in terms of units.

'O' stands for cost of placing one order including the cost of receiving it.

'I' stands for interest payment per unit per annum (or, carrying cost per unit per annum).

Illustration 4.

From the following particulars, calculate the Economic Order Quantity :

Annual requirement 1,600 Units

Cost of material per unit	Rs. 40
Cost of placing and receiving one order	Rs. 50
Annual carrying cost of inventory	10% of inventory value

(P.U. B.Com. Sept., 1999)

Solution :

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

Where C is annual consumption O is ordering cost per order I is carrying cost per unit.

C = 1600 units

O = Rs. 50

I = 10% of 40 *i.e.* Rs. 4 P.U.

Hence $$EOQ = \sqrt{\frac{2 \times 1600 \times 50}{4}}$$

$$= \sqrt{40000} = 200 \text{ units}$$

Illustration 5.

From the following data calculate economic order quantity :

(*i*) Name of article : A

(*ii*) Rate of material : Rs. 25 per unit.

(*iii*) Consumption of material per annum : 8,000 units

(*iv*) Cost of placing one order : Rs. 100

(*v*) Rate of interest : 10 % per annum.

Solution. To procure 800 as EOQ see the table given on next page.

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

$$= \sqrt{\frac{2 \times 8000 \times 100}{25 \times \frac{10}{100}}} = \sqrt{\frac{16,00,000}{2.5}}$$

$$= \sqrt{6,40,000}$$

= 800 units.

If the quantity ordered at one point is 800 units :

Total number of orders to be placed during the year will be $\frac{8,000}{800} = 10$.

$\frac{D}{EOQ}$

Cost of placing 10 orders (10 × Rs. 100)	= Rs. 1,000
Interest payment for carrying average inventory of 400 units (50 % of 800 units) will be (400 units × Rs. 2.50)	= Rs. 1,000
Total Costs	Rs. 2,000

(ii) In case the quantity to be ordered at one point is raised to 1,000 units

Total number of orders to be placed during the year will be

$$\frac{8,000}{1,000} = 8.$$

Cost of placing 8 orders will be (8 × Rs. 100)	= Rs. 800
Interest payment for carrying average inventory of 500 units (50 % of 1,000 units) will be (500 units × Rs. 2.50)	= Rs. 1,250
Total Costs	Rs. 2,050

(iii) In case the quantity to be ordered at one point is reduced to 500 units

Total number of orders to be placed will be $\frac{8,000}{500} = 16.$

Cost of placing 16 orders will be (16 × Rs. 100)	= Rs. 1,600
Interest payment for carrying average inventory of 250 units (50 % of 500 units) will be (250 units × Rs. 2.50)	= Rs. 625
Total Costs	Rs. 2,225

The total cost of placing orders and carrying average inventory (50 % of the ordering quantity) is the minimum when quantity ordered is 800 units. Hence, 800 units is the economic or optimum order quantity.

Note : It is assumed that the average stock carried in the store is 50 % of the order size.

Economic order quantity may also be ascertained by tabular method in the following manner :

TABLE SHOWING THE CALCULATION OF ECONOMIC ORDER QUANTITY

(a) Number of orders	(b) Quantity per order (units)	(c) Average Stock held (units)	(d) Cost of carrying average stock	(e) Ordering Cost (a) × Rs. 100	(f) Total Cost (d) + (e)
			Rs.	Rs.	Rs.
2	4,000	2,000	5,000	200	5,200
5	1,600	800	2,000	500	2,500
8	1,000	500	1,250	800	2,050
10	800	400	1,000	1,000	2,000
16	500	250	625	1,600	2,225
20	400	200	500	2,000	2,500
25	320	160	400	2,500	2,900

The total cost of placing orders and carrying average inventory is the minimum when quantity ordered is 800 units. Hence, 800 units is the economic order quantity.

Illustration 6.

From the following data calculate Economic Order Quantity :

(*i*)	Name of Article	:	X
(*ii*)	Rate of material	:	Rs. 25 per unit
(*iii*)	Consumption of material p.a.	:	8000 units
(*iv*)	Cost of placing an order	:	Rs. 100
(*v*)	Rate of Interest	:	10% per annum.

(Pbi. University Oct. 2003)

Solution : $EOQ = \sqrt{\frac{2\,CO}{I}}$

where C is annual consumption

O is ordering cost per order

I is carrying cost per unit

Here carrying cost is Interest on cost per unit which is

$$= 25 \times \frac{10}{100} = \text{Rs. } 2 \cdot 5$$

Hence $$EOQ = \sqrt{\frac{2 \times 8000 \times 100}{2 \cdot 5}}$$

$$= \sqrt{640000} = 800 \text{ units.}$$

Illustration 7 :

Calculate EOQ from the following information and state the number of orders to be placed in a year :

Consumption of materials per annum	10,000 kg.
Ordering cost per order	Rs. 50.
Cost per kilogram of raw material	Rs. 2
Storage cost	8% on average inventory

(P.U. B.Com. Sept., 2001)

Solution :

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

C = 10,000 kg.

O = Rs. 50

$$I = \frac{8}{100} \times \text{Rs. } 2 = 0 \cdot 16$$

Hence $$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{0 \cdot 16}} = 2500 \text{ units}$$

No. of orders in a year = $\frac{10,000}{2,500} = 4$.

ISSUING OF MATERIALS :

Whenever certain materials are required in a production department, it has to prepare a Materials Requisition. Materials Requisition or 'Requisition Slip' or 'Material Requisition Note' can be defined as "*a document which authorises and records the issue of material for use*". In other words, Material Requisition is a document which is used for drawing materials form the stores and signifies the quantity and quality of materials required and the job No. or work order for which it is required. Material Requisition is to be signed by the foreman of the department or the works manager to accord it proper authenticity with regard to requirement of materials for a particular job or work order. In other words, it is an authorisation to the store-keeper to issue the quantity and quality of materials specified in the Materials Requisition or Requisition Slip.

After receiving the Materials Requisition, the store-keeper issues the materials to the job and enters the same in the appropriate Bin Card. The signature of the person receiving the materials against the Materials Requisition from the stores must also be obtained by

(*ii*) It obviates the necessity of physical stock-taking at the end of the financial year.

(*iii*) It assists in the detection and immediate rectification of clerical errors in the store records.

(*iv*) In case of serious discrepancies, it gives rise to thorough investigation into their causes and prevents the recurrence of similar irregularities.

(*v*) It serves as a moral check upon those who are responsible for the handling of materials.

(*vi*) Any divergence from the pre-determined maximum and minimum stock levels is immediately brought to light.

(*vii*) It ensures more reliability and accuracy in the process of stock verification as it is carried out by expert personnel.

But this system is costly and can be followed only by large manufacturing concerns.

A.B.C Analysis of Material Control (or Proportional Parts Value Analysis) : A.B.C Analysis is a technique followed for the purpose of exercising control over materials according to their importance or value. Under this system, all the items of material are classified into three categories A, B and C according to their value.

Category 'A' consist of materials which constitute 5% to 10% of the total items in the store and represent 70% to 85% of the total store value ; Category 'B', the items constituting 10% to 20% of the total items in the store and 10% to 20% of the store value and category 'C', the items constituting 70% to 85% of the total items and representing 5% to 10% of the store value. Thus, category 'A' represents items with small quantity but high value, category 'B' represents items with medium quantity and value while category 'C' represents items with high quantity but small value.

The percentages given above are by way of guidelines only and are not fixed. These can be modified as per the choice and requirements of the management.

Under A.B.C. Analysis of materials, items of material falling under category 'A' must be closely controlled at all stages of handling viz., purchasing, receiving, inspecting, storing and issuing. In respect of items falling under category 'C', elaborate control procedures are not necessary. The routine of indenting, purchasing, storing and issuing materials can be simplified for these items. The items under category 'B' receive as much attention as items under category 'A' but the frequency of purchase and issue are so planned as to keep them at the minimum.

A.B.C. Analysis of Materials is also known as 'Always Better Control Method' since it aims at obtaining maximum control over materials and minimum cost of control through equitable distribution of time, attention and cost involved in material control with reference to value.

Advantages of A.B.C. Analysis : The main advantages of A.B.C Analysis of materials can be given as follows :

(*i*) It ensures closer control over costly items of material in which considerable amount of capital is locked.

(*ii*) It leads to reduction in carrying costs.

(*iii*) It enables to keep enough safety stock for items falling under category 'C'.

(*iv*) It enables to maintain high stock turnover rate

V.E.D. Analysis : This concept of V.E.D. Analysis is used in connection with the control of spare parts in a manufacturing concern. Under V.E.D. Analysis :

'V' stands for 'Vital',

'E' stands for 'Essential', and

'D' stands for 'Desirable'.

Under this system, spare parts required and used in a manufacturing concern, with reference to their importance, are divided into three categories :

(*i*) Vital Spare Parts *i.e.*, the spares, the stock-out of which even for a very short time will interrupt production for quite some time.

(*ii*) Essential Spare Parts *i.e.*, the spares the absence of which cannot be tolerated for more than a few hours or a day. These spare parts are essential for production otherwise the cost of the production lost is high.

(*iii*) Desirable Spare Parts *i.e.*, the spares which are needed but their non-availability for even a week or so will not lead to interruption in production.

Some spare parts, though carrying very small monetary value, may be vital for ensuring un-interrupted production and require constant attention. Such spare parts may not be given proper attention under A.B.C. Analysis since their value is very small. In such cases, V.E.D. Analysis should be made to ensure the availability of the various types of spare parts at the proper time.

TURNOVER OF MATERIALS

Turnover of materials refers to movement of material into and out of an organisation. It is in the best interest of the organisation to compare the turnover of different types and grades of material as a measure of detecting stock which does not move regularly thereby minimising capital investment in undesirable stock.

Materials turnover can be easily calculated by comparing balance of stores with the total issues or withdrawals during a particular period of time. Materials turnover ratio can be calculated in this regard as follows :

$$\text{Material Turnover Ratio} = \frac{\text{Value of materials consumed during the period}}{\text{Value of average stock (or, inventory held during the period)}}$$

Average stock can be calculated by adding opening and closing stocks and then dividing by two or it may be put like this : –

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

A high material turnover ratio indicates that the material item is fast moving and exhausts easily and investment in that item can be kept minimum. On the other hand, low material turnover ratio in relation to a particular item indicates its slow movement and alarms the organisation to avoid over-stocking of that item in the stores and immediate disposal of such item is in the best interests of the concern.

(*ii*) **Spoilage.** Spoilage refers to the deterioration of goods beyond rectification and are sold out without any further processing. Spoilage is of two types. The first is *normal spoilage* which occurs due to inherent nature of the manufacturing operations. Such a spoilage is uncontrollable. Like normal wastage it is not recorded in the books of cost accounts but its cost is spread over the remaining units.

The second type is *Abnormal spoilage* which takes place due to certain avoidable causes as explained while discussing abnormal wastage. It is debited to Costing Profit and Loss Account.

A specimen of spoilage report is given below.

SPOILAGE REPORT

Department ..... Report No .....

Cost centre ..... Date .....

Job or Process No.	Actual Spoilage		Standard Spoilage		Cost of spoilage less salvage value	Cost of Abnormal spoilage	Reasons and Actions suggested
	Qty.	% age to good units	Qty.	% age to good units	Rs.	Rs.	
Total							

Action taken by .....

Entered by ..... Signature

Inspector

(*iii*) **Scrap.** Scrap may be defined as "*the incidental residue from certain types of manufacture usually of small amount and low value, recoverable without further processing.*" For example, outlined metal from turnings, borings, saw dust, short lengths from wood work operations and iron dust from machines and foundry works, etc.

The difference between scrap and waste is that the former is always available after the completion of a particular production operation while the latter may or not be available in the residue form.

For controlling or minimising scrap, proper standards for scrap should be fixed in advance of actual operations and records in the form of *Scrap Reports* should be prepared and preserved for future references.

A specimen of Scrap Report is given below :

SCRAP REPORT

No.....

Department .....

Date.....

Cost centre.....

Job or Process No.	Scrap Tag No.	Actual Scrap (Qty.)	Actual Scrap % age	Normal Scrap (Qty.)	Normal Scrap % age	Abnormal Scrap		Action Suggested
						Qty.	Amount Rs.	

Action taken by .....

Signature

Entered by .....

Inspector

Scrap can be of three types viz.,

(*a*) *Pre-determined* or *Anticipated Scrap* is fixed in advance at the time of anticipation of costs.

(*b*) *Administrative Scrap*. occurs due to obsolete design of a product.

(*c*) *Defective Scrap* takes place due to basic defects in raw materials, production processes and other discrepancies leading to unsaleable products.

Accounting Treatment of Scrap. Under the first method, the realisable value of scrap is credited to Costing Profit and Loss Account and termed as abnormal gain. The unit cost of the product includes the value of scrap. This method of recording scrap value is quite simple and can be employed very successfully where the quantum of scrap is negligible. Effective control over scrap lacks under this method as detailed records of scrap values are not preserved and are non-identified to different jobs and process.

Under the second method, the net sale proceeds of scrap (obtained after deducting selling and distribution costs) is deducted from material cost or factory overheads, thereby reducing the overall cost of materials and overheads. This method is most suitable where several production orders are undertaken simultaneously and scrap values are not worked out for each order. Again this method is very suitable in exercising control over scrap arising in different processes and jobs.

Under the third method, which is an improvement over the first two methods, the scrap values realised are credited to each job, process or operation. This is a detailed method and is immensely helpful in identifying scrap values in case of every job, process or operation.

(*iv*) *Defectives*. 'Defectives' signify units or portion of production which can be rectified and turned out as good units by the application of additional materials, labour or other services. Defectives arise due to sub-standard materials, inadequate equipment, inefficient supervision, defective planning, and poor workmanship, etc. Usually, it is possible to avoid defects in the units produced but to some extent defectives may be

unavoidable. The basic difference between 'defectives' and 'spoilages' is that the former can be sold after rectifying them whereas the latter has got to be rejected or sold as sub-standard or rejected articles.

A "Defective Work Report" is prepared by the inspector specifying information pertaining to defective units, normal defectives, abnormal defectives, cost of rectification, disposal value of defectives and reasons and actions suggested. Following is the specimen of defective work report.

DEFECTIVE WORK REPORT

Department..... No. .....

Cost centre..... Date.....

Job or Process No.	Defective units	Normal Defectives	Abnormal Defectives	Cost of Rectification	Disposal value of Defectives	Reasons for Defectives and Action Suggested

Action taken by .....

Entered by ..... Signatures of the Inspector

.....

The normal defective are unavoidable and can be identified with specific jobs and their cost of rectification can be attributed to the job. But if the defective production can not be identified with the specific jobs, the cost of defectives should be added to the factory overheads. In case of defectives arising due to abnormal circumstances, the cost of rectification is treated as an abnormal loss and charged to the Costing Profit and Loss Account.

MISCELLANEOUS ILLUSTRATIONS (SOLVED)

Illustration 10.

Discuss the considerations that influence the setting of maximum, minimum, and re-order stock levels. Illustrate their computation by using the following information for a component 'ZYP'.

Normal usage .....50 per week.

Minimum usage .....20 per week.

Maximum usage .....75 per week.

Re-order quantity ..... 300 units

Re-order period .....4 to 6 weeks.

Solution :

(**Note :** For considerations influencing the stock levels, read the discussion in the previous pages)

Reorder level = Max. consumption × Max. Re-order period

= 75 × 6

= 450 units

Maximum level = Re-order level– Consumption during the minimum time required for getting supplies + Re - order quantity

= 450 – (20 × 4) + 300

= 450 – 80 + 300

= 670 units

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

= 450 – (50 × 5)

= 450 – 250

= 200 Units

Illustration 11.

Two Components, X and Y are used as follows :

Normal Usage	450 units per week each
Minimum Usage	225 units per week each
Maximum Usage	675 units per week each
Re-order quantity	X : 3600 units
	Y : 5400 units
Re-order period	X : 6 to 9 weeks
	Y : 3 to 6 weeks

Calculate for each component

(*i*) Re-order Level

(*ii*) Minimum Level

(*iii*) Maximum Level

(*iv*) Average Stock Level

(*P.U., B.Com. Sept. 2002*)

Solution :

(*a*) **Re-order Level** = Maximum consumption × Maximum Re-order period.

Component X = 675 × 9 = 6075 units

Component Y = 675 × 6 = 4050 units

(*b*) **Minimum Level** = Re-order Level – (Normal consumption × Average Re-order period)

Component X = 6075 – (450 × 7·5) = 2700 units

Component Y = 4050 – (450 × 4·50) = 2025 units

(*c*) **Maximum Level** = Re-order Level − Consumption during the time required to get supplies at minimum rate + Re-order quantity

Component X = 6075 − (225 × 6) + 3600 = 8325 units

Component Y = 4050 − (225 × 3) + 5400 = 9775 units

(*d*) **Average Stock Level** = Minimum Level + $\frac{1}{2}$ (Re-order quantity)

Component X = 2700 + $\frac{1}{2}$ × 3600 = 4500 units

Component Y = 2025 + $\frac{1}{2}$ × 5400 = 4725 units

Illustration 12.

The following information is available in respect of component D - 20 :

Maximum stock level : 8,400 units

Budgeted consumption : Maximum 1,500 units per month

Minimum 800 units per month

Estimated delivery period : Maximum 4 months

Minimum 2 months

You are required to calculate :

(*i*) re-order level ;

(*ii*) re -order quantity.

Solution.

(*i*) Re-order Level = Maximum Consumption × Maximum Re-order period.

= 1,500 months × 4 units = 6,000 units

(*ii*) Re-order quantity = (Maximum stock level-Reorder level)

+ Mininum Consumption × Minimum delivery period)

= (8,400 units − 6,000 units) + (800 units × 2 months)

= 4,000 units.

Illustration 13.

Following figures were taken from the records of M/s Dhigra and Co. of Ambala for the year ending 31st March. 1982. The valuation of inventory is Re. 1 per kg : −

	Material "X" (kg.)	Material "Y" (kg.)
	Rs.	Rs.
Opening stock	1,700	1,200
Purchases	51,000	32,000
Closing stock	1,200	1,000

Calculate the material turnover ratio and express in number of days the average inventory is held.

Solution.

Working notes :

1. Materials consumed

	Material 'X'	Material 'Y'
	(Kgs.)	(kgs.)
Opening stock	1,700	1,200
Add Purchases	51,000	32,000
	52,700	33,200
Less Closing stock	1,200	1,000
	51,500	32,200

2. *Average Inventory*

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

$$\text{Material 'X'} = \frac{1,700 + 1,200}{2} = \frac{2,900}{2}$$

$$= 1,450 \text{ kgs.}$$

$$\text{Material 'Y'} = \frac{1,200 + 1,000}{2} = \frac{2,200}{2}$$

$$= 1,100 \text{ kgs.}$$

Material Turnover Ratio

$$= \frac{\text{Material consumed during the peirod}}{\text{Average inventory}}$$

$$\text{Material 'X'} = \frac{51,500}{1,450} = 35.5 \text{ times (approx.)}$$

$$\text{Material 'Y'} = \frac{32,200}{1,100} = 29.3 \text{ times (approx.)}$$ or 29.27 times

Number of Days Average Inventory is held

$$= \frac{\text{No. of days in the period}}{\text{Material Turnover}}$$

$$\text{Materials 'X'} = \frac{365}{35.5} = 10.3 \text{ days(approx.)}$$

$$\text{Materials 'Y'} = \frac{365}{29.3} = 12.5 \text{ days (approx.)}$$

or 12.47

Illustration 14.

Do as directed :

Annual consumption : 40,00,000 Kgs.

Cost of placing one order : Rs. 100

Cost of carrying one Kg. of raw material

for one year : 50 Paise.

Calculate the Economic Order Quantity.

Solution.

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

$$= \sqrt{\frac{2 \times 40,00,000 \times 100}{0 \cdot 50}}$$

$$= 40,000 \text{ units.}$$

Illustration 15.

Good Luck Company estimates its carrying cost at 15 % and its ordering cost at Rs. 9 per order. The estimated annual requirement is 38,000 units at a price of Rs. 4 per unit. What is the most economical number of units to order and how often will an order need to be placed.

Solution :

(*a*) Economic order Quantity $= \sqrt{\frac{2CO}{1}}$

$$= \sqrt{\frac{2 \times 38,000 \times 9}{4 \times \frac{15}{100}}}$$

$$= \sqrt{\frac{2 \times 38,000 \times 9}{0.6}} = 1067 \cdot 71$$

(*b*) Daily consumption = 38,000 units/365 days

= 104.11units

Period after which order to be placed $= \frac{\text{E.O.Q .}}{\text{Daily Consumption}}$

$$= \frac{1,068}{104.11}$$

= 10·258 or 10 days

Illustration 16.

Find out the Economic Order Quantity and order schedule for raw materials and packing materials with the following data given to you :

1. Cost of ordering :
   Raw materials ... Rs. 1,000 per order
   Packing materials Rs. 5,000 per order
2. Cost of holding inventory
   Raw materials ... 1 Paisa per unit p.m.
   Packing materials ... 5 Paise per unit p.m.
3. production rate 2,00,000 units per month.

Solution :

Calculation of E.O.Q $= \sqrt{\frac{2CO}{I}}$

(*a*) Raw materials $= \sqrt{\frac{2 \times 2,00,000 \times 1,000}{0.01}}$

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

= 2,00,000 units.

(*b*) Packing materials $= \sqrt{\frac{2 \times 2,00,000 \times 5,000}{0.05}}$

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

= 2,00,000 units

Illustration 17.

A publishing house purchase 2,000 units of a particular item per year at unit cost of Rs. 20, the ordering cost per order is Rs. 50 and the inventory carrying cost is 25 per cent. Find the optimal order quantity and the minimum total cost including purchase cost.

If a 3 percent discount is offered by the supplier for purchase in lots of 1,000 or more should the publishing house accept the order ?

Solution : EOQ without discount

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

$= \sqrt{\frac{2 \times 2,000 \times 50}{20 \times \frac{25}{100}}}$

$= \sqrt{\frac{2 \times 2,000 \times 50 \times 100}{20 \times 25\% = 5}}$

= 200 units.

Number of orders to be placed $= \left| \frac{\text{Annual purchases}}{\text{EOQ}} \right| = \frac{D}{EOQ}$

$= \frac{2,000}{200} = 10$ orders.

Total cost without discount

Purchase price – 2,000 units @ Rs. 20	40,000
Ordering cost – 10 orders @ Rs. 50	500
Carrying cost of average inventory :	
Average inventory $\frac{200}{2} = 100$ units	
Carrying cost per unit $\frac{25}{100} \times 20 = $ Rs. 5	
For 100 units @ Rs. 5 per unit	500
Total cost	Rs. 41,000

Total Cost with discount

Purchase Price = 2,000 units @ Rs. 19.40 (20 – 3% of 20) discount	38,800
Ordering cost – No. of order is 2 $\left(i.e. \frac{2,000}{1,000}\right)$ @ Rs. 50	100
Carrying cost of average inventory :	
Average inventory $\frac{1,000}{2} = 500$ units	
Carrying cost $\frac{25}{100} \times 19 \cdot 40 = 4 \cdot 85$	
For 500 units @ Rs. 4·85	2,425
Total Cost	41,325

Hence offer of discount is not acceptable since it will increase cost by Rs. 325.

Illustration 18.

A production company furnish the following information regarding the requirements of material X, Y and Z in their production.

Raw materials	*Usage per unit of production*	*Reorder quantity*	*Price per kg.*	*Delivery period*	*Order level*	*Minimum level*
	(Kgs.)	*(Kgs.)*	*(Rs.)*	*(Weeks)*	*(Kg.)*	*(Kgs.)*
X	20	20,000	1.00	1 to 3	16,000	
Y	8	10,000	3.00	3 to 5	9,500	
Z	12	20,000	1.50	2 to 4		4,000

Weekly production varies from 350 to 450 units averaging to 400 units. What would you expect the quantities of the following to be :

(*a*) Minimum stock level of X

(*b*) Maximum stock level of Y

(*c*) Reorder stock level of Z and

(*d*) Average stock level of X

Solution :

Minimum level of X = Reorder level – (Average level × Average delivery period)

= 16,000 – 400 × 20 × 2

= 16,000 – 16,000 = 0

Maximum level of Y = (Reorder level + Reorder quantity) – (Min. usage × Min. reorder period)

= (9,500 + 10,000) – 350 × 8 × 3)

= 19,500 – 8,400 = 11,000 units

Average stock level of X = Minimum level + $\frac{1}{2}$ Reorder quantity

= 0 + $\frac{1}{2}$ × 20,000 = 10,000 units.

Illustration 19.

From the following inventory problem find out :

(*a*) how much should be ordered each time ;

(*b*) when should the order be placed ; and

(*c*) what should be the inventory level immediately before the material order is received ?

Annual consumption	–	12,000 units (360 days)
Cost per unit	–	Re. 1
Ordering cost	–	Rs. 12 per order
Inventory carrying charge	–	24%
Normal lead time	–	15 days
Safety stock	–	30 days consumption

Solution :

(*i*) EOQ = $\sqrt{\frac{2\,CO}{I}} = \sqrt{\frac{2 \times 12,000 \times 12}{1 \times \frac{24}{100}}}$

= $\sqrt{\frac{2 \times 12,000 \times 12 \times 100}{1 \times 24}} = \sqrt{12,00,000} = 1,095$ units

(*ii*) Time of placing the order

For 12,000 units the period is 12 months (360 days)

For 1,095 units – ? $\frac{1{,}095 \times 12}{12{,}000} = 1 \cdot 095$ months or 33 days

(*iii*) Inventory level before the order is received

= (Delivery period × Normal usage) + Safety stock

$= \left(15 \text{ days} \times \frac{12{,}000}{360}\right) + 1{,}000$ (See note)

$= 15 \times 33 \cdot 34 = 1{,}000$

$= 500 + 1{,}000 = 1{,}500$

Note : For 360 days safety stock is 12,000.

For 30 days – $\frac{12{,}000 \times 30}{360} = 1{,}000$ units.

Illustration 20.

M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during 1997 :

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

Compute from the above :

(1) Economic Order Quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting ?

(2) Maximum level of stock.

(3) Minimum level of stock.

(4) Reorder level.

Solution :

(1) Economic order quantity (EOQ)

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

where,

C = Annual consumption

= Normal usage per week × 52 weeks

= 100 Tubes × 52 weeks = 5,200 Tubes

O = Cost per order *i.e.* Rs. 100 per order

I = Storage cost per annum *i.e.*, 20% or 0·20

$$EOQ = \sqrt{\frac{2 \times 5,200 \times 100}{500 \times 0 \cdot 20}} = \sqrt{\frac{10,40,000}{100}}$$

$$= \sqrt{10,400} = 102 \text{ Tubes}$$

If the supplier is willing to supply quarterly 1,500 units at a discount of 5%

Statement showing total cost

(When order size is 1,500 units)

	Rs.
Cost of 5,200 Units	
5,200 units × Rs. 475	24,70,000
Ordering cost $\left(\frac{5,200 \text{ units}}{1,500 \text{ units}} \times \text{Rs. } 100\right)$	347
Carrying cost $\left(\frac{1}{2} \times 1,500 \text{ units} \times \text{Rs. } 475 \times \frac{20}{100}\right)$	71,250
Total Cost	25,41,597

Statement showing total cost

(When order size is 102 units)

	Rs.
Cost of 5,200 Units	
5,200 units × Rs. 500	26,00,000
Ordering cost $\left(\frac{5,200 \text{ units}}{102 \text{ units}} \times \text{Rs. } 100\right)$	5,098
Carrying cost $\left(\frac{1}{2} \times 102 \text{ units} \times \text{Rs. } 500 \times \frac{20}{100}\right)$	5,100
Total Cost	26,10,198

Analysis : From the above analysis we can observe that total cost of inventory is lowest when discount is availed. Hence purchase in bulk quantity is suggested.

(2) Maximum level of stock

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

= 1,600 units + 102 units – 50 units × 6 weeks = 1,402 units.

(3) Minimum level of stock

= Re-order level – Normal usage × Average reorder period

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

(4) Re-order level = Maximum consumption × Maximum re-order period

= 200 units × 8 weeks

= 1,600 units.

Illustration 21.

From the following information, calculate

(*i*) Reorder level

(*ii*) Maximum level

(*iii*) Minimum level

(*iv*) Danger level

Re-ordering quantity is to be calculated on the basis of following information :

Cost of placing a purchase order is Rs. 20

Number of units to be purchased during the year is 5,000

Purchase price per unit inclusive of transportation cost is Rs. 50.

Annual cost of storage per unit is Rs. 5

Details of lead time : Average 10 days, Maximum 15 days, Minimum 6 days. For emergency purchase 4 days.

Rate of consumption : Average : 15 units per day, Maximum : 20 units per day.

Solution :

Given is

O (Ordering Cost per order) = Rs. 20

C (Number of units to be purchased annually) = 5,000 units

I (Annual cost of storage per unit) = Rs. 5

(*i*) Re-order quantity $= \sqrt{\frac{2\,CO}{I}}$

$$= \sqrt{\frac{2 \times 5{,}000 \text{ units} \times \text{Rs. } 20}{\text{Rs. } 5}}$$

= 200 units

(*ii*) Average rate of consumption

$$= \left[\frac{\text{Minimum rate of consumption} + \text{Maximum rate of consumption}}{2}\right]$$

$$15 \text{ units per day} = \left[\frac{x + 20 \text{ units per day}}{2}\right]$$

or x = 10 units per day

Computation of Stock levels

(*i*) Re-ordering level = Max. usage per period × Max. re-order period
= 20 units per day × 15 days = 300 units

(*ii*) Maximum level = Re-order level + Re-order Quantity
– [Min. rate of consumption × Min. re-order period]
= 300 units + 200 units – [10 units per day × 6 days]
= 440 units.

(*iii*) Minimum level = Re-order level – [Average rate of consumption × Average re-order period]
= 300 units – (15 units per day × 10 days) = 150 units.

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

Illustration 22.

After inviting tenders, two quotations are received as follows :

(*a*) Rs. 4.80 per unit

(*b*) Rs. 4.40 per unit plus Rs. 12,000 fixed charges to be added irrespective of the units ordered.

Advise with your arguments with whom order should be placed and what quantity is to be ordered.

The following additional information may be interest :

Present stock	35,000 units
Average monthly requirements	10,000 units
Maximum level	80,000 units
Minimum level	30,000 units

Sales tax problem may be ignored.

Solution :

The order quantity is to be calculated so as to find out which quotation is advantageous. In the absence of data about ordering costs and carrying costs, order quantity maybe calculated by the following formula (which is used to determine maximum stock level) :

Maximum stock = Reorder level + order quantity – [Min. Consumption × Min. reorder period]

Changing the formula, we get the following

Order quantity = Max. Stock – Reorder level + [~~Min.~~ Cons. rate × ~~Min.~~ reorder period] ...(1)

But there is no information about minimum reorder period or delivery time. However, if it is assumed that reorder period is fixed, and the present stock given in the

question represents the reorder level, the same (average reorder period) may be computed by the following formula :

Reorder level = Min. Stock + [Average monthly Consumption × Average reorder period]

$35,000 = 30,000 + (10,000 \times \text{Average reorder period})$

$35,000 - 30,000 = 10,000 \times \text{Average reorder period}$

$\therefore$ Average reorder period $= \frac{5,000}{10,000}$

$= \frac{1}{2}$ month or 15 days

Now using (1) above,

Order quantity $= 80,000 - 35,000 + \left[10,000 \times \frac{1}{2}\right]$

$= 50,000$ units

The cost of purchasing 50,000 units from the two suppliers :

(*a*) 50,000 × Rs. 4.80 = Rs. 2,40,000

(*b*) 50,000 × Rs. 4.40 + Rs. 12,000 = Rs. 2,32,000.

Since total cost of (*b*) is lower, tender (*b*) should be accepted.

Illustration 23.

Rama Ltd. uses three types of materials X, Y and Z for the production. The relevant monthly data for the components are as given below :

	X	Y	Z
Normal usage (in units)	200	150	180
Maximum usage (in units)	300	250	270
Minimum usage (in units)	100	100	90
Re-order quantity (in units)	750	900	720
Re-order period (in months)	2 to 3	3 to 4	2 to 3

Calculate for each component

(*a*) Re order level (*b*) Minimum level

(*c*) Maximum level and (*d*) Average stock level. *(P.U. 2001)*

Solution. (*a*) **Re Order Level** = Maximum Consumption in Maximum Re-order Period

For X = 300 × 3 = 900 units

Y = 250 × 4 = 1,000 units

Z = 270 × 3 = 810 units

(*b*) **Minimum Level** = Re Order Level – Normal consumption in Average re-order period

For X = 900 – 200 × 2·5 = 400 units

Y = 1000 – 150 × 3·5 = 475 units

Z = 810 – 180 × 2·5 = 360 units

(*c*) **Maximum Level = Re-order Level + Re-order Qty. –Minimum Consumption in Minimum re-order period.**

For X = 900 + 750 – 100 × 2 = 1,450 units

Y = 1,000 + 900 – 100 × 3 = 1,600 units

Z = 810 + 720 – 90 × 2 = 1,350 units

(*d*) **Average stock level** = $\frac{\text{Maximum Level + Minimum Level}}{2}$

For X = $\frac{1,450 + 400}{2}$ = 925 units

For Y = $\frac{1,600 + 475}{2}$ = 1,037·5 units.

For Z = $\frac{1,350 + 360}{2}$ = 855 units

SHORT ANSWER TYPE QUESTIONS

Answer the following questions is not more than 5 lines each.

(*a*) Define the term 'material control.'

(*b*) Distinguish between Direct Materials and Indirect Materials.

(*c*) What is Economic Order Quantity.

(*d*) What is Inventory Turnover Ratio ?

(*e*) Distinguish between Bin Card and Stores Ledger.

(*f*) What is Material Abstract ?

(*g*) What is meant by ABC analysis ?

(*h*) Distinguish between periodical inventory system and perpetual inventory control system.

(*i*) Explain the meaning of Danger Level.

(*j*) Give the meaning and specimen of Material Returned Note.