4 CHAPTER

Material Cost

Meaning of Material	• The general meaning of material is all commodities/physical objects supplied to an organization to be used in producing or manufacturing of finished or intermediate goods. • It may be classified as direct material or indirect material.
Control of Material	• It starts from 3Es i.e. Economy, Efficiency and Effectiveness • In other words, it is economy in procurement, efficiency in handling and processing the material and effectiveness in producing desired output as per the standard.
Importance of Material Control	• **Quality of final product** as it depends on quality of inputs. • **Price of final product** as material constitute significant part of any product • **Production continuity** depends on availability of material • To minimize **cost of stock holding and stock out** • To minimize **wastage and other losses**
Objective of Material Control	• **Minimized Cost** – Material should be purchased only when it is needed and in most economic quantities. • **Availability** – Material of desired quality should be available when needed to minimize interruption in production process. • **Lowest Purchase Price** – Purchasing of material will be made at the most favorable prices under the best possible terms. • **Minimum Investment** – Investment in material is maintained at minimum level consistent with the operating requirement. • **Material Storage** – Materials are, at all the time, charged as the responsibility of some individual. • **Reduction in Wastage** – Wastage and losses while the materials are in store should be avoided as far as possible.
Elements of Material Control	• It involves efficient functioning of the following operations: (*a*) Purchasing of material (*b*) Receiving of material (*c*) Inspection of material (*d*) Storage of material (*e*) Issuing material (*f*) Maintenance of inventory records (*g*) Stock audit

Steps involved in Purchase Procedure	• Depending upon the size and nature of the operations the purchase procedure may differ from organization to organization. However, the main steps involved in purchasing procedure are as follows: **Step – 1→** Receipt of purchase requisition **Step – 2→** Issue of enquiry letters and tenders **Step – 3→** Finalization of quotations and placing of purchase orders on suppliers **Step – 4→** Preparation, placement and follow up of purchase order **Step – 5→** Receipt of material **Step – 6→** Inspection of materials **Step – 7→** Return of rejected materials **Step – 8→** Checking and passing of purchase invoices for payments **Step – 9→** Making payment to supplier
Bill of Material or Material Specification List	• It is a complete schedule of component parts and raw materials required for a particular job or work order prepared by the drawing office/production planning/engineering department along with the necessary blue prints of drawings. • On this basis only, purchase requisitions are prepared by the production or maintenance department and sent to the purchase department for procurement of materials. • Uses of Bill of material by different departments: (*a*) Marketing or Purchase department – Materials are purchased based on the specification mentioned in bill of material (*b*) Production department – Production is planned based on the this and accordingly material requisition list is prepared. (*c*) Stores department – It is used as reference document while issuing materials to different departments (*d*) Cost or Accounting department – It is used to estimate cost and profit and becomes basis for verification or comparison.
Purchase Requisition	• It is a document prepared by the department requiring material to the purchase department to purchase the materials specified therein. • It provides for the information in respect of specification of the materials and quantity to be purchased. • It also gives the information as to when these materials are required. • It is prepared by stores keeper for regular material and by the departmental head for special materials (not stocked as regular items)
Purchase Order	• It is a document prepared by the purchase department which authorizes the supplier to supply the specified quantity of materials of specified quality at specified price on terms specified therein and commitment from buyer to accept and pay for the goods ordered.

Goods Receipt Note	• All materials and stores received during the day are recorded by storekeeper on Goods Received Note, which are numbered serially and are prepared in triplicate. • One copy of Goods Received Note is kept in store and other three copies are sent to purchase department, accounting department and order intending department.
Goods Inspection Note	• Inspection department checks the quality of material received to ensure that the quality of material is as per specifications stated in the purchase order. • After checking the quality, it prepares the inspection report to show the results of the inspection. • If the goods are rejected, reasons for such rejection are specified in this report. • The report is either prepared separately or incorporated in the goods received note.
Material Requisition Note	• It is a formal request, for the supply of specified materials, stores etc. to the production departments for a specific job or work order. • It authorizes the issuing department to draw from stores the requisitioned materials. • Such notes contain information about the description, code and quantity of materials needed. It also has job/work order number for which the material has been requisitioned.
Material Transfer Note	• The transfer of material from one job to another should be strictly prohibited unless the procedure is adequately recorded on the Material Transfer Note. • This should indicate all necessary data for debiting and crediting the concerned jobs or processes affected. • No entry is required in Bin Card and Stores Ledger for material transfer.
Material Returned Note	• It is prepared in case when the material is returned after its entry in the receiving report and account books should be adjusted accordingly.
Duties of Store Keeper	• General control over store • Safe custody of materials • Maintaining records • Initiate purchase requisition • Maintaining adequate level of stock • Issues of materials • Stock verification and reconciliation
Store Records	• It can be prepared in three forms: (*a*) Bin cards (*b*) Stock control cards (*c*) Stores ledger

Bin Card	• Bin refers to an almirah, a rack, box, container or space where materials are kept. • A separate bin is maintained for each item of material and is assigned an identification number. • A card is tied to or placed outside each bin to record the quantity of materials received, issued, returned and in hand in the bin. • This card is called bin card or stock card. • This card also contains particulars regarding maximum level, minimum level, reorder level, Bin no, name and code of material, location and stores ledger folio.
Two Bin System	• Under this system each bin is divided into two parts. • One smaller part, should stock the quantity equal to the minimum stock or even the re-ordering level, and the other to keep the remaining quantity. • Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bins fresh order is placed. • Two bin system is supplemental to the record of respective quantities on the bin card and the stores ledger card.
Stock Control Cards	• It is a quantitative record of inventory maintained by stores department for every item of material. • It shows overall inventory position in store.
Stores Ledger	• It records both quantity and cost of materials received, issued and those in stock. • It is maintained by the cost/accounts department.
Inventory Control	• Its main objective is to maintain a trade-off between stock-out and over-stocking. • It can be done on following basis: (*a*) By setting quantitative levels (*b*) On the basis of relative classification (*c*) Using ratio analysis (*d*) Physical control
Inventory Control by Setting Quantitative Levels	• It is done by setting various levels of stock which are as follows: (*a*) Re-order quantity or EOQ (*b*) Re-order level (*c*) Maximum level (*d*) Minimum level (*e*) Average level (*f*) Danger level (*g*) Buffer stock

Economic Order Quantity (EOQ) or Re-Order Quantity	• If purchases of material are made in bulk then inventory carrying cost will be high. • If order size is small each time, then the ordering cost will be high. • The size of the order for which both ordering and carrying cost are minimum is known as economic order quantity • Economic Order Quantity = $\sqrt{\frac{2 \times A \times O}{C}}$ A = Annual demand/annual consumption in units O = Cost of placing and receiving an order C = Carrying cost per unit per annum
Ordering Cost	• These are the costs which are associated with the purchasing or ordering of materials. It includes costs like tender invitation, transportation of goods, inspection costs etc.
Carrying Cost	• These are the costs for holding or storing goods in the stores. It includes costs like storage, rent, insurance, spoilage, deterioration etc.
Assumptions of EOQ	• Annual consumption/usage/requirement of raw material is known in advance. • Ordering cost per order is known and constant. • Cost per unit of the material to be purchased is known and it is constant. • Carrying cost is computed on average inventory ordered. • The rate of carrying cost remains constant. • The consumption/usage of material is expected to be even throughout the year.
Material Handling Cost	• It refers to the expenses involved in receiving, storing, issuing and handling materials. • These costs are included as part of the cost of materials either: • at the rate of percentage of the cost of material issued or • on the basis of weight of materials issued
Re-order Level	• It is the level at which purchase manager will issue a fresh purchase order with supplier. • It is fixed somewhere between maximum and minimum level. Re-order Level = Maximum Consumption × Maximum Re-order Period Re-order Level = Minimum Level + (Avg. Consumption × Avg. time) Re-order Level = Safety Stock + (Average Consumption × Average time)

Minimum Level	• It is the lowest quantity of a particular material which must be held in the store at all times. • It is the level of goods at which the fresh goods ordered earlier should reach the factory premises. • It is fixed to avoid the cost of under-stocking and shortage. Minimum Level = Re-order level – (Avg. consumption × Avg. Re-order period)
Maximum Level	• It is the level beyond which goods are not allowed to exceed. • In other words, it is the largest quantity of a particular material which may be held in the store at any time. • It is fixed to avoid the costs of over-stocking. Maximum Level = Re-order Level + Re-order Quantity – [Min. Consumption × Min. time]
Average Level or Normal Stock Level	• It is the average quantity of goods held in the stores. $\text{Average Level} = \frac{(\text{Maximum Level} + \text{Minimum Level})}{2}$ $\text{Average Level} = \frac{\text{Minimum Level} + (\text{Re-order Quantity})}{2}$
Danger Level	• Danger level is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made on special requisition approved by the competent authority. • If it is fixed below the minimum level, then it is meant for taking urgent corrective action. • If it is fixed above the minimum level, then it is meant for taking urgent preventive action. Danger Level = Avg. Consumption × Re-order period for emergency purchases
Buffer Stock	• This stock is kept for contingency and to be used in case of sudden order.
Stock-Out	• It occurs when an inventory item could not be supplied due to insufficient stock in the store. • It leads to both financial and non-financial loss to company. • If high safety stock is maintained than it will lead to high carrying cost whereas in case of low or zero safety stock, it will lead to high stock out cost. • Thus, it is a trade-off between the carrying cost and stock-out cost.

<table>
<tr><td>Just in Time (JIT) Purchases</td><td>
• It means the purchase of gods or materials such that delivery immediately precedes their use.
• It ensures that socks are as loss as possible or at zero level.
• It is implemented by developing closer relationship with supplier.
• It is also known as demand pull or pull through system of production.
</td></tr>
<tr><td>ABC Analysis</td><td>
• It stands for Always Better control Analysis.
• It exercises discriminating control over various items of inventory by classifying them into different categories on the basis of value, quantity, frequency of replacement etc.
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<tr><td></td><td>
<table>
<tr><th>Category</th><th>% in total value</th><th>% in total quantity</th><th>Extent of control</th></tr>
<tr><td>A</td><td>70%</td><td>10%</td><td>Strict control through stock levels, EOQ etc.</td></tr>
<tr><td>B</td><td>20%</td><td>20%</td><td>Need based selective control</td></tr>
<tr><td>C</td><td>10%</td><td>70%</td><td>Little control – Focus on saving associated costs</td></tr>
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<tr><td>Advantages of ABC analysis</td><td>
• Smooth Flow – It ensures that, there should be no danger of interruption of production.
• Cost saving – The cost of placing orders, receiving goods and maintaining stocks is minimized.
• Control by exception – Management time is saved since attention need to be paid only to some of the items rather than all the items.
• Standardization of work – It makes much of the work systematized on a routine basis.
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<tr><td>FSN Analysis</td><td>
• It is a measure of material control to determine the slow-moving and non-moving items to avoid the stocking of such items and consequential loss on its disposal. FSN stands for,
F = Fast Moving items; S = Slow Moving items;
N = Non-Moving items
• Fast moving items are consumed very rapidly and their stocks are to be replenished very frequently.
• Slow moving items are not frequently required or may be required once in a quarter or so.
• Non-moving items (Dormant stock) refer to those which are not moving temporarily but movement is expected soon.
• If non-moving items are not required then these are to be declared as surplus and its disposal should be done by tender or auction. The loss on disposal is treated as factory overheads.
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VED analysis	• It is generally used for spare parts. • Spare parts are classified as Vital (V), Essential (E) and Desirable (D). • The vital spares are a must for running the concern smoothly and these must be stored adequately. • The E type of spares are also necessary but their stocks may be kept at low figures. • The stocking of D type of spares may be avoided at times. • A wrong classification of any spares will create difficulties for production department. The classification of spares should be left to the technical staff because they know the need, urgency and use of these spares.
HML Inventory	• It stands for High cost, Medium cost and Low cost inventory. • In this classification is done on the basis of cost of an individual item rather than overall basis. • High cost inventories are given more priority whereas medium and low cost items are given lesser priority.
Input-Output Ratio	• It is the ratio of quantity of input of material required to produce actual output. • It enables comparison of actual consumption and standard consumption.
Inventory Turnover Ratio	• It indicates the number of times inventory has moved out of stores. • This ratio indicates the efficiency or inefficiency with which inventories are maintained. • Its purpose is to ensure the blocking of only required minimum funds in inventory. • A high ratio indicates that goods are fast moving and vice-versa. $\text{Inventory Turnover Ratio} = \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$ = …… times $\text{Also, Inventory held period} = \frac{\text{Days/Months/Weeks in a year}(365/12/52)}{\text{Inventory Turnover Ratio}}$
Periodic Inventory System	• It is a system in which inventory is computed whenever required on the basis of actual physical count/measure/weight. • Inventory is directly calculated by applying the method of valuation of inventories like FIFO, LIFO. • In this system, generally losses can't be detected at earlier stage. • This system is simple and less expensive.

<table>
<tr><td>Perpetual Inventory System</td><td>• It is a system in which a continuous record of receipt and issue of materials is maintained by the stores department.
• In this system the stock control cards, bin cards and stores ledger show the receipts, issue and balance of each item at any point of time after each transaction.
• The stocks as per dual records namely bin card and stores ledger are reconciled on a continuous basis.
• This system facilitates planning and control.</td></tr>
<tr><td>Continuous Stock Taking</td><td>• It is a system of physical verification of stocks of each item on continuous basis.
• The actual quantity in the bin card is compared with bin balances.
• Such verification is conducted round the year such that all items of stocks are verified 3 to 4 times in a year.
• Any discrepancies are investigated and reported for corrective action.
• It serves as a moral check on stores staff and acts as deterrent to dishonesty.</td></tr>
<tr><td>Treatment of discrepancies between actual stock and recorded stock</td><td>
<table>
<tr><th>Causes of Discrepancies</th><th>Treatment</th></tr>
<tr><td>1. Due to clerical errors (e.g. omission to post a receipt/issue, wrong recording of a receipt/ issue)</td><td>These discrepancies are rectified by passing a suitable rectifying entry in the relevant records.</td></tr>
<tr><td>2. Due to normal factors causing losses (e.g. shrinkage, evaporation, natural deterioration etc.)</td><td>The amount of these discrepancies is treated as part of cost either by inflating the cost per unit or by treating as part of factory overheads.</td></tr>
<tr><td>3. Due to abnormal factors (e.g. pilferages, fire, theft etc.)</td><td>The amount of these discrepancies is charged to costing profit & loss account.</td></tr>
<tr><td>4. Due to normal factors causing surpluses (e.g. appreciation in the weight)</td><td>The amount of these discrepancies is treated as reduction in overheads.</td></tr>
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</td></tr>
<tr><td>Specific Price Method</td><td>• Under this method, purchases made for particular jobs are kept physically separate in the store rooms and store cards are made out for the individual purchases.
• When materials are issued for jobs, requisitions are priced at the exact cost as recorded on the appropriate store cards or at the price purchased.
• This system is time consuming, but it is used effectively, when non-standardized items of materials have to be purchased to meet a customer's specification.</td></tr>
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First-in-first out method (FIFO)	• It assumes that items first received are the first to be issued and that the requisitions are priced at the cost at which these items were placed in stock. • It is suitable when prices are falling. • Under this method, closing stock of material will be represented very closely at current market price.
Last-in-First-out Method (LIFO)	• It assumes that the last items purchased are the first to be used. • The balance on hand is priced at the cost of the earliest purchases. • It simply means that prices of the last purchase are used for accounting purposes first regardless of actual material flow. • It is suitable when prices are rising. • Under this method, cost of materials represent the current market price. • As per AS-2 and Ind AS-2, LIFO is not permitted.
FIFO under inflationary conditions	• When prices are rising, FIFO method may not reflect current prices in the material issues and, therefore, charge to production is unduly low. This method therefore tends to inflate profits
LIFO under inflationary conditions	• Under LIFO method, in times of inflation, charge to production is at the latest high price paid. This will result in lower profits and also lower tax liability.
LIFO and FIFO	• In LIFO method, production is charged with current market prices and hence pricing of the production is facilitated. • In case of FIFO method, production is charged with old price (i.e. low price under inflationary conditions). • Therefore, we prefer to use LIFO method so the product cost is near to market price.
Base Stock Method	• Under this method, minimum quantity of stock is always held at a fixed price as reserve in the stock, to meet the state of emergency if it arise. • The material other than base stock are valued using other methods like FIFO, LIFO etc.
Simple Average Method	• Under this method, material issues are valued at average price. • It is calculated by dividing the total of the prices of the materials in the stock, from which the material to be priced could be drawn, by the number of prices used in that total. • This method works well when there is little variation in the purchase prices. • The issue price is determined as follows: $\text{Issue Price} = \frac{\text{Unit prices of materials in stock}}{\text{Number of purchases}}$

Weighted Average Price Method	• Under this method, quantity of material purchased during a particular period is also taken into account. • Under this method weighted average price is calculated by dividing the total cost of material purchased during the accounting period, in which the material to be priced is used, by the total quantity of material purchased during that period. • A new average price is calculated at the end of each period, normally a month and is applied to all the issues in that month. Periodic weighted average price $= \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$
Replacement Price Method	• Replacement price is the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. • Material issues are valued at replacement cost of items. • Main objective is to make the product cost at current market price.
Realizable Price Method	• Realizable price is the price at which the material to be issued can be sold in the market. • This price may be more or less than the original cost price. • The stores ledger would show profit or loss in this method too.
Standard Price	• A standard price will be set for each material and is applied for all the issues in a period, normally a year.
	• It is fixed after taking into account factors such as current prices, anticipated market trends, discount available and transport charges etc. • Standard price should not be set on a long term basis. • It should be determined for short periods only and revised as and when necessary. • All receipts under this method are posted at actual prices and issues at standard prices for each material. • The difference between standard and actual is disposed of through price variance account.
Inflated Price	• It is a price which includes a charge designed to cover the cost of contingencies or related costs. • Normally, the invoice price includes the cost of freight, insurance and taxes less discounts. Other Expenses like cost of receiving, inspection, storing and carrying, handling of materials and losses arising out of evaporation and breaking-up bulk etc.; are treated as production overhead. • Under this method, all these expenses are added to determine the cost of issues. • Thus, inflated price will recover the full cost of materials.
Re-use Price Method	• When materials are rejected and returned to the stores then such materials are priced at a rate different from the price paid for them originally. • There is no final procedure for valuing use of material.

<table>
<tr><td>Treatment of material returned & shortage in stores ledger</td><td>
<table>
<tr><th>Item</th><th>How to record in Stores Ledger</th></tr>
<tr><td>1. Materials returned by stores to vendor</td><td>Such returns should be entered in the issue column and valued at the store ledger price which includes freight, receiving and handling charges etc.
Note: In practice such returns are valued at invoice price only and the difference between the store ledger price and invoice price is charged as overheads.</td></tr>
<tr><td>2. Materials returned to stores</td><td>There are two ways of treating such returns:
(a) Such returns are entered in the receipt column at the price at which they were originally issued, and the materials are kept in suspense, to be issued at the same price against the next requisition.
(b) Such returns are entered in the receipt column as if they were fresh purchases at the original issue price.</td></tr>
<tr><td>3. Shortages during physical verifications</td><td>Shortages of materials found during physical verifications should be entered in the issue column and valued at the rate as per the method adopted, i.e. FIFO or any other.</td></tr>
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<tr><td>Waste</td><td>• It represents the portion of basic raw materials lost in processing having no recoverable value.
• Waste may be visible—remnants of basic raw materials—or invisible, e.g. disappearance of basic raw materials through evaporation, smoke etc.
• Loss on normal wastage is usually charged to production by inflating the unit price of material used in such a way that total cost is recovered out of the smaller quantity actually used, whereas abnormal waste is transferred to the Costing Profit and Loss Account.</td></tr>
<tr><td>Scrap</td><td>• It has been defined as the incidental residue from certain types of manufacture, usually of small amount and low value, recoverable without further processing.
• Accounting Treatment:
• Where the value of scrap is negligible, it may be excluded from costs.
• The sales value of scrap is deducted from overhead to reduce the overhead rate.
• If scrap is identifiable with a particular job or process and its value is significant than credit is given to the job or process concerned.
• Scrap due to abnormal reasons will be transferred to the Costing P&L Account.</td></tr>
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Spoilage	• It is the term used for materials which are badly damaged in manufacturing operations, and they cannot be rectified economically and hence taken out of process to be disposed off in some manner without further processing. • It involves not only the loss of material but also of labour and overheads incurred upto the stage where the spoilage has occurred. • Normal spoilage costs are included in costs either by charging the loss due to spoilage to the production order or charging it to production overhead. • Abnormal spoilages are charged to the Costing Profit and Loss Account.
Defective Work/Rejects	• It represents unit of output which fail to comply with a set quality standard and are subsequently rectified, sold as sub-standard or disposal as scrap. • Defective work may be due to various factors like poor quality of materials, incompetent supervision etc. • Accounting Treatment: • If defective work has a nominal value, the loss is completely absorbed by good units. • Alternatively, the cost of defective work can be charged as general factory overhead. • Alternatively, cost of defective work is charged directly to departments responsible for it. • The cost of defective work due to abnormal reasons shall be charged to the Costing P&L Account.
Rectification	• It means bringing back the defective units either to standard units of production or as seconds, by reworking. • The work of rectification in small concerns is usually entrusted to the production shop, whereas in big concerns, a separate department carries out the task. • The task of rectification is usually carried out under a 'Rectification Work Order'. • Accounting Treatment: • If it is due to normal consequences than it is charged to the jobs. • If it is due abnormal reasons then it is charged to Costing P&L Account.
Obsolescence	• It is the loss in the intrinsic value of an asset due to its supersession or technological advancements. • The loss arising out of obsolete materials is an abnormal loss and thus should be transferred to costing P&L.

PRACTICAL QUESTIONS

1. Calculate the economic order quantity from the following information. Also state the number of orders to be placed in a year. **[SM]**

Consumption of materials per annum	:	10,000 kg
Order placing cost per order	:	₹50
Cost per kg of raw materials	:	₹2
Storage costs	:	8 % on average inventory

Ans. 2,500 kg

2. A wholesaler supplies 30 stuffed dolls each weekday to various shops. Dolls are purchased from the manufacturer in lots of 120 each of ₹1200 per lot.

Every order incurs a handling charge of ₹60 plus a freight charge of ₹250 per lot. Multiple and fractional lots also can be ordered and all orders are filled the next day. The incremental cost is ₹0.60 per year to store a doll in inventory. The wholesaler finances inventory investments by paying its holding company 2% monthly for borrowed funds.

How many dolls should be ordered, at a time in order to minimize the total annual inventory cost? Assume that there are 250 weekdays in a year. How frequently he should order?

Ans. 7 orders; 1.71 months

3. A manufacturer buys certain equipment from outside suppliers at ₹20 per unit. Total annual needs are 900 units. The further data are available:

Annual return of investment	10%
Rent, Taxes, insurance per unit per year	₹2
Cost of placing an order	₹200

Determine the economic order quantity.

Ans. 300 units

4. (i) Compute EOQ and total variable cost for the following: **[SM]**

Annual Demand	=	5,000 units
Unit price	=	₹20
Order cost	=	₹16
Storage cost	=	2% per annum
Interest rate	=	12% per annum
Obsolescence rate	=	6% per annum

(ii) Determine the total cost that would result for the items if a new price of ₹12.80 is used.

Ans. (i) 200 units: ₹1,00,800; (ii) ₹64,640

5. SK Ltd. has received an offer of quantity discounts on its order of materials as under:

Tons (No.)	**Price per tons (₹)**
Less than 250	6.00
250 and less than 800	5.90
800 and less than 2,000	5.80
2,000 and less than 4,000	5.70
4,000 and above	5.60

The annual requirement for the materials is 4,000 tons. The ordering cost per order is ₹6 and the carrying cost is estimated at 20% per annum. You are required to compute the most Economic Order Quantity presenting the relevant information in a tabular form.

Ans. Order size of 800 units

6. A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2020:

(i) Annual demand of Alpha 8,000 units
(ii) Cost of placing an order ₹200 per order
(iii) Cost per unit of Alpha ₹400
(iv) Carrying cost p.a. 20%

The company has been offered a quantity discount of 4% on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

Required:

(i) Compute the economic order quantity

(ii) State whether the quantity discount offer can be accepted.

Ans. (i) 200 units; (ii) Not to be accepted.

7. A company manufactures a product from a raw material which is purchased at ₹60 per kg. The company incurs a handling cost of ₹360 plus freight of ₹390 per order. The incremental carrying cost of inventory of raw material is ₹0.50 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹9 per kg per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg of raw material.

[MTP – July 2020] [RTP – May 2023]

Required:

(a) Calculate the economic order quantity of raw material

(b) Advise, how frequently should orders for procurement be placed. (Assuming 360days in the year)

(c) If the company proposes to rationalize placement of orders on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

Ans. (a) 2,000 kg; (b) 18 days; (c) 2%

8. SK Ltd. which manufactures a product 'S' provides you the following information:

Monthly demand of 'S'	=	900 units
Cost of placing an order	=	₹75
Carrying cost per unit p.m.	=	2%
Cost of input to be purchased	=	₹50 per kg
Output per kg of input	=	1.5 units

Required:

(a) What percentage of discount in the price of input should be negotiated if the company proposes to rationalize placements of orders on monthly basis?

(b) Suppose the company followed the policy of economic order quantity and at the end of the year, it was found that the cost of placing an order was ₹108 instead of ₹75 and all other estimates were correct. What is the difference in cost on account of this error?

Ans. (a) 0.24%; (b) ₹72

9. SK Limited produces product 'S' which has a quarterly demand of 20,000 units. Each product requires 3kg and 4kg of material K and M respectively. Material K is supplied by a local supplier

and can be procured at factory stores at any time, hence, no need to keep inventory for material K. The material M is not locally available, it requires to be purchased from other states in a specially designed truck container with a capacity of 10 tons. **[RTP Nov 2019]**

The cost and other information related with the materials are as follows:

Particulars	Material-K	Material-M
Purchase price per kg (excluding GST)	₹140	₹640
Rate of GST	18%	18%
Freight per trip (fixed, irrespective of quantity)	-	₹28,000
Loss of materials in transit*	-	2%
Loss in process*	4%	5%

*On purchased quantity

Other information:

The company has to pay 15% p.a. to bank for cash credit facility.

Input credit is available on GST paid on materials.

Required:

(a) Calculate cost per kg of material K and M

(b) Calculate the economic order quantity for both the materials

Ans. (a) ₹145.83**;** ₹691.23; (b) 0 kg; 13,632.62 kg.

10. SK Ltd. manufactures a product S which requires two raw materials P and M in a ratio of 1:4. The sales department has estimated a demand of 5,00,000 units for the product for the year. To produce one unit of finished product, 4 units of material P is required. **[MTP – Nov 2019]**

Stock position at the beginning of the year is as below:

Product SK	12,000 units
Material P	24,000 units
Material M	52,000 units

To place an order the company has to spend ₹15,000. The company is financing its working capital using a bank cash credit @ 13% p.a.

Product SK is sold at ₹1,040 per unit. Material P and M are purchased at ₹150 and ₹200 respectively.

Required: Compute economic order quantity (EOQ):

(a) If purchase order for both materials is placed separately

(b) If purchase order for both materials is not placed separately

Ans. (a) 54,462 units; 94,600 units; (b) 21,592 units; 86,860 units.

11. SK Ltd. manufacturers of a special product, follows the policy of EOQ (Economic Order Quantity) for one of its components. The components details are as follows:

Purchase price per component	₹200
Cost of an order	₹100
Annual cost of carrying unit in Inventory	10% of purchase price
Total cost of carrying and ordering per annum	₹4,000

The company has been offered a discount of 2% on the price of the component provided the lot size is 2,000 components at a time.

You are required to:

(a) Compute the EOQ

(b) Advise whether the quantity discount offer can be accepted

(c) Would your advice differ if the company is offered 5% discount on a single order? (Assume that the inventory carrying cost does not vary according to discount policy)

Ans. (a) 200 units; (b) Not to accept offer; (c) Accept the offer

12. Two components, A and B are used as follows: **[SM]**

Normal usage	50 per week each
Maximum usage	75 per week each
Minimum usage	25 per week each
Re-order quantity	A:300; B:500
Re-order period	A: 4 to 6 weeks
	B: 2 to 4 weeks

Calculate for each component (a) Re-ordering level, (b) Minimum level, (c) Maximum level and (d) Average level

Ans. (a) 450 units; 300 units; (b) 200 units; 150 units; (c) 650 units; 750 units; (d) 425 units; 450 units

13. From the details given below, calculate: **[SM]**

(i) Re-ordering 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 ₹20.

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

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

Annual cost of storage per unit is ₹5.

Details of lead time: Average – 10 days, Maximum- 15 days, Minimum- 5 days
For emergency purchase – 4 days

Rate of consumption: Average- 15 units per day
Maximum- 20 units per day

Ans. (i) 300 units; (ii) 450 units; (iii) 150 units; (iv) 60 units.

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

Average monthly market demand	2,000 tubes
Ordering cost	₹100 per order
Inventory carrying cost	20% per annum
Cost of tubes	₹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 the following from the above information:

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

(b) Maximum level of stock

(c) Minimum level of stock

(d) Reorder level

Ans. (a) 102 tubes; Accept the offer (b) 1,600 tubes; (c) 900 tubes; (d) 1,402 tubes.

15. A company buys in lots of 6,250 units which is a 3 month's supply. The cost per unit is ₹2.40. Each order costs ₹45 and inventory carrying cost is 15% of average inventory value.

Required:

(a) What is the total annual cost of existing inventory policy?

(b) How much money could be saved by employing the economic order quantity?

(c) If the company operates 250 days a year, the procurement time is 10 days and safety stock is 500 units. Find the reorder level, maximum level, minimum level and average inventory level.

Ans. (a) ₹61,305 (b)₹405 (c) 1,500 units; 6,750 units; 500 units; 3,625 units.

16. Ananya Ltd. produces a product 'Exe' using a raw material Dee. To produce one unit of Exe, 2 kg of Dee is required. As per the sales forecast conducted by the company, it will able to sale 10,000 units of Exe in the coming year. The following is the information regarding the raw materials: **[RTP – May 2019]**

(i) The Re-order quantity is 200 kg. less than the Economic Order Quantity (EOQ).

(ii) Maximum consumption per day is 20 kg. more than the average consumption per day.

(iii) There is an opening stock of 1,000 kg.

(iv) Time required to get the raw materials from the suppliers is 4 to 8 days.

(v) The purchase price is ₹125 per kg.

There is an opening stock of 900 units of the finished product Exe.

The rate of interest charged by bank on Cash Credit facility is 13.76%.

To place an order company has to incur ₹720 on paper and documentation work.

From the above information find out the followings in relation to raw material:

(a) Re-order Quantity

(b) Maximum Stock level

(c) Minimum Stock level

(d) Calculate the impact on the profitability of the company by not ordering the EOQ.

[Take 364 days for a year]

Ans. (a) 1,000 kg; (b) 1,440 kg; (c) 260 kg; (d) ₹440.

17. SK Ltd. supplies surgical gloves to nursing homes and polyclinics in the city. These surgical gloves are sold in pack of 10 pairs at price of ₹250 per pack. **[RTP – May 2018]**

For the month of November 2018, it has been anticipated that a demand for 60,000 packs of surgical gloves will arise. SK Ltd. purchases these gloves from the manufacturer at ₹228 per pack within a 4 to 6 days lead time. The ordering and related cost is ₹240 per order. The storage cost is 10% p.a. of average inventory investment.

Required:

(a) Calculated the Economic Order Quantity (EOQ)

(b) Calculate the number of orders needed every year

(c) Calculate the total cost of ordering and storage of the surgical gloves.

(d) Determine when should the next order to be placed. (Assuming that the company does not maintain a safety stock and that the present inventory level is 10,033 packs with a year of 360 working days).

Ans. (a) 3,893 packets; (b) 185 orders; (c) ₹88,780; (d) Immediately.

18. SK, a small scale manufacturer, produces a product S by using two raw materials K and M in the ratio of 3:2. Material K is perishable in nature and if not used within 5 days of purchase it becomes obsolete. Material M is durable in nature and can be used even after one year. The company has estimated a sales volume of 30,000 kg. for the month of October and expects that the trend will continue for the entire year. The ratio of input and output is 5:3. The purchase price of per kilogram of raw material K and M is ₹15 and ₹22 respectively exclusive of taxes. Material K can be purchased from the local market within I to 2 days period. On the other hand, Material M is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

To place an order the company has to incur an administrative cost of ₹120. Carrying cost for Material K and M is 15% and 5% respectively.

At present Material K is purchased in a lot of 8,000 kg. to avail 10% discount on market price. SGST & CGST applicable for material K is 4% (credit available) and IGST on Material M is 2% (credit not available). Company works for 25 days in a month and production is carried out evenly. **[Similar RTP -May 2024]**

You are required to calculate:

(a) Economic Order Quantity (EOQ) for each material;

(b) Maximum stock level for Material K;

(c) Calculate saving/loss in Material K if purchase quantity equals to EOQ.

Ans. (a) 6,197 kg; 71,65 kg; (b) 6,000 kg; (c) ₹9,03,828

19. A company has the option to procure a particular material from two sources:

Source I – assures that defectives will not be more than 2% of supplied quantity

Source II does not give any assurance, but on the basis of past experience of supplies received, it is observed that defective percentage is 2.8%

The material is supplied in lots of 1,000. Source II supplies the lot at a price, which is lower by ₹100 as compared to Source I. The defective units of material can be rectified for use at a cost of ₹5 per unit. You are required to find out which of the two source is more economical.

Ans. Source-II

20. MM Ltd. has provided the following information about the items in its inventory. **[July 2021]**

Item Code Number	Units	Unit Cost (₹)
101	25	50
102	300	01

103	50	80
104	75	08
105	225	02
106	75	12

MM ltd. has adopted the policy of classifying the items constituting 15% or above to Total Inventory Cost as "A" category, items constituting 6% or less of Total Inventory Cost as "C" category and the remaining items as "B" category.

You are required to:

(i) Rank the items on the basis of % of Total Inventory Cost.

(ii) Classify the items into A, B and C categories as per ABC analysis of Inventory Control adopted by MM Ltd.

Ans. (i) II; VI; I; IV; V; III; (ii) A; C; A; B; C; B

21. Compute the materials turnover ratio for materials S and K and comment upon the results.

	Material S	**Material K**
Opening stock	25,000	87,500
Purchases during the year	1,90,000	1,25,000
Closing stock	15,000	62,500

Ans. 10 times; 2 times

22. The following data are available in respect of material X for the year ended 31st March, 2021.

Opening stock	₹90,000
Purchases during the year	₹2,70,000
Closing stock	₹1,10,000

Calculate:

(i) Inventory turnover ratio, and

(ii) The number of days for which the average inventory is held.

Ans. (i) 2.5 times; (ii) 146 days

23. Raw material 'S' costing ₹150 per kg and 'K' costing ₹90 per kg are mixed in equal proportions for making product 'M'. The loss of material in processing works out to 25% of the product. The production expenses are allocated at 40% of direct material cost. The end product is priced with a margin of 20% over the total cost.

Material 'K is not easily available and substitute raw material 'P' has been found for 'K' costing ₹75 per kg. It is required to keep the proportion of this substitute material in the mixture as low as possible and at the same time maintain the selling price of the end product at existing level and ensure the same quantum of profit as at present.

You are required to compute the ratio of the mix of the raw material 'S' and 'P'.

Ans. 3:2

24. At what price per unit would S entered in the stores ledger, if the following invoice was received from a supplier? **[SM]**

Invoice	₹
200 units S @ ₹5	1,000
Less: 20% discount	200
	800
Add: IGST @ 12%	96
	896
Add: Packing charges (non-returnable boxes)	50
	946

Notes: (a) A 2% discount will be given for payment in 30 days
(b) Documents for claiming input credit are available.

Ans. ₹4.25

25. SK Ltd., not registered under GST, purchased material S from a company which is registered under GST. The following information is available for the one lot of 1,000 units of material purchased:
[RTP – May 2022]

List price of one lot	₹50,000
Trade discount	@10% on listed price
CGST and SGST (Credit not available)	@12% (CGST 6% & SGST 6%)
Cash discount	@10%
(will be given only if payment is made within 30 days)	
Freight and Insurance	₹3,400
Toll tax paid	₹1,000
Demurrage	₹1,000
Commission on brokerage on purchases	₹2,000
Amount deposited for returnable containers	₹6,000
Amount of refund on returning containers	₹4,000
Other expenses	@2% of total cost

20% of material shortage is due to normal reasons.
The payment to the supplier was made within 20 days of the purchases
You are required to calculate cost per unit of material purchased to SK Ltd.

Ans. ₹75

26. A manufacturer of Surat purchased three chemicals S, K and M from Delhi. The invoice provides the following information:

	₹
Chemical S : 3,000 kg at ₹4.20 per kg	12,600
Chemical K : 5,000 kg at ₹3.80 per kg	19,000
Chemical M : 2,000 kg at ₹4.75 per kg	9,500
CGST & SGST	2,055
Railways freight	1,000
Total cost	44,155

A shortage of 200 kg in chemical S, 280 kg in chemical K and 100 kg in chemical M was noticed due to normal breakages. The manufacturer paid cartage of ₹22 for chemical S, ₹63 for chemical K and ₹32 for chemical M. Calculate the stock rate that you suggest for pricing issue of chemicals assuming a provision of 5% towards further deterioration.

Ans. ₹5.09; ₹4.57; ₹5.65

27. SK Ltd. has projected the following for a product S.

Annual Requirement	10,400 units
Economic Order Quantity	1,040 units
Expected usage per week	200 units
Re-order period	2 weeks

The probability distribution of usage of S over a two week period is as follows:

Usage (Units)	150	250	310	400	460	500	560
Probability	0.05	0.05	0.10	0.50	0.10	0.15	0.05

The stock out cost is ₹4 per unit and carrying cost of ₹5.2 per unit per annum. Calculate Safety Stock and Re-order point.

Ans. Safety stock 100 units and ROL 500 units.

28. SK Ltd. uses a small casting in one of its finished products. The castings are purchased from a foundry. SK limited purchases 54,000 castings per year at a cost of ₹800 per casting. The castings are used evenly throughout the year in the production process on a 360 day per year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year. The high carrying costs results from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance. **[SM]**

Delivery from the foundry generally takes 6 days, but it can take as much as 10 days. The days of delivery time and percentage of their occurrence are shown in the following tabulation.

Delivery time (days):	6	7	8	9	10
Percentage of occurrence:	75	10	5	5	5

Required:

(a) Compute the economic order quantity (EOQ)

(b) Assume the company is willing to assume a 15% risk of being out of stock. What would be the safety stock? The re-order point?

(c) Assume the company is willing to assume a 5% risk of being out of stock. What would be the safety stock? The re-order point?

(d) Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?

(e) Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only ₹600. In addition, company estimates that when the waste and inefficiency caused by inventories are considered, the true costs of carrying a unit in stock is ₹720 per year.

(i) Compute the new EOQ

(ii) How frequently would the company be placing an order, as compared to the old purchasing policy?

Ans. (a) 1,800 units; (b) 150 units; 1,050 units; (c) 450 units; 1,350 units; (d) ₹6,75,000; (e) (i) 300 units; (ii) 12 days; 2 days.

29. From the following data, prepare store ledger for the month of April using (a) FIFO; (b) LIFO; (c) Weighted Average;

1 April	Opening balance	50 units @ ₹2
3 April	Receipt No. 6	30 units @ ₹3
4 April	Issues	40 units
5 April	Returned to store by production department from issue of 4.4.2012	5 units
6 April	Receipt No. 8	20 units @ ₹4
7 April	Receipt No. 9	50 units @ ₹5
9 April	Issues	40 units
13 April	Issues	40 units
16 April	Returned to vendor from goods purchased on 7.4.2012	5 units
18 April	Transferred from Job 182 to 187	19 units
20 April	Receipt No. 10	30 units @ ₹6
25 April	Issues	20 units

The stock verifier of the company reported a shortage of 10 units on 15th April and 10 units on 30th April.

30 SK Appliances manufactures electronic home appliances. It follows weighted average cost method for inventory valuation. Following are the data of component S: **[RTP May 2020]**

Date	Particulars	Units	Rate per unit (₹)
15 Dec	Purchase Order – 002	10,000	9,930
30 Dec	Purchase Order – 003	10,000	9,780
01 Jan	Opening stock	3,500	9,810
05 Jan	GRN*-002 (against Purchase Order – 002)	10,000	-
05 Jan	MRN**-001 (against the Purchase Order – 002)	500	-
06 Jan	Material Requisition – 005	3,000	-
07 Jan	Purchase Order – 004	10,000	9,750
10 Jan	Material Requisition – 006	4,500	-
12 Jan	GRN-003 (against the Purchase Order – 003)	10,000	-
12 Jan	MRN-002 (against the Purchase Order – 003)	400	-
15 Jan	Material Requisition – 007	2,200	-
24 Jan	Material Requisition – 008	1,500	-
25 Jan	GRN-004 (against the Purchase Order – 004)	10,000	-
28 Jan	Material Requisition – 009	4,000	-
31 Jan	Material Requisition – 010	3,200	-

*GRN – Goods Received Note; **MRN – Material Returned Note

Based on the above data, you are required to Calculate:

(a) RE-order level

(b) Maximum stock level

(c) Minimum stock level

(d) Prepare store ledger for the period January and determine the value of stock as on 31 Jan.

(e) Value of components used during the month of January.

(f) Inventory turnover ratio.

Ans. (a) 94,500 units; (b) 85,000 units; (c) 43,500 units; (d) ₹1,39,001; (e) ₹1,81,061; (f) 2.09 times

31. A Limited has furnished the following information for the months from 1st January to 30th April, 2023: **[May 2023]**

	January	February	March	April
Number of working days	25	24	26	25
Production (in units) per working day	50	55	60	52
Raw material purchases (% by weights to total of 4 months)	21%	26%	30%	23%
Purchase price of raw material (per kg)	₹10	₹12	₹13	₹11

Quantity of raw material per unit of product: 4 kg
Opening stock of raw material on 1st January: 6,020 kg (Cost ₹63,210)
Closing stock of raw material on 30th April: 5,100 kg
All the purchases of material are made at the start of each month.
Required:

(i) Calculate the consumption of raw materials (in kgs) month by month and in total

(ii) Calculate the month-wise quantity and value of raw materials purchased.

(iii) Prepare the priced stores ledger for each month using the FIFO method.

Ans. (i) 5,000; 5,280; 6,240; 5,200; 21,720; (ii) ₹43,680; ₹64,896; ₹81,120; ₹52,624; (iii) ₹56,732

PRACTICE QUESTIONS

32. A Ltd. a toy company purchases its requirement of raw material from S Limited at ₹120 per kg. The company incurs a handling cost of ₹400 plus freight of ₹350 per order. The incremental carrying cost of inventory of raw material is ₹0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹15 per kg per annum. The annual production of the toys is 60,000 units and 5 units of toys are obtained from one kg of raw material. **[May 2022]**

Required:

(i) Calculate the Economic Order Quantity (EOQ) of raw materials.

(ii) Advise, how frequently company should order to minimize its procurement cost. Assume 360 days in a year.

(iii) Calculate the total ordering cost and total inventory carrying cost per annum as per EOQ.

Ans. (i) 1,000 kg; (ii) 30 days; (iii) ₹18,000

33. (a) SK Ltd. has received an offer of quantity discounts on its order of materials as under:

Price per ton (₹)	Ton (Nos.)
1,200	Less than 500
1,180	500 and less than 1,000

1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above

The annual requirement for the material is 5,000 tons. The ordering cost per order is ₹1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to compute the most economical purchase level.

(b) What will be your answer, if there are no discounts offered and the price per ton is ₹1,500?

Ans. (a) 1,000 units; (b) 200 units

34. The complete Gardner is deciding on the economic order quantity for two brands of lawn fertilizer: SK and PM. The following information is collected: **[SM]**

Fertilizer	SK	PM
Annual Demand	2,000 Bags	1,280 Bags
Relevant ordering cost per purchase order	₹1,200	₹1,400
Annual relevant carrying cost per bag	₹480	₹560

Required:

(a) Compute EOQ for SK and PM.

(b) For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for SK and PM.

(c) For the EOQ compute the number of deliveries per year for SK and PM.

Ans. (i) 100 bags; 80 bags; (ii) ₹48,000; ₹44,800; (iii) 20 orders; 16 orders]

35. M/s X Private Limited is manufacturing a special product which requires a component "SKY BLUE". The following particulars are collected for the year ended 31st March, 2018: **[May 2018]**

Annual demand of "SKY BLUE"	12,000 units
Cost of placing an order	₹1,800
Cost per unit of "SKY BLUE"	₹640
Carrying cost per annum	18.75%

The company has been offered a quantity discount of 5% on the purchase of "SKY BLUE", provided the order size is 3,000 components at a time.

Required:

(*a*) Compute the economic order quantity

(*b*) Advise whether the quantity discount offer can be accepted

Ans. (a) 600 units; (b) Accept the offer

36. Surekha Limited Produces 4,000 litres of paints on a quarterly basis. Each litre requires 2 kg of raw material. The cost of placing one order for raw material is ₹40 and the purchasing price of raw material is ₹50 per kg. The storage cost and interest cost is 2% and 6% per annum respectively. The lead time for procurement of raw material is 15 days. Calculate Economic Order Quantity and Total Annual Inventory Cost in respect of the above raw material. **[Nov 2019]**

Ans. ₹16,03,200

37. SK Ltd. buys its annual requirement of 36,000 units in 6 instalments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. Calculate, how much money can be saved by economic order quantity? **[SM]**

Ans. ₹750; ₹150

38. An automobile company purchases 27,000 spare parts for its annual requirements. The cost per order is ₹240 and the annual carrying cost of average inventory is 12.5%. Each spare part costs ₹50. **[Nov 2020]**

At present, the order size is 3,000 spare parts.

(Assume that number of days in a year = 360 days)

Find out:

(i) How much the company's cost would be saved by opting EOQ model?

(ii) The Re-order point under EOQ model if lead time is 12 days.

(iii) How frequently should orders for procurement be placed under EOQ model?

Ans. (i) ₹2,475; (ii) 900 units; (iii) 18.94 days

39. SK Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹20. For every finished product, one unit of component is required. The ordering cost is ₹120 per order and the holding cost is 10% p.a. **[SM]**

You are required to calculate:

(i) Economic order quantity

(ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?

(iii) What is the minimum carrying cost, the company has to incur?

Ans. (i) 2,400 units; (ii) ₹640; (iii) ₹2,400

40. The annual demand for an item of raw material is 4,000 units and the purchase price is expected to be ₹90 per unit. The incremental cost of processing an order is ₹135 and the annual cost of storage is estimated to be ₹12 per unit. Compute the optimal order quantity and total relevant cost of this order quantity? **[MTP – Nov 2018]**

Suppose that ₹135 as estimated to be the incremental cost of processing an order is incorrect and should have been ₹80. All other estimates are correct. Estimate the difference in cost on account of this error?

Assume at the commencement of the period that a supplier offers 4,000 units at a price of ₹86. The materials will be delivered immediately and placed in the stores. Assume that the incremental cost of placing the order is zero and original estimate of ₹135 for placing an order for the economic batch is correct. Analyze, should the order be accepted?

Ans. Cost of error = ₹94; Not to accept the offer

41. A company uses three raw materials A, B and C for a particular product for which the following data apply: **[SM]**

Raw Material	Usage per unit (Kg)	Reorder Quantity (Kg)	Price per Kg (₹)	Min	Delivery period Average	Max	Reorder level (Kg)	Minimum level (Kg)
A	10	10,000	0.10	1	2	3	8,000	
B	4	5,000	0.30	3	4	5	4,750	
C	6	10,000	0.15	2	3	4		2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities:

(a) Minimum stock of A?

(b) Maximum stock of B?

(c) Re-order level C?

(d) Average stock level of A?

Ans. (a) 4,000 kg; (b) 7,650 kg; (c) 5,400 kg; (d) 9,000 kg

42. A company uses four raw materials A, B, C and D for a particular product for which the following data apply:- **[RTP – Nov 2020]**

Raw Material	Usage per unit of product (Kg)	Re-order Quantity (Kg)	Price per Kg (₹)	Delivery period (in weeks)			Re-order level (Kg)	Minimum level (Kg)
				Minimum	Average	Maximum		
A	12	12,000	12	2	3	4	60,000	?
B	8	8,000	22	5	6	7	70,000	?
C	6	10,000	18	3	5	7	?	25,500
D	5	9,000	20	1	2	3	?	?

Weekly production varies from 550 to 1,250 units, averaging 900 units of the said product. What would be the following quantities:

(i) Minimum Stock of A?

(ii) Maximum Stock of B?

(iii) Re-order level of C?

(iv) Average stock level of A?

(v) Re-order level of D?

(vi) Minimum Stock level of D?

Ans. (i) 27,600 kg; (ii) 56,000 kg; (iii) 52,500 kg; (iv) 33,600 kg; (v) 18,750 kg; (vi) 9,750 kg

43. SK Ltd. is the manufacturer of monitor for PCs. A monitor requires 4 units of Part-S. The following are the details of this operation during 2020: **[RTP – Nov 2018]**

Average monthly market demand	2,000 Monitors
Ordering cost	₹1,000 per order
Inventory carrying cost	20% per annum

Cost of Part	₹350 per part
Normal usage	425 parts per week
Minimum usage	140 parts per week
Maximum usage	710 parts per week
Lead time to supply	3-5 weeks

Compute from the above:

(a) Economic order quantity (EOQ). If the supplier is willing to supply quarterly 30,000 units of Part-S at a discount of 5%, is it worth accepting?

(b) Re-order level

(c) Maximum level of stock

(d) Minimum level of stock

Ans. (a) 1,656 units; Accept; (b) 3,550 units; (c) 4,786 units; (d) 1,850 units

44. MM Ltd. uses 7500 valves per month which is purchased at a price of ₹1.50 per unit. The carrying cost is estimated to be 20% of average inventory investment on an annual basis. The cost to place an order and getting the delivery is ₹15. It takes a period of 1.5 months to receive a delivery from the date of placing an order and a safety stock of 3,200 valves is desired. **[Nov 2022]**

You are required to determine:

(i) The Ecomic Order Quantity (EOQ) and the frequent orders.

(ii) The re-order point

(iii) The Economic Order Quantity (EOQ) if the valve cost ₹4.50 each instead of 1.50 each.

(Assume a year consist of 360 days)

Ans. (i) 3,000 valves; 12 days; (ii) 14,450 valves; (iii) 1,732 valves

45. ACE Ltd. produces a product EMM using a material 'REX'. To produce one unit of EMM 0.80 kg of 'REX' is required. As per the sales forecast conducted by the company it will be able to sell 45,600 units of product EMM in the coming year. There is an opening stock of 3,150 units of product EMM and company desires to maintain closing stock equal to one month's forecasted sale. Following is the information regarding material 'REX'. **[May 2019]**

Purchase price per kg	₹25
Cost of placing order	₹240 per order
Storage cost	2% per annum
Interest rate	10% per annum
Average lead time	8 days
Difference between minimum and maximum lead time	6 days
Maximum usage	150 kg
Minimum usage	90 kg

Opening stock of material 'REX' is 2,100 kg and closing stock will be 10% more than opening stock. Required:

(i) Compute the EOQ and total cost as per EOQ

(ii) Compute the reorder level and maximum level

(iii) If the company places an order of 7,500 kg of REX at a time, it gets 2% discount, should the offer be accepted?

Ans. (i) 2,440 kg; ₹9,37,750; (ii) 1,650 kg; 3,640 kg; (iii) Accept the offer

46. The yearly production of a company's product which has a steady market is 40,000 units. Each unit of a product requires 1 kg of raw material. The cost of placing one order for raw material is ₹1,000 and the inventory carrying cost is ₹20 per annum. The lead time for procurement of raw material is 36 days and a safety stock of 1,000 kg of raw materials is maintained by the company. The company has been able to negotiate the following discount structure with the raw material supplier: **[MTP – Nov 2021]**

Order Quantity (kgs)	Discount (₹)
Upto 6,000	Nil
6,000 – 8,000	4,000
8,000 – 16,000	20,000
16,000 – 30,000	32,000
30,000 – 45,000	40,000

You are required to:

(a) Calculate the re-order point taking 30 days in a month

(b) Prepare a statement showing the total cost of procurement and storage of raw materials after considering the discount if the company elects to place one, two, four or five orders in the year.

(c) State the number of orders which the company should place to minimize the costs after taking EOQ also into consideration.

Ans. (a) 5,000 kg; (b) ₹3,61,000; ₹1,70,000; ₹84,000; ₹81,000; (c) 20 orders

47. M/s SJ Private Limited manufactures 20,000 units of a product per month. The cost of placing an order is ₹1,500. The purchase price of the raw material is ₹100 per kg. The re-order period is 5 to 7 weeks. The consumption of raw materials varies from 200 kg to 300 kg per week, the average consumption being 250 kg. The carrying cost of inventory is 9.75% per annum. **[Nov 2018]**

You are required to calculate:

(i) Re-order quantity

(ii) Re-order level

(iii) Maximum level

(iv) Minimum level

(v) Average stock level

Ans. (i) 2,000 kg; (ii) 2,100 kg; (iii) 3,100 kg; (iv) 600 kg; (v) 1,850 kg

48. M/s Tanishka Materials Private Limited produces a product which names "ESS". The consumption of raw material for the production of "ESS" is 210 kgs to 350 kgs per week. Other information is as follows: **[RTP – Nov 2022]**

Procurement time	5 to 9 days
Purchase price of raw material	₹100 per kg

Ordering cost per order	₹200
Storage cost	1% per month plus ₹2 per unit per annum

Consider 365 days a year:

You are required to calculate:

(a) Economic order quantity

(b) Re-order level

(c) Maximum level

(d) Minimum level

(e) Average stock level

(f) Number of orders to be placed per year

(g) Total inventory cost

(h) If the supplier is willing to offer 1% discount on purchase of total annual quantity in two orders, whether offer is acceptable?

(i) If the answer is no, what should be the counter offer w.r.t. percentage of discount?

Ans. (a) 646 kg; (b) 450 kg; (c) 946 kg; (d) 170 kg; (e) 558 kg; (f) 23 orders; (g) ₹14,69,122; (h) not to accept offer; (i) Discount of at least 2.82%

49. A company produces a product 'AB' by using two raw materials – 'Material Ae' and 'Material Be' in the ratio of 5:3. **[MTP – Nov 22]**

A sales volume of 50,000 kgs is estimated for the month of December by the managers expecting the trend will continue for the entire year. The ratio of input and output is 8:5.

Other information about raw material Ae is as follows:

Purchase price	₹150 per kg
Re-order period	2 to 3 days
Carrying cost	12%

Note: Material Ae is perishable in nature and if not used within 3.5 days of purchase if becomes obsolete.

To place an order for material 'Ae' the company has to incur an administrative cost of ₹375 per order. At present, material 'Ae' is purchased in a lot of 7,500 kgs to avail the discount on purchase. Company works for 25 days in a month and production is carried out evenly.

You are required to calculate:

(a) Economic order quantity (EOQ) for material Ae

(b) Maximum stock level for Material Ae

Ans. (a) 5,000 kg; (b) 7,000 kg

50. From the following details, draw a plan of ABC selective control: **[SM]**

Item	Units	Unit Cost (₹)
1	7,000	5
2	24,000	3
3	1,500	10
4	600	22
5	38,000	1.5

6	40,000	0.5
7	60,000	0.2
8	3,000	3.5
9	300	8
10	29,000	0.4
11	11,500	7.1
12	4,100	6.2

Assume the following basis for selective control:

₹50,000 and above - Category A
₹15,000 to ₹50,000 - Category B
Below ₹15,000 - Category C

Ans. Category A – 11, 2, 5; Category B – 1, 12, 6, 3; Category C – 4, 7, 10, 8, 9

51. A factory uses 4,000 varieties of inventory. In terms of inventory holding and inventory usage, the following information is compiled: **[SM]**

No. of varieties of inventory	%	% value of inventory holding (average)	% of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

Classify the items of inventory as per ABC analysis with reasons.

Ans. C; B; A

52. The following data are available in respect of material X for the year ended 31st March, 2021. **[SM]**

Opening stock ₹90,000
Purchases during the year ₹2,70,000
Closing stock ₹1,10,000

Calculate:

(i) Inventory turnover ratio, and
(ii) The number of days for which the average inventory is held.

Ans. (i) 2.5 times; (ii) 146 days

53. From the following data for the year ended 31st March, calculate the inventory turnover ratio of the two items and put forward your comments on them. **[SM]**

Particulars	Material A(₹)	Material B(₹)
Opening stock	10,000	9,000

Purchases during the year	52,000	27,000
Closing stock	6,000	11,000

Ans. Material A – 7 times; 52 days; Material B – 2.5 times; 146 days

54. XYZ Ltd uses two types of raw materials – 'Material A' and 'Material B' in the production process and has provided the following data for the year ended on 31st March, 2021: **[Dec 2021]**

Particulars	Material A(₹)	Material B(₹)
Opening stock as on 1.04.2020	30,000	32,000
Purchases during the year	90,000	51,000
Closing stock as on 31.02.2021	20,000	14,000

You are required to calculate:

(a) The inventory turnover ratio of 'Material A' and ' Material B'

(b) The number of days for which the average inventory is held for both materials 'A' and 'B'.

(i) Based on above calculations, give your comments.
(Assume 360 days in a year)

Ans. (i) (a) 4 times; 3 times; (b) 90 days; 120 days; (ii) Material A is fast moving]

55. The following details are provided by M/s SKU Enterprises for the year ended 31st March, 2018: **[May 2018]**

Particulars	Material – M (₹)	Material-N (₹)
Stock as on 01-04-2017	6,00,000	10,00,000
Stock as on 31-03-2018	4,50,000	7,25,000
Purchases during the year	9,50,000	18,40,000

You are required to:

(i) Calculate Turnover Ratio of both the materials

(ii) Advise which of the two materials is fast moving. (Assume 360 days in a year)

Ans. (i) 2 times; 2.4 times; (ii) Material N

56. An invoice in respect of a consignment of chemicals A and B provide the following information: **[SM]**

	(₹)
Chemical A: 10,000 kgs at ₹10 per kg	1,00,000
Chemical B: 8,000 kgs at ₹13 per kg	1,04,000
Basic custom duty @10% (credit is not allowed)	20,400
Railway freight	3,840
	2,28,240

A shortage of 500 kg in chemical A and 320 kg in chemical B is noticed due to normal breakages. You are required to compute the rate per kg of each chemical, assuming a provision of 2% for further deterioration.

Ans. ₹12.04; ₹15.43

57. M/s SK Ltd trades in chairs. It stocks sufficient quantity of chairs of almost every variety. In year end, the report of sales manager revealed that M/s SK experienced stock-out of chairs. The stock-out data is as follows: **[SM]**

Stock-out of chairs	No. of times
100	2
80	5
50	10
20	20
10	30
0	33

M/s SK loses ₹150 per unit due to stock-out and spends ₹50 per unit on carrying of inventory. Determine optimum safest stock level.

Ans. 20 units

58. The following are the details of receipt and issue of material 'CXE' in a manufacturing Co. during the month of April 2019: **[May 2019]**

Date	Particulars	Quantity (kg)	Rate per kg
April 4	Purchases	3,000	₹16
April 8	Issue	1,000	
April 15	Purchases	1,500	₹18
April 20	Issue	1,200	
April 25	Return to supplier out of purchase made on April 15	300	
April 26	Issue	1,000	
April 28	Purchase	500	₹17

Opening stock as on 01-04-2019 is 1,000 kg @ ₹15 per kg.
On 30th April, 2019 it was found that 50 kg of material 'CXE' was fraudulently misappropriated by the store assistant and never recovered by the company. Required:

(i) Prepare a store ledger account under each of the following method of pricing the issue:
  (a) Weighted Average Method
  (b) LIFO

(ii) What would be the value of material consumed and value of closing stock as on 30-04-2019 as per these two methods?

59. The following information is provided by SK Ltd. for the fortnight of April, 2022: **[SM]**

Material Exe:
Stock on 1-4-2022, 100 units at ₹5 per unit
Purchases:
5-4-2022, 300 units at ₹6
8-4-2022, 500 units at ₹7

12-4-2022, 600 units at ₹8
Issues:
6-4-2022, 250 units
10-4-2022, 400 units
14-4-2022, 500 units
Required:

(A) Calculate using FIFO and LIFO methods of pricing issues:
   (*a*) the value of materials consumed during the period
   (*b*) the value of stock of materials on 15-4-2022

(B) Explain why the figures in (a) and (b) in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the stores ledger.

60. SK Ltd. is recently incorporated start-up company back in the year 2019. It is engaged in creating embedded products and internet of things ((IoT) solutions for the industrial market. It is focused on innovation, design, research and development of products and services. One of its embedded products is LogMax, a system on module (SoM) Carrier board for industrial use. It is a small, flexible and embedded computer designed as per industry specifications. In the beginning of the month of September 2022, company entered into a job agreement of providing 4,800 LogMax to Nit, Mandi. Following details w.r.t. issues, receipts, returns of store department handling Micro-controller, a component used in the designated assembling process have been extracted for the month of September, 2021: **[SM]**

Sep. 1	Opening stock of 6,000 units at ₹285 per unit
Sep. 8	Issued 4,875 units to mechanical division vide material requestion no. mech 009/20
Sep. 9	Received 17,500 units @ ₹276 per unit vide purchase order no. 159/2020
Sep. 10	Issued 12,000 units to a technical division vide material requisition no. Tech -21/20
Sep. 12	Returned to stores 2375 units by technical division against material requisition no. Tech 021/20
Sep. 15	Received 9,000 units @ ₹288 per units vide purchase order no. 160/2020
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/2020
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/20

On 25th September, 2021, the stock manager of the company expressed his need to leave for his hometown due to certain contingency and immediately left the job same day. Later, he also switched his phone off.

As the company has the tendency of stock-taking every end of the month to check and report for the loss due to rusting of the components, the new stock manager, on 30th September, 2021, found that 900 units of Micro-controllers where missing which was apparently misappropriated by the former stock manager. He, further reported loss of 300 units due to rusting of the components.

From the above information, you are required to prepare the stock ledger account using 'Weighted Average' method of valuing the issues.

61. The following transactions in respect of material Y occurred during the six months ended 30th June: **[SM]**

Month	Purchase (units)	Price per unit (₹)	Issued Units
January	200	25	Nil
February	300	24	250
March	425	26	300
April	475	23	550
May	500	25	800
June	600	20	400

Required:

(a) The chief accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? Explain. Detailed stores ledger are not required.

(b) State when and why would you recommend the LIFO method of pricing material issues?

62. The following information is extracted from the stores ledger: **[SM]**

Material X

Opening stock	Nil
Purchases:	
Jan. 1	100 @ ₹1 per unit
Jan. 20	100 @ ₹2 per unit
Issues:	
Jan. 22	60 for Job W16
Jan. 23	60 for Job W 17

Complete the receipts and issues valuation by adopting the First-in-First-Out, Last-in-First-out and the weighted average method. Tabulate the values allocated to Job W16 and W17 and the closing stock under the methods aforesaid.

63. SK Ltd. furnishes the following store transactions for September: **[SM]**

1 Sep	Opening balance	25 units value ₹6.50
4 Sep	Issues Req. No. 85	8 units
6 Sep	Receipts from B & Co. GRN No. 26	50 units @ ₹5.75 per unit
7 Sep	Issues Req. No. 97	12 units
10 Sep	Return to B & Co.	10 units
12 Sep	Issues Req. No. 108	15 units
13 Sep	Issues Req. No. 110	20 units
15 Sep	Receipts from M & Co. GRN No. 33	25 units @ ₹6.10 per unit
17 Sep	Issues Req. No. 121	10 units
19 Sep	Received replacement from B & Co. GRN No. 38	10 units
20 Sep	Returned from department, material of M & CO. MRR No. 4	5 units
22 Sep	Transfer from Job 182 to Job 187 in the dept. MTR 6	5 units

26 Sep	Issues Req. No. 146	10 units
29 Sep	Transfer from Dept. A to Dept. B MTR 10	5 units
30 Sep	Shortage in stock taking	2 units

Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking

64. From the following information, calculate the total cost of Product A and B using the ABC Analysis: **[MTP May 2024]**

	Product A	**Product B**
Units	5,000	5,000
Number of purchase order placed	100	220
Number of deliveries received	70	200
Ordering cost	₹4,00,000	
Delivery cost	₹1,35,000	

A. A = ₹47,500; B = ₹1,27,500

B. A = ₹2,67,500; B = ₹2,67,500

C. A = ₹1,60,00; B = ₹3,75,000

D. A = ₹1,47,500; B = ₹1,47,500

Ans. (c)

65. The purchase committee of A Ltd. has been entrusted to review the material procurement policy of the company. The chief marketing manager has appraised the committee that the company at present produces a single product X by using two raw materials A and B in the ratio of 3:2. Material A is perishable in nature and has to be used within 10 days from Goods received note (GRN) date otherwise material becomes obsolete. Material B is durable in nature and can be used even after one year. Material A is purchased from the local market within 1 to 2 days of placing order. Material B, on the other hand, is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

The purchase price of per kilogram of raw material A and B is ₹30 and ₹44 respectively exclusive of taxes. To place an order, the company has to incur an administrative cost of ₹1,200. Carrying cost for Material A and B is 15% and 5% respectively. At present material A is purchased in a lot of 15,000 kg. to avail 10% discount on market price. GST applicable for both the materials is 18% and the input tax credit is availed.

The sales department has provided an estimate that the company could sell 30,000 kg. in January 2024 and also projected the same trend for the entire year.

The ratio of input and output is 5:3. Company works for 25 days in a month and production is carried out evenly.

The following queries/ calculations to be kept ready for purchase committees' reference:

(i) For the month of January 2024, what would be the quantity of the materials to be requisitioned for both material A and B:

(a) 9,000 kg & 6,000 kg respectively (b) 18,000 kg & 12,000 kg respectively

(c) 27,000 kg & 18,000 kg respectively (d) 30,000 kg & 20,000 kg respectively.

(ii) The economic order quantity (EOQ) for both the material A & B:

(a) 13,856 kg & 16,181 kg respectively (b) 16,197 kg & 17,327 kg respectively

(c) 16,181 kg & 17,165 kg respectively (d) 13,197 kg & 17,165 kg respectively

(iii) What would the maximum stock level for material A:

(a) 18,200 kg. (b) 12,000 kg. (c) 16,000 kg. (d) 16,200 kg.

(iv) Calculate saving/ loss in purchase of Material A if the purchase order quantity is equal to EOQ.

(a) Profit of ₹3,21,201. (b) Loss of ₹3,21,201.

(c) Profit of ₹2,52,500. (d) Loss of ₹2,52,500.

(v) What would the minimum stock level for material A:

(a) 1,800 kg. (b) 1,200 kg. (c) 600 kg. (d) 2,400 kg.

Ans. (i)- (d), (ii) - (a), (iii) - (b), (iv) - (ii), (v) - (iii)

SOLUTION OF PRACTICE QUESTIONS

32. (*a*) A = 60,000 ÷ 5 = 12,000 kg, O = 400 + 350 = ₹750, C = 15 + (0.25 × 12) = ₹18

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 12{,}000 \times 750}{18}} = 1{,}000 \text{ kg}$$

(b) Number of orders to be placed = $\frac{12{,}000}{1{,}000}$ = 12 orders

$$\text{Frequency of order} = \frac{360}{\text{No. of orders}} = \frac{360}{12} = 30 \text{ days}$$

(c) Total ordering cost = No. of order × cost per order = 12 × 750 = ₹9,000

$$\text{Total carrying cost} = \frac{\text{Order Size}}{2} \times \text{carrying cost per unit p.a.} = \frac{1{,}000}{2} \times 18 = ₹\ 9{,}000$$

Total cost = ₹ 18,000

33. (a) Statement of Cost

Total annual requirement (A)	Order Size (Tonnes) (OS)	Price per tonne (P)	No. of Orders (A,OS= S)	Cost of inventory (PC) (A × P)	Ordering cost (OC) (S × ₹12,00)	Carrying cost (CC) [(OS2) × P]	Total cost (PC + OC + CC)
5,000	400	1,200	12.5 or 13	60,00,000	15,600	48,000	60,63,000
	500	1,180	10	59,00,000	12,000	59,000	59,71,000
	1,000	1,160	5	58,00,000	6,000	1,16,000	59,22,000
	2,000	1,140	2.5 or 3	57,00,000	3,600	2,28,000	59,31,600
	3,000	1,120	1.666 or 2	56,00,000	2,400	3,36,000	59,38,400

From the above table, it can be verified that total cost is lowest in case when the order size is 1,000 units. Thus, most economical purchase level is 1,000 units.

(b) If there is not discounts offered than the order size should be equal to EOQ.

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 5,000 \times 1,200}{20\% \times ₹1,500}} = 200 \text{ units}$$

34. (i)

	SK	PM
A = Annual Requirement O = Ordering cost per order C = Carrying cost/ unit/annum $EOQ = \sqrt{\frac{2 \times A \times O}{C}}$	2000 Bags ₹1200 ₹480 $\sqrt{\frac{2 \times 2,000 \times 1,200}{480}}$ = 100 bags	1280 Bags ₹1400 ₹560 $\sqrt{\frac{2 \times 1,280 \times 1,400}{560}}$ = 80 bags
(ii) Ordering cost [(A÷EOQ) × O) Carrying cost [(EOQ,2) × C] Total of ordering and carrying cost	[(2,000,100) × 1200] = ₹24,000 [(100 ÷ 2) × 480] = ₹24,000 ₹24,000 + ₹24,000 = ₹48,000	[(1,280÷80) × 1400] = ₹22,400 [(80 ÷ 2) × 560] = ₹22,400 ₹22,400 + ₹22,400 = ₹44,800
(iii) No. of Deliveries i.e; No. of orders to be placed per year [A÷EOQ]	[2,000 ÷ 100] = 20 orders p.a.	[1,280 ÷ 80] =16 orders p.a.

35. (i) $EQO = \sqrt{\frac{2 \times A \times O}{C}}$

A = 12,000 units

O = ₹1,800

C = ₹640 per unit × 18.75% = ₹120 per unit

$$EOQ = \sqrt{\frac{2 \times 12,000 \times 1,800}{120}} = 600 \text{ units}$$

(ii) Statement showing evaluation of proposal

Particulars	Order 600 units	Order 3,000 units
Annual purchase cost (₹640/608 p.u)	76,80,000	72,96,000
Annual Ordering cost (₹1,800 per order)	36,000	7,200
Annual carrying cost (₹120/114 per unit)	36,000	1,71,000
Total Cost	₹77,52,000	₹74,74,200

Since the total cost is lower by ₹2,77,800 in case when the company gets the discount offer of 5%, thus, it is recommended to accept the discount offer with order size of 3,000 units.

36. A = 4,000 × 2 × 4 = 32,000 kg

O = ₹40

C = 50 × (2% + 6%) = ₹4

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 32,000 \times 40}{4}} = 800 \text{ kg}$$

Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (32,000 \times 50) + \left(\frac{32,000}{800} \times 40\right) + \left(\frac{800}{2} \times 4\right) = ₹16,03,200$$

37. (*a*) Total ordering cost = 6 orders × ₹25 = ₹150

Total carrying cost = $\frac{36,000}{6} \times \frac{1}{2} \times 20\% \times 1$ = ₹600

Total Cost ₹750

(*b*) $EOQ = \sqrt{\frac{2 \times 36,000 \times 25}{20\% \times 1}}$ = 3,000 units

Total ordering cost = $\frac{36,000}{3,000} \times ₹25$ = ₹300

Total carrying cost = $3,000 \times \frac{1}{2} \times 20\% \times 1$ = ₹300

Total Cost = ₹600

Saving due to EOQ = ₹750 – ₹600 = ₹150

38. (i) Annual requirement (A) = 27,000

Cost per order (O) = ₹240

Carrying cost per unit p.a. (C) = 50 × 12.5% = ₹6.25

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 27,000 \times 240}{6.25}} = 1,440 \text{ units}$$

Statement of Cost

Particulars	Order size = 3,000	Order size = 1,440
Purchase cost	27,000 × 50 = 13,50,000	27,000 × 50 = 13,50,000
Ordering cost	$\frac{27,000}{3,000} \times 240$ = 2,160	$\frac{27,000}{1,440}$ or 18.75 or 19×240 = 4,560
Carrying cost	$\frac{3,000}{2} \times 6.25$ = 9,375	$\frac{1,440}{2} \times 6.25$ = 4,500
Total cost	**13,61,535**	**13,59,060**

Saving due to EOQ = ₹13,61,535 – ₹13,59,060 = ₹2,475

(ii) Re-order point = Maximum consumption × Maximum time = $\frac{27,000}{360}$ × 12 = 900 units

(iii) Number of orders under EOQ Model = $\frac{27,000}{1,440}$ = 18.75 or 19

Frequency of order = $\frac{360}{19}$ = 18.94 days

39. (i) EQO = $\sqrt{\frac{2\times A\times O}{C}}$

A = 4000 × 12 = 48000 units

O = ₹120 per order

C = 20 × 10% = ₹2 per order per annum

EOQ = $\sqrt{\frac{2\times 4,800\times 240}{2}}$ = 2400 units

(ii) Statement Showing Determination of various cost

	Order 2400 units	Order 4000 units
Annual Ordering cost $\left(\frac{48,000}{2,400}120\right)\left(\frac{4,8000}{4,000}120\right)$	2,400	1,440
Annual Carrying cost $\left(\frac{2,400}{2}2\right)\left(\frac{4,000}{2}2\right)$	2,400	4,000
Total Cost	**4,800**	**5,440**

Extra Cost includes = ₹(5550 – 4800) = ₹640

(iii) Minimum Carrying Cost = ₹2,400 which is possible at 2,400 units (EOQ)

40. EOQ = $\sqrt{\frac{2\times A\times O}{C}}$ = $\sqrt{\frac{2\times 4,000\times 135}{12}}$ = 300 units

Number of orders= $\frac{4000}{3000}$ = 13.33 or 14 orders

Relevant cost of this order quantity:

Ordering cost [14 × 135]	1,890
Carrying cost [(300 ÷ 2) × 12]	1,800
Relevant cost	3,690

Revised EOQ = $\sqrt{\frac{2\times A\times O}{C}}$ = $\sqrt{\frac{2\times 4,000\times 80}{12}}$ = 231 units

'Number of orders= 4000/231= 17.31 or 18

Statement of cost

Particulars	OS = 300	OS = 231
Ordering Cost	140 × 80 = 1120	18 × 80 = 1440
Carrying Cost	(300/2) × 12 = 1800	(231/2) × 12 = 1386
Total	2920	2826

Difference in cost on account of this error = 2920 – 2826 = 94

Statement of Evaluation of Offer

Costs	Order Size = 300	Order Size = 4,000
Purchase Cost	4,000 × 90 = 3,60,000	4,000 × 86 = 3,44,000
Ordering Cost	14 × 135 = 1,890	$\frac{4,000}{4,000} \times 0 = 0$
Carrying Cost	$\frac{300}{2} \times 12 = 1,800$	$\frac{4,000}{2} \times 12 = 24,000$
Total Cost	3,63,690	3,68,000

This special offer at ₹86 per unit should not be accepted as its total cost is higher as compared to original offer.

41. (a) Minimum stock of A = ROL – (Average lead time × Average consumption)
= 8,000 – (2 × 200 × 10) = 4,000 kg

(b) Maximum stock of B = ROL + ROQ – (Min. lead time × Min. consumption)
= 4,750 + 5,000 – (3 × 175 × 4) = 7,650 kg

(c) Re-order level of C = Max. lead time × Max. consumption
= 4 × 225 × 6 = 5,400 kg

(d) Average level of A = Minimum level + $\frac{ROQ}{2}$ = 4,000 + $\frac{10,000}{2}$ = 9,000 kg

42. (i) Minimum stock of A = Re-order level – (Avg. consumption × Avg. delivery time)
= 60,000 – (900 × 12 × 3) = 27,600 kg

(ii) Maximum stock of B = Re-order level + Re-order quantity – (Min. consumption × Min. time)
= 70,000 + 8,000 – (550 × 8 × 5) = 56,000 kg

(iii) Re-order level of C = Maximum consumption × Maximum delivery time
= (1,250 × 6) × 7 = 52,500 kg

(iv) Average stock of A = Minimum stock + $\frac{\text{Re-order Quantity}}{2}$

= 27,600 + $\frac{12,000}{2}$ = 33,600 kg

(v) Re-order level of D = Maximum consumption × Maximum time
= (1,250 × 5) × 3 = 18,750 kg

(vi) Minimum stock of D = Re-order level – (Avg. consumption × Avg. time)
= 18,750 – (900 × 5 × 2) = 9,750 kg

43. (*a*) A = Annual usage of parts = 2,000 × 4 × 12 = 96,000 units
O = Cost per order = ₹1,000
C = Carrying cost per unit per annum = 350 × 20% = ₹70
EOQ = 1,656 parts (approx.)
The supplier is willing to supply 30,000 units at a discount of 5%, therefore cost of each part shall be ₹350 – 5% = ₹332.50

Statement of Evaluation of Offer

Particulars	Order 30,000 units	Order 1,656 units
Annual Purchase Cost	96,000 × 332.5= 3,19,20,000	96,000 × 350 = 3,36,00,000
Annual Ordering Cost	$\frac{96,000}{30,000}$ or $4 \times 1,000$ = 4,000	$\frac{96,000}{1,656}$ or $58 \times 1,000$ = 58,000
Annual Carrying Cost	$\frac{30,000}{2} \times 332.5 \times 20\%$ = 9,97,500	$\frac{1,656}{2} \times 350 \times 20\%$ = 57,960
Total Cost	**3,29,21,500**	**3,37,15,960**

Since the total cost under the supply of 30,000 units with 5% discount is lower than that when order size is 1,656 units, therefore the offer should be accepted.

(b) Re-order level = Maximum consumption × Maximum re-order period
= 710 × 5 = 3,550 units

(c) Maximum level = ROL + ROQ – (Minimum consumption × Minimum re-order period)
= 3,550 + 1,656 – (140 × 3 = 4,786 units

(d) Minimum level = ROL – (Normal consumption × Normal re-order period)
= 3,550 – (425 × 4) = 1,850 units

44. (i) A = 7,500 × 12 = 90,000 valves
O = ₹15
C = 20% × 1.50 = ₹0.30

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 90,000 \times 15}{0.30}} = 3,000 \text{ valves}$$

Number of orders = 90,000 ÷ 3,000 = 30 orders
Frequency of order = 360 ÷ 30 = 12 days.

(ii) Re-order Quantity = Safety stock + (Average consumption × Average lead time)
= 3,200 + (7,500 × 1.5) = 14,450 valves

(iii) New carrying cost (C) = 20% × 4.50 = ₹0.90

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 96,000 \times 1,000}{70}} = 1,732 \text{ valves}$$

Working Notes:

45. (1) Production units of EMM = Sales + Closing stock – Opening stock

$$= 45,600 + \frac{45,600}{12} - 3,150 = 46,250 \text{ units}$$

(2) Quantity of REX required to produce 1 unit of EMM 0.80 kg

Quantity of REX required to produce 46,250 units of EMM 37,000 kg

Purchase units of REX = Consumption + Closing stock – opening stock

= 37,000 + 2,310 – 2,100 = 37,210 kg

(3) Maximum lead time – Minimum lead time = 6

Max. lead time = 6 + Minimum lead time

Also, Average lead time = $\frac{\text{Minimum lead time+Maximum lead time}}{2}$

$8 = \frac{\text{Min. lead time+ 6 +Min. lead time}}{2}$

16 = 2(Min. lead time) + 6

Min. lead time = 5 days

∴ Max. lead time = 6 + 5 = 11 days

(i) **Computation of EOQ**

A = 37,210 kg

O = ₹240

C = (10% + 2%) × 25 = 12% × 25 = ₹3

$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 37,210 \times 240}{3}} = 2,440$ kg

Number of orders = 37210/2440 = 15.25 or 16

Total cost at EOQ = Purchase cost + Ordering cost + Carrying cost

$$= (37,210 \times 25) + (16 \times 240) + \left(\frac{2,440}{2} \times 3\right) = ₹9,37,750$$

(ii) Reorder level = Maximum usage × Maximum lead time = 150 kg × 11 days = 1,650 kg

Maximum level = Reorder level + Reorder Quantity – (Min. usage × Min. lead time)

= 1,650 + 2,440 – (90 × 5) = 3,640 kg

(iii) New Purchase price after 2% discount = 25 – 2% = ₹24.50

Number of orders = 37210/7500 = 4.96 or 5

Total cost at order size of 7,500 kg = Purchase cost + Ordering cost + Carrying cost

$$= (37,210 \times 24.50) + (5 \times 240) + \left(\frac{7,500}{2} \times 12\% \times 24.50\right) = ₹9,23,870$$

With order size of 7,500 kg, company can save ₹13,880, ₹9,37,750, ₹9,23,870. Thus, it is recommended to accept the offer.

46. (i) Annual Production = 40,000 units

Annual Consumption of Raw Material = (40,000 units × 1 kg) = 40,000 kg

Reorder point = Safety Stock Level + Normal Usages × Normal Lead Time

= 1,000 kg + 4,000= 5,000 kg

(ii) Statement showing determination of EOQ

Annual Requirement (kg)	No. of Orders P.a	Size of Order (kg)	Avg. Units (kg)	Annual Ordering Cost(₹) (A)	Annual Carrying Cost(₹) (B)	Annual Discount (₹) (C)	Annual ordering & Carrying cost offer Discount (₹) (A)+(B)-(C)
40,000	1	40,000	20,000	1000	4,00,000	40,000	3,61,000
	2	20,000	10,000	2000	2,00,000	32,000	1,70,000
	4	10,000	5,000	4000	1,00,000	20,000	84,000
	5	8,000	4,000	5000	80,000	4,000	81,000

(iii) EQO = $\sqrt{\frac{2\times A\times O}{C}} = \sqrt{\frac{2\times 40,000\times 100}{2}}$ =2,000 kg

No discount on purchases, sine the quantity is less than 6,000 kg

Total carrying cost and ordering cost = $\left(\frac{40,000}{2,000}\times 1,000\right)+\left(\frac{2,000}{2}\times 20\right)$ = ₹40,000

Advise: Optimal order size = 2,000 units

Optimal number of orders p.a = $\frac{40,000}{2,000}$ = 20 orders

47. (i) EQO = $\sqrt{\frac{2\times A\times O}{C}}$

A = 250 kg × 52 weeks = 13,000 kg

O = ₹1,500

C = ₹100 per kg × 9.75% = ₹9.75 per kg

EOQ = $\sqrt{\frac{2\times 13,000\times 1,500}{9.75}}$ = 2,000 kg

(ii) Re-order level = Maximum Consumption × Maximum lead Time

= 300 × 7 = 2,100 kg

(iii) Maximum level = Reorder level + Reorder Qty – (Min consumption × min lead time)

= 2,100 + 2,000 – (200 × 5) = 3,100 kg

(iv) Minimum level = Reorder Level – (Average Consumption × Average Reorder Period)
= 2,100 – (250 × 6) = 600 kg

(v) Average Stock Level = (Minimum level + maximum level)/2
= (3,100 + 600)/2 = 1,850 kg

48. Maximum consumption per day = 350 ÷ 7 = 50 kg
Minimum consumption per day = 210 ÷ 7 = 30 kg
Average consumption per day = (50 + 30) ÷ 2 = 40 kg

(a) A = 40 kg × 365 = 14,600 kg
O = ₹200 per order
C = (1% × 12 × 100) + 2 = ₹14

$$EOQ = \sqrt{\frac{2 \times 14,600 \times 200}{14}} = 646 \text{ kg}$$

(b) Re-order level = Maximum Consumption × Maximum lead Time
= 50 × 9 = 450 kg

(c) Maximum level = Reorder level + Reorder Qty – (Min consumption × min lead time)
= 450 + 646 – (30 × 5) = 946 kg

(d) Minimum level = Reorder Level – (Average Consumption × Average Reorder Period)
= 450 – (40 × 7) = 170 kg

(e) Average Stock Level = (Minimum level + maximum level)/2
= (170 + 946)/2 = 558 kg

(f) Number of order per year = $\frac{\text{Annual consumption}}{\text{EOQ}} = \frac{14,600}{646}$ = 22.60 or 23 orders

(g) Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (14600 \times 100) + (23 \times 200) + \left(\frac{646}{2} \times 14\right) = ₹14,69,122$$

(h) New offer price = 100 – 1% = ₹99
Revised carrying cost = (99 × 1% × 12) + 2 = ₹13.88
Revised order quantity = 14600 ÷ 2 = 7,300 kg
Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$\text{(after discount)} = (14600 \times 99) + (2 \times 200) + \left(\frac{7300}{2} \times 13.88\right) = ₹14,96,462$$

Since cost is higher at offer price, thus offer should not be accepted.

(i) Let new price = y
New carrying cost = (y × 1% × 12) + 2 = 0.12y + 2
Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (14600 \times y) + (2 \times 200) + \left(\frac{7300}{2} \times (0.12y + 2)\right)$$

= 14,600y + 400 + 438y + 7300
= 15,038 + 7,700

$\therefore$ 14,69,122 = 15,038y + 7,700

y = ₹97.18

$\therefore$ Discount per unit = ₹100 – ₹97.18 = ₹2.82

Discount % = $\frac{2.82}{100} \times 100$ = 2.82%

49. (a) Annual raw material requirement = 50,000 × 12 × (8 ÷ 5) = 9,60,000 kg

Material requirement of Ae = 9,60,000 × (5 ÷ 8) = 6,00,000 kg

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 6,00,000 \times 375}{12\% \times 150}} = 5,000 \text{ kg}$$

(b) Maximum level for material Ae = ROL + ROQ – (Min. consumption × Min. lead time)

= (Max. consumption × Max. time) + ROQ – (Avg. consumption × Avg. time)

$$= \left(\frac{6,00,000}{25 \times 12} \times 3\right) + 7,500 - \left(\frac{6,00,000}{25 \times 12} \times 2\right) = 9,500 \text{ kg}$$

Also, since material Ae is perishable in nature and will become obsolete after 3.5 days,

$$\therefore \text{ Maximum level} = \left(\frac{6,00,000}{25 \times 12} \times 3.5\right) = 7,000 \text{ kg}$$

So maximum level will be minimum of the two values i.e. 7,000 kg and 9,500 kg.

$\therefore$ Maximum level for material Ae = 7,000 kg

50.

Statement of Total Cost and Classification

Item	Units	% of Total Units	Unit Cost (₹)	Total Cost (₹)	% of Total Cost	Category
1	7,000	3.1963	5.00	35,000	9.8378	B
2	24,000	10.9589	3.00	72,000	20.2378	A
3	1,500	0.6849	10.00	15,000	4.2162	B
4	600	0.2740	22.00	13,200	3.7103	C
5	38,000	17.3516	1.50	57,000	16.0216	A
6	40,000	18.2648	0.50	20,000	5.6216	B
7	60,000	27.3973	0.20	12,000	3.3730	C
8	3,000	1.3699	3.50	10,500	2.9513	C
9	300	0.1370	8.00	2,400	0.6746	C
10	29,000	13.2420	0.40	11,600	3.2605	C
11	11,500	5.2512	7.10	81,650	22.9502	A
12	4,100	1.8721	6.20	25,420	7.14151	B
	2,19,000	**100**		**3,55,770**	**100**	

51. Classification of the items of inventory as per ABC analysis is as follows:

(1) 15 number of units of varieties of inventory items should be classified as 'A' category item because of the following reasons:

(*a*) Constitute 0.375% of total number of varieties of inventory handled by stores, which is minimum as per given classification in the table.

(*b*) 50% of total use value of inventory holding (average), which is maximum, according to given table

(*c*) Highest in consumption, about 85% of inventory usage (in end-product).

(2) 110 number of varieties of inventory items should be classified as 'B' category item because of the following reasons:

(*a*) Constitute 2.75% of the total number of varieties of inventory items handled by stores of factory.

(*b*) Requires moderate investment of about 30% of total use value of inventory holding (average).

(*c*) Moderate in consumption, about 10% of inventory usage (in end product).

(3) 3,875 number of varieties of inventory items should be classified as 'C' category item because of the following reasons:

(*a*) Constitute 96.875% of total varieties of inventory items handled by stores of factory.

(*b*) Requires about 20% of total use value of inventory holding (average).

(*c*) Minimum inventory consumption i.e. about 5% of inventory usage (in end product)

52. Cost of raw material consumed = opening stock + Purchases – closing stock

= 90,000 + 2,70,000 – 1,10,000 = ₹2,50,000

$$\text{Average stock of material} = \sqrt{\frac{2 \times 90{,}000 \times 15}{0.30}} = \frac{90{,}000 + 1{,}10{,}000}{2} = ₹1{,}00{,}000$$

$$\text{Inventory turnover ratio (ITR)} = \frac{\text{RAw material consumed}}{\text{Average stock of material}} = \frac{2{,}50{,}000}{1{,}00{,}000} = 2.5 \text{ times}$$

$$\text{Average number of days of inventory holding} = \frac{365}{ITR} = \frac{365}{2.5} = 146 \text{ days}$$

53.

Particulars	Material A	Material B
Opening stock	10,000	9,000
Add: Purchases	52,000	27,000
Less: Closing stock	(6,000)	(11,000)
Material consumed (A)	56,000	25,000
Average stock [(Op + Cl),2] (B)	8,000	10,000
Inventory turnover rate (C = A ÷ B)	7 times	2.5 times
Number of days (365 ÷ C)	52 days	146 days

54.

(i) Calculation of Inventory Turnover Ratio

Particulars	Material A	Material B
Opening stock	30,000	32,000
Add: Purchases	90,000	51,000
Less: Closing Stock	20,000	14,000
Raw Material Consumed (A)	1,00,000	69,000
Average Stock $\left(\frac{\text{Opening+Closing}}{2}\right)$ (B)	$\frac{30,000+20,000}{2}$ = 25,000	$\frac{32,000+14,000}{2}$ = 23,000
Inventory Turnover Ratio (ITR)	$\frac{1,00,000}{25,000}$ = 4 times	$\frac{69,000}{23,000}$ = 3 times
Number of days (360 ÷ ITR)	$\frac{360}{4}$ = 90 days	$\frac{360}{3}$ = 120 days

(ii) Material A is moving faster than Material B.

55.

(i) Calculation of turnover ratio

Particulars	Material M	Material N
Turnover Ratio $\left(\frac{\text{Cost of stock of mateiral consumed}}{\text{Average stock of material}}\right)$	$\frac{6,00,000+9,50,000-4,50,000}{(6,00,000+4,50,000)/2}$ = 2.09	$\frac{10,00,000+18,40,000-7,25,000}{(10,00,000+7,25,000)/2}$ = 2.45
Average number of days for which the average inventory is held $\left(\frac{360}{\text{Inventory Turnover Ratio}}\right)$	$\frac{360}{2.09}$ = 172.25 days	$\frac{360}{2.45}$ = 146.94 days

(ii) Advise

On comparing the two, it can be said that Material M is slow moving as compared to Material N because of having higher inventory holding period of 172.25 days. Since the inventory holding period is high in both case then the exact decision should be taken by comparing the same with the industry standards.

56.

Statement of Cost

Particulars	Chemical A	Chemical B
Purchase price	1,00,000	1,04,000
Add: Basic custom duty @10%	10,000	10,400

(+) Railway freight (₹3,840 in ratio of 5:4 i.e. quantity purchased)	2,133	1,707
Total Cost (A)	1,12,133	1,16,107
Quantity Purchased	10,000	8,000
(-) Normal breakage	(500)	(320)
	9,500	7,680
(-) Provision for detonation @ 2%	(190)	(153.6)
Net Quantity (B)	9,310	7,526.4
Total cost per kg (A ÷ B)	12.04	15.43

57.

Computation of probability of stock out

Stock-out (units)	100	80	50	20	10	0	Total
No. of times	2	5	10	20	30	33	100
Probability	0.02	0.05	0.10	0.20	0.30	0.33	1.00

Statement showing determination of Optimal Stock

Safety Stock Units	Stock-out units	Prob.	Expected annual stock out units	Expected annual stock out costs	Annual holding cost	Total annual expected cost
100	0	0	0	0	5,000	5,000
80	20	0.02	0.4	60	4,000	4,060
50	50 30	0.02 0.05	1.0 1.5 2.5	150 225 375	2,500	2,875
20	80 60 30	0.02 0.05 0.10	1.6 3 3 7.6	240 450 450 1,140	1,000	2,140
10	90 70 40 10	0.02 0.05 0.10 0.20	1.8 3.5 4.0 2.0 11.3	270 525 600 300 1,695	500	2,195
0	100 80 50 20 10	0.02 0.05 0.10 0.20 0.30	2 4 5 4 3 18	300 600 750 600 450 2,700	0	2,700

It is recommended to maintain safety stock level of 20 units at which total cost is least i.e. ₹2,140.

58.

(a) Stores Ledger (Weighted Average Basis)

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-19	-	-	-	-	-	-	1,000	15	15,000
4-4-19	3,000	16	48,000	-	-	-	4,000	15.75	63,000
8-4-19	-	-	-	1,000	15.75	15,750	3,000	15.75	47,250
15-4-19	1,500	18	27,000	-	-	-	4,500	16.50	74,250
20-4-19	-	-	-	1,200	16.50	19,800	3,300	16.50	54,450
25-4-19	-	-	-	300	18	5,400	3,000	16.35	49,050
26-4-19	-	-	-	1,000	16.35	16,350	2,000	16.35	32,700
28-4-19	500	17	8,500	-	-	-	2,500	16.48	41,200
30-4-19	-	-	-	50	16.48	824	2,450	16.48	40,376

(b) Stores Ledger (LIFO)

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-19	-	-	-	-	-	-	1,000	15	15,000
4-4-19	3,000	16	48,000	-	-	-	1,000 3,000	15 16	15,000 48,000
8-4-19	-	-	-	1,000	16	16,000	1,000 2,000	15 16	15,000 32,000
15-4-19	1,500	18	27,000	-	-	-	1,000 2,000 1,500	15 16 18	15,000 32,000 27,000
20-4-19	-	-	-	1,200	18	21,600	1,000 2,000 300	15 16 18	15,000 32,000 5,400
25-4-19	-	-	-	300	18	5,400	1,000 2,000	15 16	15,000 32,000
26-4-19	-	-	-	1,000	16	16,000	1,000 1,000	15 16	15,000 16,000
28-4-19	500	17	8,500	-	-	-	1,000 1,000 500	15 16 17	15,000 16,000 8,500
30-4-19	-	-	-	50	17	850	1,000 1,000 450	15 16 17	15,000 16,000 7,650

(ii) Value of Material Consumed and Closing Stock

	Weighted Average Method (₹)	LIFO Method (₹)
Opening stock as on 01-04-2019	15,000	15,000
Add: Purchases	83,500	83,500
Less: Return to supplier	(5,400)	(5,400)
Less: Abnormal loss	(824)	(850)
Less: Closing stock as on 30-04-2019	(40,376)	(38,650)
Value of material consumed	**51,900**	**53,600**

59.

(A) Statement of receipts and issues using FIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-23	-	-	-	-	-	-	100	5	500
5-4-23	300	6	1800	-	-	-	100 300	5 6	500 1800
6-4-23	-	-	-	100 150	5 6	500 900	150	6	900
8-4-23	500	7	3500	-	-	-	150 500	6 7	900 3500
10-4-23	-	-	-	150 250	6 7	900 1750	250	7	1750
12-4-23	600	8	4800	-	-	-	250 600	7 8	1750 4800
14-4-23	-	-	-	250 250	7 8	1750 2000	350	8	2800

The value of material consumed = (500 + 900) + (900 + 1750) + (1750 + 2000) = ₹7,800

Balance of material as on 15-4-2023 = ₹2800

Statement of receipts and issues using LIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-23	-	-	-	-	-	-	100	5	500
5-4-23	300	6	1800	-	-	-	100 300	5 6	500 1800
6-4-23	-	-	-	250	6	1500	100 50	5 6	500 300

8-4-23	500	7	3500	-	-	-	100 50 500	5 6 7	500 300 3500
10-4-23	-	-	-	400	7	2800	100 50 100	5 6 7	500 300 700
12-4-23	600	8	4800	-	-	-	100 50 100 600	5 6 7 8	500 300 700 4800
14-4-23	-	-	-	500	8	4000	100 50 100 100	5 6 7 8	500 300 700 800

The value of material consumed = 1,500 + 2,800 + 4,000 = ₹8,300

Balance of material as on 15-4-2023 = 500 + 300 + 350 + 800 = ₹2,300

(b) On 6-4-2023, 250 units were issued to production. Under FIFO their value comes to ₹1,400 and under LIFO its ₹1,500. Hence, ₹100 more was charged to production under LIFO.

On 10-4-2023, 400 units were issued to production. Under FIFO their value comes to ₹2,650 and under LIFO its ₹2,800. Hence, ₹150 more was charged to production under LIFO.

On 14-4-2023, 500 units were issued to production. Under FIFO their value comes to ₹3,750 and under LIFO its ₹4,000. Hence, ₹250 more was charged to production under LIFO.

Thus, the total excess amount charged to production under LIFO comes to ₹500.

The difference of ₹500 (2,800 – 2,300) in value of closing stock is due to following reasons:

(a) In case of FIFO, all the 350 units of the closing stock belongs to the purchase of material made on 12-4-2023, whereas under LIFO these units were from opening balance and purchases made on 5-4-2023, 8-4-2023 and 12-4-2023.

(b) Due to different purchase price paid by the concern on different days of purchase, the value of closing stock differed under FIFO and LIFO. Under FIFO 350 units of closing stock were valued @ ₹8 per unit whereas under LIFO first 100 units were valued @₹5 per unit, next 50 units @₹6 per unit, next 100 units @₹7 per unit and last 100 units@₹8 per unit.

60.

Date Sep.	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1	-	-	-	-	-	-	6,000	285.00	17,10,000
8	-	-	-	4,875	285.00	13,89,375	1,125	285.00	3,20,625

9	17,500	276.00	48,30,000	-	-	-	18,625	276.54	51,50,625
10	-	-	-	12,000	276.54	33,18,480	6,625	276.54	18,32,145
12	2,375	276.54	6,56,783	-	-	-	9,000	276.54	24,88,928
15	9,000	288.00	25,92,000	-	-	-	18,000	282.27	50,80,928
17	-	-	-	700	288.00	2,01,600	17,300	282.04	48,79,328
20	-	-	-	9,500	282.04	26,79,380	7,800	282.04	21,99,948
30	-	-	-	900*	282.04	2,53,836	6,900	282.04	19,46,112
30	-	-	-	300**	-	-	6,600	294.87	19,46,112

*900 units is abnormal loss, hence it will be transferred to costing P&L account.

**300 units is normal loss, hence it will be absorbed by good units.

61. Assumption – No opening stock on 1st January

Materials cost and control

Month	Opening balance	Purchase	Issued Units (₹)	Closing Balance
January	Nil	200	Nil	200
February	200	300	250	250
March	250	425	300	375
April	375	475	550	300
May	300	500	800	Nil
June	Nil	600	400	200

At the end of May, there was no closing stock, i.e. no opening stock on June. But there was closing stock of 200 units at the end of June.

Value of closing stock at the end of June:

FIFO – 200 units @ ₹20 = ₹4,000

LIFO – 200 units @ ₹20 = ₹4,000

Weighted average – 200 units @ ₹20 = ₹4,000

Hence the argument of the Chief Accountant is correct. He is correct only in the above case. If there was closing stock at the end of May, the argument of the Chief Accountant would not have been correct.

62. **Statement of receipts and issues using FIFO**

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	100 100	1 2	100 200

Jan 22	-	-	-	60	1	60	40 100	1 2	40 200
Jan 23	-	-	-	40 20	1 2	40 40	80	2	160

Statement of receipts and issues using LIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	100 100	2 1	200 100
Jan 22	-	-	-	60	2	120	40 100	2 1	80 100
Jan 23	-	-	-	40 20	2 1	80 20	80	1	80

Statement of receipts and issues using Weighted Average

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	200	1.50	300
Jan 22	-	-	-	60	1.50	90	140	1.50	210
Jan 23	-	-	-	60	1.50	90	80	1.50	120

Statement of Required Data

	FIFO (₹)	LIFO (₹)	Weighted Average (₹)
Material for Job W16	60	120	90
Material for Job W17	80	100	90
Closing stock	160	80	120

63.

Date	GRN/ MRN	Receipt			Requisition No.	Issue			Balance		
		Qty	Rate	Amount		Qty	Rate	Amount	Qty	Rate	Amount
1 Sep	-	-	-	-	-	-	-	-	25	6.50	162.5
4 Sep	-	-	-	-	85	8	6.5	52	17	6.50	110.5

Date	GRN/ MRN	Receipt			Requisition No.	Issue			Balance		
		Qty	Rate	Amount		Qty	Rate	Amount	Qty	Rate	Amount
6 Sep	26	50	5.75	287.50	-	-	-	-	17 50	6.50 5.75	162.50 287.50
7 Sep	-	-	-	-	97	12	6.50	78	5 50	6.50 5.75	32.50 287.50
10 Sep	-	-	-	-	-	10	5.75	57.50	5 40	6.50 5.75	32.50 230
12 Sep	-	-	-	-	108	5 10	6.50 5.75	32.50 57.50	30	5.75	172.50
13 Sep	-	-	-	-	110	20	5.75	115	10	5.75	57.50
15 Sep	33	25	6.10	152.50	-	-	-	-	10 25	5.75 6.10	57.50 152.50
17 Sep	-	-	-	-	121	10	5.75	57.50	25	6.10	152.50
19 Sep	38	10	5.75	57.50	-	-	-	-	25 10	6.10 5.75	152.50 57.50
20 Sep	4	5	5.75	28.75	-	-	-	-	5 25 10	5.75 6.10 5.75	28.75 152.50 57.50
26 Sep	-	-	-	-	146	5 5	5.75 6.10	28.75 30.50	20 10	6.10 5.75	122 57.50
30 Sep	-	-	-	-	Shortage	2	6.10	12.20	18 10	6.10 5.75	109.80 57.50

Working Notes:

(a) The material received as replacement form vendor is treated as fresh supply

(b) In the absence of any information, the price of the material returned from a user department on 20 Sep has been taken at the price of the latest issue made on 17 Sep. In FIFO method, physical flow of the material is irrelevant and issue price is based on first in first out.

(c) The issue of material on 26 Sep is made out of the material received from a user department on 20 Sep.

(d) The entries for transfer of material from one job to another on 22 Sep and 29 Sep do not affect the store ledger. Hence no entries are passed in its respect.

(e) The material found short as a result of stock taking has been written off at relevant issue price.

64. Ordering cost per order = 4,00,000 ÷ 320 = ₹1,250

Delivery cost per delivery = 1,35,000 ÷ 270 = ₹500

A = (1,250 × 100) + (500 × 70) = ₹1,60,000

B = (1,250 × 220) + (500 × 200) = ₹3,75,000

65.

(i) (d) Monthly Production of $X = 30,000$ kgs.

Raw Material Required $= \frac{50,000}{5} \times 3 = 30,000\,\text{kg}.$

$$\text{Material A} = \frac{50,000}{5} \times 3 = 30,000 \text{ kg}$$

$$\text{Material B} = \frac{50,000}{5} \times 2 = 20,000 \text{ kg}$$

(ii) (a) Calculation of Economic Order Quantity (EOQ):

$$\text{Material A} = \sqrt{\frac{2 \times \text{Annual consumption} \times \text{Ordercost}}{\text{Carrying cost per unit p.a.}}}$$

$$= \sqrt{\frac{2 \times (30,000 \times 12) \times 1,200}{15\% \text{ of} 30}} = 13,856 \text{ kg}$$

$$\text{Material B} = \sqrt{\frac{2 \times (20,000 \times 12) \times 1,200}{5\% \text{ of} 44}} = 16,181 \text{ kg}$$

(iii) (b) Calculation of Maximum Stock level: Since, the Material A is perishable in nature and it required to be used within 10 days, hence, the Maximum Stock Level shall be lower of two:

(a) Stock equal to 10 days consumption.

$$\frac{30000}{25} \times 10 \text{ days} = 12,000 \text{ kg}$$

(b) Maximum Stock Level for Matyerial A:

Re-order Quantity + Re-order level – (Min consumption* × Min. lead time)

Where, Re-order Quantity = 15,000 kg.

Re-order level = Max. Consumption* × Max. Lead time

= 30,000/25 × 2 days = 2,400 kg.

Maximum stock level = 15,000 kg. + 2,400 kg

(30,000/25 × 1 day)

= 17,400 – 1,200 = 16,200 kg.

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, maximum Stock Level will be **12,000 kg.**

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

(iv) (b) Calculation of Savings/loss in Material A if purchase quantity equals to EOQ.

	Purcahse Quantity = 15,000 kg	**Purchase Quantity = EOQ i.e. 13,856 kg.**
Annual consumption	3,60,000 kg. (30,000 × 12 months)	3,60,000 kg. (30,000 × 12 months)
No. of orders [Not-(i)]	30 (3,60,000 ÷ 12,000)	30 (3,60,000 ÷ 12,000)
Ordering Cost (a)	₹36,000 (₹1200 × 30)	₹36,000 (₹1200 × 30)
Carrying Cost (b) [Note-(ii)]	₹30,375 (15% of ₹27 × 7,500)	₹31,176 (15% of ₹30 × 6,928)

Purcahse Cost (c) (for good portion)	₹97,20,000 (₹27 × 3,60,000)	₹1,08,00,000 (₹30 × 3,60,000)
Loss due to obsolescence (d) [Note - (iii)]	₹24,30,000 [₹27 × (30 × 3,000)]	₹16,70,400 [₹30 × (30 × 1,856)]
Total Cost [(a) + (b) + (c) + (d)]	₹1,22,16,375	₹1,25,37,576

Purchasing of material - A at present policy of 15,000 kg saves **₹3,21,201**.

Notes: (i) Since, material gets obsolete after 10 days, the quantity in excess of 10 days consumption i.e. 12,000 kg a fresh order needs to be given.

(ii) Carrying cost is incurred on average stock of Materials purchased.

(iii) The excess quantity of material becomes obsoltete and loss has to be incurred.

(v) (c) Minimum Stock Level for Material A

= Re-order level – (Average Consumption Rate × Average Re-order Period)

= 2400 – (1200 × 1.5) = **600 kgs**

Re-order level = Max. Consumption* × Max. Lead time

= 30,000/25 × 2 days = 2,400 kg.

Average Consumption Rate = (30,000/25 + 30,000/25)/2

= 1,200 kg

Average Re-order Period = (1 + 2)/2 = 1.5 Days

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, maximum Stock Level will be 12,000 kg.

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

❑❑❑