Unit-II

MATERIAL COST AND CONTROL

Part I: Theoretical questions

Q.1. What is meant by Inventory/Material Control? Explain different methods of inventory/ material control ***[G.U.1999]***

Meaning:

The term inventory is defined by the Institute of Charterd Accountants of India as "Tangible property held :

(i) for sale by ordinary course of business or

(ii) at a process of production for such sale; or

(iii) for consumption in the production of goods or services for sale, including, maintenance supplies and consumables other than machinery spares"

The American Production and Inventory Control Society states that *inventories are:*

"Stock-keeping items which are held in a stock point and which serve to decouple successive operations in the process of manufacturing a product and getting it to the consumer:"

Thus the term inventory or stock comprises raw materials, work-in progress, finished products, components going into production, consumable stores and tools and implements.

Inventory Control:

- Inventory control may be defined as *"Systematic control and regulation of purchase, storage and usage of materials in such a way so as to maintain an even flow of production and at the same time avoiding excessive investment in inventories. Efficient material control cuts out losses and wastes of materials that otherwise pass unnoticed."*

Again Official Terminology defines inventory control as *"The systematic regulation of stock levels "*

It is a system which aims at controlling investment in inventories.

So it involves:

(i) Inventory planning : and

(ii) Decision making with regard to

(a) quantity and time of purchase;

(b) fixation of stock level;

(c) maintenance of stores records; and

(d) continuous stock-taking.

Methods of Inventory Control :

The following are the common techniques/methods of inventory control:

(i) Mini-max plan;

(ii) Two-bin system:

(iii) Order cycling system;

(iv) The ABC plan and VED analysis;
(v) Fixation of various levels or level setting;
(vi) Economic order quantity;
(vii) Perpetual inventory system and continuous verification;
(viii) Inventory turnover ratio and their review and
(ix) Inventory cost reports.

1. Mini-Max Plan:

It is one of the oldest methods of inventory control. Under this plan, the analyst fixes a maximum and minimum quantity of each stock item keeping in view its uses, requirements and safety margins. The minimum level establishes the re-order points. It is simple and is based on minimum and maximum quantity limits.

2. Two-bin system:

Under this system, for each item of stock, two piles, bundles or bins are maintained. The first bin stocks that quantity of inventory which is sufficient to meet its usage during the period from the date of receipt of an order and the placing of the next. The second bin contains the safety stock and the normal amount of stock which is to be used from placing of an order to the date of delivery.

3. Order Cycling system :

In this system, quantities in hand of each item or class of stock are reviewed periodically and if the stock level of an item is found insufficient for the period existing to the date of next scheduled review, an order is placed to replenish this stock. The review period may be 30 days or 40 days, etc. as per the existing convention.

4. ABC Analysis:

In this technique, materials are classified according to their value and costly and more valuable materials are given greater attention and stricter control while less costly materials are given minimum attention. Under this system materials are classified into three groups viz. Group-A, Group-B and Group-C.

Group A: These are high-value items but consist of only a small percentage of the total items handled. Because of high cost, there should be tightest control upon such materials and they should be under the responsibility of the most experienced person.

Group B: These are medium-value items and consist of a medium percentage of total items handled. Such materials should be under normal control procedures.

Group C: They are low-value materials and constitute a very large percentage of the total items of materials handled. Such materials should be under the simple and economic method of control.

5. Fixation of Various Levels or Level Setting:

In order to have proper control on materials, certain stock levels are fixed up for every item of stores so that stocks and purchases can be effectively controlled. These are:

(a) Maximum Level- It represents the maximum quantity of an item of material above which stock cannot be held at any time. It helps in avoiding over-stocking.

(b) Minimum Level- It represents the minimum quantity of an item of material that can be held at any time. It helps in avoiding Stock-out.

(c) Danger Level- It is a level at which normal issues of the materials are stopped and issues of materials are made only under specific instructions. It helps for special arrangement of materials.

(d) Ordering Level/Re-order Level- It is the point at which indents are placed for replenishing stocks.

***6. Economic Order* Quantity:**

It is the quantity of materials that is to be ordered in one time. The quantity is fixed in such a manner as to minimise the cost of carrying and ordering the stock. The object is to have the lowest total cost which consists of carrying cost and stock out cost.

7. Perpetual Inventory System and Continuous Verification:

ICWA, U.K. has defined it as *"a system of records maintained by the controlling department which reflects the physical movement of stocks and their current balance. A perpetual inventory is usually checked by a programme of continuous stock taking . The former means the system of records wheres the latter means the physical checking of those records."*

Bin Cards and Stores Ledger help the management in maintaining this system. They make a record of' the physical movements of the stocks on the receipts and issues of the materials and also show the balance of stores after every receipt and issue of materials.

Continuous verification verifies the balance of stocks as shown by the Bill Cards and Stores Ledger with the actual balance of stocks as ascertained through physical verification.

8. Inventory Turnover - Ratio and its Review:

Inventory Turnover Ratio is a technique of exercising material control. It is calculated as follows:

$$\frac{\text{Cost of Material consumed during the period}}{\text{Cost of Average Inventory held during the Period}}$$

Average stock is the average of opening and closing stock. Inventory or Stock Turnover Ratio can be calculated in days also:

$$\frac{\text{Days during the period}}{\text{Inventory Turnover Ratio}}$$

Turn over Ratios show the turnover of different kinds of materials. Comparison of these ratios shows the movement of different items of materials. A low ratio indicates slow moving stock. On the other hand, a high ratio indicates the fast moving stock. In case of low ratio, stock gets accumulated resulting in locking up of capital. On the contrary, a fast ratio indicates fast moving of stock resulting in least locking up of capital. In the former case, capital investment is high while in the later case, capital investment is low. If the Turnover Ratio is zero, it indicates that the item has not been used at all during the period and should be immediately disposed of otherwise, there will a loss. Thus the analysis of turnover ratios of different items will help the management to avoid unnecessary blockage of capital.

9. Inventory Cost Reports:

It is a report containing information relating to quantity of materials purchased and used and stocks in hand. It is sent to different levels of management who can use the report for the purpose of material control.

Material control is divided into three aspects viz:- Purchases Control, Stores Control and Consumption Control.

The Purchase Control is to ensure the efficiency of the purchasing department; The Stores Control, to ensure the efficiency of the stores department and the Consumption Control is to ensure the efficiency of the departmental foreman.

Q. 2 Write short note on ABC Plan and VED Analysis:

ABC Plan and VED Analysis:

Q.4. What are the objectives/importance/functions of material control? [G.U.1991,1993, 2002]

Following are the objectives of material control:

(i) ***To ensure the availability of adequate materials:***

Material control ensures the availability of minimum quantity of each item of materials in store for smooth functioning of production. Thus it helps the management in avoiding over-stocking of materials.

(ii) ***Optimum use of resources:***

Material control reduces capital investment in inventory to the minimum by avoiding overstocking. Thus resources saved can be otherwise fruitfully used.

(iii) ***Reasonable price of acquisition :***

Material control helps in purchasing of a right quantity of material at a right time at the right price from right sources. Thus materials are acquired at opportune time at reasonable prices.

(iv) ***Minimum wastage:***

It minimises wastage and prevents theft and pilferage of materials by using various techniques in purchasing, storing and issuing materials.

(v) ***Avoidance of spoilage and obsolescence:***

By using the techniques of stock levels and stock turnover, the risk of spoilage and obsolescence can be avoided.

(vi) ***Production planning:***

Bin cards and stores ledgers provide information about each type of material in stores at any point of time. Thus it helps the management in production planning.

(vii) ***Reduction in carrying cost:***

It reduces the carrying cost of stock because it maintains only the required amount of stocks of each item of store.

(viii) ***Reduction in buying cost:***

It reduces buying cost of materials by using the technique of economic order quantity,

Q.5 *Discuss about the measures that are to be undertaken for effective material control* [G.U.1993,2005]

or, Discuss the essentials of material control

or, Discuss the principles of material control

Following are the measures to be undertaken by an organisation for enforcing an effective material control :

(i) ***Departmental Co-ordination and co-operation.,***
There should be proper co-ordination and co-operation among the departments which are involved in respect of the receipt, inspection, storage, issue, use and accounting of materials.

(ii) ***Planning of Materials:***
There should be proper planning and scheduling of material requirements.

(iii) ***Classification and Codification of Materials:***
There should be proper classification and codification of materials.

(iv) ***Inspection of Materials:***
There should be proper inspection of materials when they are received.

(v) ***Proper Storage of Materials:***
There should be proper storage of materials in order to avoid loss of materials due to damage detorioration, evaporation, pilferage, theft, etc.

(vi) ***Use of Standard Forms:***
Standard forms should be used for requistion, orders, issue, and transfers of materials.

(vii) ***Proper system of Issue of Materials:***
There should be a good method which should be followed for issue of materials to different jobs, work orders, etc.

(viii) ***Perpetual Inventory system:***
Perpetual Inventory system should be operated for proper control of materials and ready information of stock position of different items.

(ix) ***Internal check:***
A system of internal check system should be introduced in respect of receipt, storage, issue and accounting of materials.

(x) ***Level setting:***
Different levels of stock such as maximum, minimum, reorder, etc. of each item of material should be set.

(xi) ***Ordering Quantity:***
Ordering quantity of each type of material should be fixed in order to minimise the material cost.

(xii) ***Fixation of Proper Issue Price:***
Issue price of the materials should be carefully choosen as it affects the cost of a job, process, etc.

(xiii) ***Record of Use of Materials:***
There should be a proper record of use of materials during production in order to minimise wastagc of materials.

(xiv) ***Reporting System:***
There should be proper reporting of purchases, return, issue and use of materials to all relevevant levels of management to ensure proper planning of production and control.

Q.6. What is meant by Perpetual Inventory? What are the advantages of keeping perpetual inventory system ? **[G. U.2004]**

• Perpetual Inventory system is a system of recording stock showing its change on every receipt and issue of materials, on the balance of stock.

ICWA, U.K. has defined it as *"A system of records maintained by the controlling department which reflects the physical movement of stocks and their balance. A perpetual inventory is usually checked by a programme of continuous stock taking. However, both are not synonymous. Perpetual inventory means the system of records whereas continuous stock taking means the physical checking of those records with actual stocks."*

Perpetual Inventory system is comprised of

(i) Bin Card,

(ii) Stores Ledger and

(iii) Continuous Stock Taking.

A Bin Card is a quantitive record of receipts, issues and closing balances of the items of stores. Each item is accompanied by a separate Bin Card and each transaction of receipt and issue of materials is a posted to the Bin Card.

A Stores Ledger records not only the physical movements of stocks but also their values.

Continuous stock taking is the regular physical verification of stocks. It ensures the accuracy of the perpetual inventory records i.e. Bin Cards and Stores Ledger. It is done through a programme so that all the items of stocks are verified in a year. Discrepancies found in physical verification of stock are adjusted in stock records by preparing a debit note or a credit note. Debit note is used in case of surplus of stocks and a credit not is used in case of deficiency of stocks.

Advantages:

Following are the advantages of perpetual inventory system:

(i) Avoidance of Physical Stock Taking:

It obviates the need for physical stock taking of all items of stocks at the end of the year and as a result, dislocation of production in stock taking is avoided.

(ii) Quick preparation of Profit and Loss Account:

The inventory of various items of stocks can be easily ascertained from the bin cards and stores ledger and a Profit and Loss Account can be prepared quickly.

(iii) Reliable check on stores:

A detailed and more reliable check on the stores can be exercised.

(iv) Reliability of stock figures:

Stock figures become reliable because of continuous stock taking.

(v) Moral Check on Staff.

This method exercises a moral check on the staff and makes them disciplined and careful about their duties.

(vi) Planning of production:

It provides constant information about the stores position and production can be planned accordingly and thus the stoppage of production can be avoided.

(vii) Perpetual Internal check on stores:

Bin Cards and the Stores Ledger act as a cross check on each other. As a result, a system of internal check is always in operation.

Q.11. Discuss and examine the meaning and significance of EOQ (Economic Order Quantity) **[G.U.1993]**

Economic Ordering Quantity or Re-ordering Quantity may be defined as the most favourable or the optimum quantity which can ideally be purchased each time most economically. It is the size of the quantity of a material that will result in the minimum total annual cost of the item of material. It contributes towards maintaining the material at the optimum level at a minimum cost.

The total cost of a material consists of:

(i) Total acquisition cost,

(ii) Total ordering cost, and

(iii) Total carrying cost.

Acquisition cost is the buying cost of materials. It Usually remains unaffected irrespective of the quantity of materials ordered at one time unless quantity discounts are available.

Ordering cost consists of : (a) Clerical cost of preparing an order (b) Postal charges and telephone bill for placing an order (c) Cost of stationery and other consumables required by purchasing department and (d) processing and receiving cost.

The above costs increase in direct proportion to the number of orders placed i.e. they vary with the number of orders.

Carrying cost consist of:

(i) Loss in the form of interest on investment on inventory (interest cost)

(ii) Cost of storage space;
(iii) Loss arising out of breakage, obsolescence, deterioration, Pilferage, etc;
(iv) Cost of insurance; and
(v) Cost of operating the stores-salaries etc.

Greater the quantity of' stock, larger is the carrying cost. Thus ordering cost and carrying cost are of opposing nature. If efforts are made to reduce one, the other one will go up. So a balance is struck between these two types of costs and the Economic Order Quantity is fixed at a point where the aggregate cost is minimum. Thus economic order quantity minimises the total cost associated with the inventory management.

The following is the mathematical formula for the determination of EOQ:

$$Q = \sqrt{\frac{2Co}{I}}$$

Where Q stands for the quantity to be ordered;
'C' stands for annual consumption of materials;
O stands for the cost of placing an order and
I stands for carrying Cost i.e. interest cost, storing cost, etc.

Significance:

(i) It gives the maximum economy in purchasing raw materials and reduces the total cost of material
(ii) It helps the management in avoiding the risk of over-stocking and under-stocking of material.
(iii) Loss through deterioration of quality, breakage, pilferage arising from overstocking and loss from the stoppage of work due to shortage of material can be avoided.
(iv) Capital blockage through over-stocking of materials can be avoided and thus loss of interest on capital can be avoided.

Q.12. Explain what is meant by Maximum Level, the Minimum Level and Re-ordering Level in the maintenance of stock in an organisation. What are the factors that govern the fixing of these levels? ***[G.U.-1992]***

Or, Explain what is meant by Maximum Level, Minimum Level and Reorder Level in the maintenance of stock in an organisation. ***[G.U.-1992 & 2005]***

Maximum Level :

Maximum Level represents the maximum quantity of an item of material which can be held at any time. Stock is not allowed to exceed this level. Its object is to avoid:

(a) Over-stocking of material and consequent loss of material due to wastage, deterioration in quality and obsolescence.
(b) Blockade of capital unnecessarily; and
(c) Unnecessary storage cost.

Following factors are considered in determining maximum stock level:

(a) Rate of consumption of materials;
(b) Lead period (i.e. time required to obtain new supplies);
(c) Availability of finance,
(d) Storage cost;
(e) Possibility of loss due to evaporation, deterioration in quality;
(f) Extent of price fluctuation;
(g) Amount of risk arising from change in specification and obsolescence
(h) Seasonal considerations (i.e. seasonal nature of supply of materials'.
(i) Economic order quantity, and

(j) Rules framed by Government for importing raw materials (i.e. government restrictions).

Formula for calculating Maximum Stock Level:

Maximum Stock level = (Re-ordering level + Re-ordering Quantity) – (Minimum Consumption × Minimum Reordering Period)

Minimum Stock:

It is the level below which stocks are not allowed to fall. So it is a quantity of material which the organisation must maintain all times. The quantity is fixed in such a way that production may not be held up due to shortage of material. So this level of stock is known as buffer stock or safety stock. As soon as the stock reaches this stage, it indicates the possibility of stoppage of production unless a quick arrangement is made for further purchase of materials.

The following factors are to be considered in fixing up this level of stock:

(i) Rate of consumption of the material during the lead time;

(ii) Lead time i.e. the time lag between the indenting and receiving of the material. It is the time which is required to replenish the supply;

(iii) Nature of material: A minimum level is not required where a special material is required in order to execute a specific order of a customer.

Formula:

Minimum Stock Level = Re-order level – (Normal Consumption × Normal Re-order Period)

Re-order Level/Ordering Level:

Re-order level is the point at which the purchase requisition for fresh supplies is initiated by the stores department. This level is fixed somewhere between the maximum and minimum levels. The difference of the quantity of the material between the Reordering Level and the Minimum Level will be such as will be sufficient to meet the production requirements till the fresh supply of materials is received. Thus it helps the management to avoid the risk of overstocking and under-stocking. However, it covers emergencies such as delay in supply or abnormal uses of the material.

The following factors are considered in order to fix the Reorder level:

(i) Minimum Stock Level
(ii) Average Consumption and
(iii) Average Lead Period or
(i) Maximum Consumption and
(ii) Maximum Lead Period.

Formula:

Reorder Level = Minimum Stock Level + (Average Consumption × Average Lead Period.)
Or = Maximum Consumption × Maximum Re-order Period/Lead period (Wheldon)

Average Stock Level :

Average stock level is the level which represents a level of stock falling between the maximum and the minimum levels of stock. It is calculated by applying the following formula:

Average Stock Level = Minimum stock Level + 1/2 of Re-order quantity
Or = 1/2 of (Minimum stock Level + Maximum Stock Level)

Danger Stock Level:

Danger Level is the level at which normal issue of materials is stopped except the issue of materials under a specific instruction and an emergency purchase has to be arranged so that production may not be stopped altogether. This level is particularly fixed to control materials during the period of emergency so that the urgent and priority orders are not held up.

Formula:

Danger Level = Average Consumption × Maximum Re-order Period for emergency purchases.

Q. 13. Define Re-order Level and explain its relation to Maximum and Mininum Stock Levels. What factors are to be considered in fixing reordering levels and quantities? **[G.U.1990, 1992 & 1997]**

Reorder Level:

Re-order level is the point at which purchase requisition for fresh supplies is initiated by the stores department. This level falls in between the maximum and the minimum levels. The difference of the quantity of the material between the reordering level and the minimum level will be such as will be sufficient to meet the production requirements till the fresh supply of materials is received.

According to wheldon, it is that level of inventory which should be equal to the maximum consumption during the lead time.

Formula for determining Re-order Level is:

Reorder Level = Minimum Stock Level + (Average Consumption per unit of time (perday) × Average Lead Period)

Or, = Maximum Consumption per unit of time (per day) × Maximum Lead Period (according to Wheldon)

Relationship of Re-order Level to Minimum and Maximum Stock Levels:

Minimum stock Level, Reorder Stock Level and Maximum Stock Level are inter-related.

(i) Minimum Stock Level:

It represents the minimum quantity of materials which must be maintained in hand at all time. It is a safety stock. It is determined by applying the following formula:

Minimum Stock Level = Re-order Level – (Normal Consumption per unit of time (per day) × Normal Lead Period)

(ii) Maximum Stock Level:

It represents the maximum quantity of an item of material which can be held in stock at any time and the stock should not be allowed to exceed that quantity. It is determined by the following formula:

Maximum Stock Level= Reorder Level+ Reorder quantity- (Minimum consumption per unit of time (perday) × Minimum lead period)

From the above definitions, it is obvious that both the Minimum and Maximum Stock Levels depend on Re-order Level and consumption during the lead period.

Minimum Stock Level is the difference between the quantity of material at Re-order Level minus consumption of materials during the lead period. Consumption during lead period changes due to change in the actual rate of consumption per unit of time or change in actual lead period. Thus change in actual consumption changes the Minimum stock level. Higher is the consumption, lower is the Minimum stock level or vice-versa.

Maximum Stock Level depends on the Reorder stock Level Re-order quantity and the Minimum Consumption during minimum Lead Period. If actual consumption is more than the assumed minimum, then the Maximum Stock Level will be less than the assumed one.

Thus both Minimum Stock and Maximum Stock Levels are dependent on Re-order level.

Factors for Fixing Re-order Level and Reorder Quantity:

Following factors are to be considered in fixing the Re-order Level:

(i) Maximum rate of consumption per unit of time (per day) and