

2. MATERIAL COST

NO. OF PROBLEMS IN 41E OF CA INTER: CLASSROOM - 22, ASSIGNMENT - 27

NO. OF PROBLEMS IN 42E OF CA INTER: CLASSROOM - 18, ASSIGNMENT - 17

NO. OF PROBLEMS IN 43E OF CA INTER: CLASSROOM - 21, ASSIGNMENT - 21

MODEL - WISE ANALYSIS OF PREVIOUS EXAMINATIONS

No.	Model Name	M - 11	N - 11	M - 12	N - 12	M - 13	N - 13	M - 14	N - 14	M - 15	N - 15	M - 16	N - 16	M - 17	N - 17	M - 18(O)	M - 18(N)	N - 18(O)	N - 18(N)	M - 19(O)	M - 19(N)	N - 19(O)	N - 19(N)
1.	ECONOMIC ORDER QUANTITY	-	-	-	5	-	5	8	-	-	-	-	-	-	-	5	5	-	-	-	-	-	5
2.	INVENTORY LEVELS	-	-	-	-	-	-	-	-	5	-	-	-	-	5	-	-	-	-	10	8	-	-
3.	MATERIAL TURNOVER RATIO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	RAW MATERIAL VALUATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	RAW MATERIAL ISSUE METHODS	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	8	-
6.	ABC ANALYSIS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	STOCK OUT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SIGNIFICANCE OF EACH PROBLEM COVERED IN THIS MATERIAL

Problem No. in this material	Problem No. in new SM	Problem No. in old SM	Problem No. in old RM	RTP	MTP	PQ	Previous Exams	Remarks
CR-1	PQ-7	ILL-12	-	-	-	-	-	-
CR-2	PQ-3	ILL-7	-	-	-	-	-	-
CR-3	-	-	6	-	N18(N&O)	-	-	-
CR-4	-	-	-	-	-	-	M18(N)-5M	-
CR-5	-	-	-	-	-	M18	-	-
CR-6	-	-	-	-	-	-	M 08	-
CR-7	-	-	-	M17	-	-	-	-
CR-8	-	-	-	-	-	-	NO19(N)	-
CR-9	-	-	-	NOV19(N)	-	-	-	-
CR-10	-	-	5	-	-	-	-	-
CR-11	-	-	-	-	-	-	N14 - 5M	-
CR-12	-	-	8	-	-	-	-	-
CR-13	PQ-4	ILL-13	-	-	-	-	-	-
CR-14	-	-	16	-	-	-	N13 - 5M	-
CR-15	-	-	-	-	-	-	M19 - 8M	-
CR-16	ILL-10	ILL-16	25	-	-	-	-	-
CR-17	ILL-1	-	-	-	-	-	-	-
CR-18	-	ILL-18	-	-	-	-	-	-
CR-19	-	-	-	-	-	-	M19 - 10M	-
CR-20	-	-	-	-	-	-	N19-(O)	-
CR-21	-	-	-	-	M18-1 (N) M18-1 (O)	-	-	-
ASG-1	ILL-3	ILL-3	-	-	-	-	-	-

ASG-2	ILL-4	ILL-4	-	-	-	-	-	-
ASG-3	PQ-1	ILL-5	-	-	-	-	-	-
ASG-4	-	-	18	-	-	-	M14 - 8M	
ASG-5	-	-	-	M 16	-	-		
ASG-6	-	-	-	-	-	-	M18(O) - 5M	
ASG-7	-	-	-	M 18(N) M 18(O)	-	-	-	
ASG-8	-	-	3	-	-	-	-	
ASG-9	-	-	-	-	-	-	M 02	
ASG-10							N18(N) - 10M	
ASG-11	-	-	13	-	-	-	-	
ASG-12	-	-	-	-	-	-	-	
ASG-13	-	-	--	-	-	-	-	
ASG-14	-	-	17	N17 M19 (N) M19 (O)	M18 -2(N) M18- 2(O) M19 - (N) (O)	-	-	
ASG-15	ILL-11 PQ-8	ILL-17	-	-	-	-	-	
ASG-16	-	-	-	-	-	-	-	
ASG-17	ILL-13	ILL-19	-	-	-	-	-	
ASG-18	-	-	-	-	-	-	-	
ASG-19	-	-	-	-	-	-	-	
ASG-20	-	-	-	-	-	-	-	
ASG-21	ILL-8	ILL-15	-	-	-	-	-	

~~STUDY MATERIALS~~ **ECONOMIC ORDER QUANTITY**

Purchase department in manufacturing concerns is usually faced with the problem of deciding the 'quantity of various items' which they should purchase. If purchases of material are made in bulk then inventory carrying cost will be high. On the other hand if order size is small, then the ordering cost will be high. In order to minimize ordering and carrying costs it is necessary to determine the order quantity which minimizes these two costs. The size of the order for which both ordering and carrying cost are minimum, is known as economic order quantity.

Assumptions underlying E.O.Q: The calculation is subject to the following assumptions:

- Ordering cost per order and carrying cost per unit per annum are known and they do not change.
- Anticipated usage of material in units is known in advance.
- Cost per unit of the material is constant and is known in advance.
- The quantity of material ordered is received immediately i.e. the lead time is zero.

How to calculate: An e.g.: Ordering cost per order: Rs.150. Carrying cost per unit: Rs.1.50 per unit per annum. Annual usage of R.M. - 3,200 units. No discounts are offered. Find EOQ.

Tabular or Trial & Error Method:

If the entire raw material required is purchased at a time, number of orders to be placed - 1:

Ordering cost P.A. - 1 order x 150 = 150

Carrying cost - 3,200 x $\frac{1}{2}$ x 1.50 = 2,400

Total cost 2,550

If two purchase orders are placed:

Ordering cost P.A. - 2 orders x 150 = 300

Carrying cost - 1,600 x $\frac{1}{2}$ x 1.50 = 1,200 (3,200 X $\frac{1}{2}$ X $\frac{1}{2}$ X 1.50)

Total cost 1,500

If 3 purchase orders are placed: Total cost - 1,250 (450 + 800)

If 4 purchase orders are placed: Total cost - 1,200 (600 + 600)

If 5 purchase orders are placed: Total cost - 1,230 (750 + 480)

Let us tabulate:

No. of Orders (1)	Qty./order (2)	Avg. Inv. (3) = 2 X ½	Ordering cost (4) = (1) X 150	Carrying cost (5) = (3) X 1.50	Total cost (6) = 4 + 5
1	3,200	1,600	150	2,400	2,550
2	1,600	800	300	1,200	1,500
3	1066	533	450	800	1,250
4	800	400	600	600	1,200 (*)
5	640	320	750	750	1,230

* Since the total cost is least here, EOQ is 800 units (i.e. 4 orders per annum)

Some Observations:

- a) At EOQ, OC = CC.
- b) Upto EOQ, total cost is decreasing and thereafter it is increasing.

Formula/Equation Method (Wilson's Formula):

$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where,

A = Annual usage _____

O = Ordering cost per order _____

C = Carrying cost per unit per annum _____

Both must be for the same time period

Costs associated with EOQ:

1. **Buying or Ordering Costs:** These are costs associated with every purchase order and are incurred every time a purchase order is made out. Some examples are:
 - a) Cost of paperwork - Purchase Requisition, Purchase Order.
 - b) Cost of placing advertisements in newspapers inviting quotations from suppliers.
 - c) Cost of administration - negotiation and liaison with suppliers.
 - d) Cost of inspection, sample testing etc.
2. **Carrying or Stockholding Costs:** These are costs associated with carrying one unit of the raw material in stock. It includes:
 - a) Interest on working capital.
 - b) Insurance & Warehousing Charges.
 - c) Loss due to deterioration of materials during storage & obsolescence etc.

As the number of purchase orders decreases, quantity ordered every time increases. Hence carrying cost also increases based on average inventory held.

Total ordering cost = no. of orders X cost per order

$$\text{Total carrying cost} = EOQ / \text{order size} \times \frac{1}{2} \times \text{carrying cost p.u / p.a}$$

INVENTORY LEVELS

Reorder Level: This is the level of Raw material at which a fresh order for Raw material purchases shall be made. This gives the answer to the questions - "When to purchase?", "When the new purchase shall be made?"

Reorder quantity: This gives the quantity to be purchased at a time. This gives the answer to the question - "How much to purchase?"

Maximum Level: It is the level of stock beyond which inventory should not cross.

Minimum Level: It is the level of stock beyond which the inventory will not be allowed to fall.

Reorder Level (0r)	Lead time consumption + Safety stock (or)
Reorder point	Maximum Usage X Maximum delivery period/lead time
Reorder quantity	EOQ
Maximum Level	Reorder Level + Reorder quantity - (Minimum usage X Minimum lead time)
Minimum Level	(Or) EOQ + Safety Stock
Average Level	Reorder level - (Normal consumption X Normal Lead time)
Danger Level	Or Safety Stock
	Min + Max / 2 (Or) Min Level + ½ ROQ
	Emergency delivery period X Average usage / Minimum usage

Note:

- a) Both usage and time must be taken for the same period of time.
- b) In the absence of information relating to normal consumption & normal lead time, use the average levels.

MATERIAL TURNOVER RATIO

Meaning: It measures the speed at which the raw materials are getting consumed. It can be expressed either in number of days or in number of times. (E.g.: 36.5 days or 10 times)

$$\text{ITR (In times)} = \frac{\text{Cost of materials consumed during the period}}{\text{Cost of average stock (Opening + Closing)/2}} \quad \text{Or}$$

$$\text{ITR (In days)} = \frac{365 \text{ days}}{\text{ITR in times}}$$

Conclusion:

- a) More the number of times the faster is the movement of Raw Material.
- b) Less the number of days the faster is the movement of Raw Material.

COST OF RAW MATERIAL RECEIPTS

$$\text{Cost per Kg. of Raw material: } \frac{\text{Total cost of purchases}^*}{\text{Total units/kgs- Normal Loss units/Kgs}}$$

* Includes purchase price, taxes paid, carriage inwards, packing material, insurance etc

S. No.	Items	Treatment
	Discounts and Subsidy	
i)	Trade Discount	Trade discount is deducted from the purchase price if it is not shown as deduction in the invoice.
ii)	Quantity Discount	Like trade discount quantity discount is also shown as deduction from the invoice. It is deducted from the purchase price if not shown as deduction.
iii)	Cash Discount	Cash discount is not deducted from the purchase price. It is treated as interest and finance charges. It is ignored.
iv)	Subsidy/ Grant/Incentives	Any subsidy/ grant/ incentive received from the Government or from other sources deducted from the cost of purchase. Duties and Taxes

Duties and Taxes		
v)	Road Tax/ Toll Tax	Road tax/ Toll tax if paid by the buyer then it is Included with the cost of purchase.
vi)	Integrated Goods And Service Tax (IGST)	Integrated Goods and Service Tax (IGST) is paid on inter-state supply of goods and provision of services and collected from the buyers. It is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
vii)	State Goods and Service Tax (SGST)	State Goods and Service Tax (SGST) is paid on intra-state supply and collected from the buyers. It is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
viii)	Central Goods and Service Tax (CGST)	Central Goods and Service Tax (CGST) is paid on manufacture and supply of goods and collected from the buyer. It is excluded from the cost of purchase if the input credits available for the same. Unless mentioned specifically CGST is not added with the cost of purchase.
ix)	Basic Custom Duty	Basic Custom duty is paid on import of goods from outside India. It is added with the purchase cost.
Penalty and Charges		
x)	Demurrage	Demurrage is a penalty imposed by the transporter for delay in uploading or offloading of materials. It is an abnormal cost and not included with cost of purchase
xi)	Detention charges/ Fine	Detention charges/ fines are imposed for noncompliance of rule or law by any statutory authority. It is an abnormal cost and not included with cost of purchase
xii)	Penalty	Penalty of any type is not included with the cost of purchase.
Other expenditures		
xiii)	Insurance charges	Insurance charges are paid for protecting goods during transit. It is added with the cost of purchase.
xiv)	Commission or brokerage paid	Commission or brokerage paid is added with the cost of purchase.
xv)	Freight inwards	It is added with the cost of purchase as it is directly attributable to procurement of material.
xvi)	Cost of containers	Treatment of cost of containers are as follows : Non-returnable containers: The cost of containers is added with the cost of purchase of materials. <ul style="list-style-type: none"> Returnable Containers: If on return of containers cost of containers is returned back then in this case cost of containers is not added with the cost of purchase. If the amount of refund on returning the container is less than the amount paid then only short fall is added with the cost of purchase.
xvii)	Shortage	Shortage in materials are treated as follows: Shortage due to normal reasons: Good units absorb the cost of shortage due to normal reasons. Losses due to breaking of bulk, evaporation, due to unavoidable conditions etc. are the reasons of normal loss. Shortage due to abnormal reasons: shortage arises due to abnormal reasons such as material mishandling, pilferage, due to avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are debited to costing profit and loss account.

PRICING OF RAW MATERIAL ISSUES

- a) **FIFO:** Under this method issues are priced on the assumption that materials purchased first are issued first. The actual physical movement of materials may or may not follow this pattern.
- b) **LIFO:** Under this method issues are priced on the assumption that materials purchased last are issued first. The actual physical movement of materials may not follow this pattern.
- c) **Simple Average Method:** Before each issue a simple average of the prices is calculated by dividing all the prices of different lots of a material in stock at the time of issue by the total number of prices (In conjunction with FIFO).
- d) **Weighted Average Method:** This takes into account the price as well as the quantity of different lots of a material in store. Before each issue the weighted average price cost is calculated by dividing the total book value of materials in hand by the total quantity of materials in stock before the issue (To be calculated at each purchase).
- e) **Periodical Simple Average Method:** This is similar to simple average method with the difference that the issue price is calculated only periodically (weekly, fortnightly or monthly etc.) and not at the time of each purchase. For the specified period the issue price remains unchanged. The work of pricing of issues of materials is done only at the end of the period. During the period only the quantities of material issued are entered in store ledger as and when issues are made. Price of opening stock is excluded both in the numerator and denominator.
- f) **Periodical Weighted Average Method:** This is similar to weighted average method with the difference that the issue price is calculated only periodically (weekly, fortnightly or monthly etc.) and not at the time of each purchase. For the specified period the issue price remains unchanged. The work of pricing of issues of materials is done only at the end of the period. During the period only the quantities of material issued are entered in store ledger as and when issues are made. Price of opening stock is excluded both in the numerator and denominator.
- g) **Base Stock Method:** Base stock represents the minimum stock of materials required to be maintained at all times. No issue shall be made out of this stock. The quantity of materials in excess of the base stock is available for production, while the base stock is used only in case of emergency. The excess is priced in conjunction with one of the other methods such as FIFO or LIFO. Thus this method can't be used independently.

PROBLEMS FOR CLASS ROOM DISCUSSION

MODEL 1: ECONOMIC ORDER QUANTITY

PROBLEM 1: G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at Rs 20. For every finished product, one unit of component is required. The ordering cost is Rs 120 per order and the holding cost is 10% p.a.

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?

(A) (NEW SM, OLD SM) (ANS.: 2400 UNITS, RS.640, RS.2400)
(SOLVE PROBLEM NO. 1,2 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if 2 units of raw material required for 1 unit of finished product?

Note: _____

PROBLEM 2: The Gardner is deciding on the EOQ for two brands of fertilizer X and Y.

Particulars	Fertilizer	
	X	Y
Annual usage	2,000 Bags	1,280 Bags
Relevant ordering cost per purchase order	Rs. 1,200	Rs. 1,400
Annual relevant carrying cost per bag.	Rs. 480	Rs. 560

Required:

- Compute EOQ for X & Y.
- For the EOQ, annual ordering costs and total annual carrying costs for X & Y?
- For the EOQ, compute the number of deliveries per year for X & Y.
- What is the time gap between two orders?

(A) (NEW SM, N99 – 8M) (ANS.: A. X: 100BAGS Y: 80 BAGS, B. X: 48,000, Y: 44,800, C. X: 20, Y: 16, D. X: 18.25, Y: 22.81

Concept question:

- If EOQ increase then ordering cost increase or decrease.
- If EOQ decrease then carrying increase or decrease.

Note: _____

PROBLEM 3: A company manufactures a product from a raw material, which is purchased at Rs.60 per kg. The company incurs a handling cost of Rs.360 plus freight of Rs.390 per order. The carrying cost of inventory of raw material is Re.0.50 per kg. per month. In addition, the cost of working capital finance on the investment in inventory of raw materials is Rs.9 per kg. per annum. The annual production of the product is 1,00,000 units and 20 units are obtained from one kg of raw material.

- Calculate the economic order quantity of raw materials. (N 01 - 10M)
- Advice, how frequently should orders for procurement be placed.
- 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.

(A) (NEW SM, OLD SM, OLD PM)(MTP N18(N&O)) (ANS.: A. 2000, B. 18 DAYS, C. 2%)
(SOLVE PROBLEM NO.3,4 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

- What is EOQ if carrying cost per unit per quarter is RS.3

Note: _____

PROBLEM 4: M/s. X private limited is manufacturing a special product which requires a component "SKY BLUE". The following particulars are available for the year ended 31st march, 2018.

- Annual demand of "SKY BLUE" 12000 units
- Cost of placing an order Rs.1800
- Cost per unit of "SKY BLUE" Rs.640
- Carrying cost per annum 18.75%

The company has been offered a quantity discount of 5% on the purchases of "SKY BLUE" provided the order size is 3000 components at a time.

You are required to

- Compute the Economic order quantity.
- Advise whether the quantity discount offer can be accepted.

Concept question:

What would be the impact on the question, if carrying cost per unit per annum is Rs 100.

Note: _____

PROBLEM 5: Arnav Ltd. manufactures a product X which requires two raw materials A and B 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 A is required.

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

Product X 12,000 units

Material A 24,000 units

Material B 52,000 units

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

Product X is sold at Rs1,040 per unit. Material A and B is purchased at Rs.150 and Rs.200 Respectively.

Required:

Compute economic order quantity (EOQ):

- (i) If purchase order for the both materials is placed separately.
- (ii) If purchase order for the both materials is not placed separately

(A) (PQ) (ANS.: (I) MATERIAL A = 54,462 UNITS; MATERIAL B=86,860 UNITS AND (II) MATERIAL A = 21,592 Tons; MATERIAL B=86,860 UNITS))

Concept question:

What would be the impact on the question, if 6 units of material required for one unit of finished product.

Note: _____

PROBLEM 6: ZED Company supplies plastic crockery to fast food restaurants in metropolitan city. One of its products is a special bowl, disposable after initial use, for serving soups to its customers. Bowls are sold in pack 10 pieces at a price of 50 per pack.

The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchases the bowl direct from manufacturer at 40 per pack within a three days lead time. The ordering and related cost is 8 per order. The storage cost is 10% per cent per annum of average inventory investment.

Required:

- a) Calculate Economic Order Quantity.
- b) Calculate number of orders needed every year.
- c) Calculate the total cost of ordering and storage bowls for the year.
- d) Determine when the next order should be placed. (Assuming that the company does maintain a safety stock and that the present inventory level is 333 packs with a year of 360 working days.

(PM, M08- 8M) (Ans.: a. 400 packs, b. 100 Orders, c. Rs. 1,600, d. Immediately)
(SOLVE PROBLEM NO.7 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if ordering cost per order is Rs 10.

Note: _____

PROBLEM 7: Aditya Ltd. has a monthly requirement for an item of raw material is 1,000 units. The purchase price per unit of material is Rs.60. The cost of processing an order is Rs.540 and the carrying cost is 20%. There is a single supplier for the material which offers quantity discounts as under:

Order Quantity (in units)	Price per unit (Rs.)
Less than 2,000 units	60.00
2,000 units and less than 4,000 units	59.80
4,000 units and less than 6,000 units	59.50
6,000 units and less than 8,000 units	58.90
8,000 units and above	58.40

The company uses the cash credit facility provided by the company's banker to finance its raw material purchase. The bank due to its own infrastructural constraint can accommodate a maximum of five fund transfer (NEFT/ RTGS) requests for any single beneficiary per annum. The company in short term is unable to arrange any other source of finance.

Required:

- Calculate the optimum purchase order size for the company;
- Calculate the order level where the company could have minimised its total cost;
- The amount of loss that the company has to bear due to bank's inability to process fund transfer requests

(B) (RTP - M17) (ANS.: I) EOQ = 1039UNITS; II) AT ORDER LEVEL OF 2000 UNITS TOTAL COST THE COMPANY IS LEAST; III) LOSS IS RS.1,852) (SOLVE PROBLEM NO. 8,9 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if annual usage of raw material is 24000 units?

Note: _____

PROBLEM 8: Surekha limited produces 4000 liters of paints on a quarterly basis. Each liter requires 2 kg of raw material. The cost of placing one order for raw material is Rs 40 and the purchasing price of raw material is Rs 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.

(NOV19(N)-5 M)

Concept question:

What would be the impact on question if, purchasing price of raw material is Rs 20 per kg.

Note: _____

PROBLEM 9: (PRINTED SOLUTION AVAILABLE) HBL limited produces 'M' which has a quarterly demand OF 20,000 UNITS. Each product requires 3 kg. and 4 kg. of material X and Y respectively. Material X is supplied by a local supplier and can be produced at factory stores at any time, hence, no need to keep inventory for material X. the material Y is not locally available, it requires to be purchased from others states in a specially designed truck container with a capacity of 10 tons.

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

Particulars	Material -X	Material-Y
Purchase price per kg. (excluding GST)	Rs 140	Rs 640
Rate of GST	18%	18%
Freight per trip (fixed irrespective of quantity)	-	Rs 28,000

Loss of materials in transit	-	2%
Loss in process	4%	5%

Other information:

- i) the company has to pay 15% p.a to bank for cash credit facility.
- ii) Input credit is available on GST paid on materials.

Required:

- i) Calculate cost per kg. of material X and Y
- ii) Calculate the economic order quantity for both the materials.

(ANS: i) X-Rs.145.83, Y-Rs.691.23 ii) EOQ: X-0, Y-13,632.62 KG)(RTP-NOV19)(N)

Concept question:

What would be the impact on question if, quarterly demand for the finished products is 20,000 UNITS?

Note: _____

MODEL 2: INVENTORY LEVELS

PROBLEM 10: A company manufactures 5000 units of a product per month. The cost of placing an order is Rs. 100. The purchase price of the raw material is Rs. 10 per kg. The re-order period is 4 to 8 weeks. The consumption of raw materials varies from 100 kg to 450 kg per week, the average consumption being 275 kg. The carrying cost of inventory is 20% per annum.

You are required to calculate:

- a) Re-order quantity
- b) Re-order level
- c) Maximum level
- d) Minimum level
- e) Average stock level.

(A) (OLD PM, N02 – 6M) (ANS.: ROQ = 1,396 KGS) ROL = 3,600 KGS, MAXIMUM LEVEL = 4,396 KGS, MINIMUM LEVEL = 1,950 KGS, AVERAGE LEVEL = 3,173 KGS OR 2548 KGS)

(SOLVE PROBLEM NO.10 OF ASSIGNMENT PROBLEMS AS REWORK)

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Concept question:

What is ROQ if carrying cost of inventory is 30% per annum

Note: _____

PROBLEM 11: Following details are related to a manufacturing concern:

Re-order Level	1,60,000 units
Economic Order Quality	90,000 units
Minimum Stock Level	1,00,000 units
Maximum Stock Level	1,90,000 units
Average Lead Time	6 days
Difference between minimum lead time and Maximum lead time	4 days

Calculate:

- (i) Maximum consumption per day
- (ii) Minimum consumption per day

(OLD PM, N14 - 5M) (ANS.: (i) 20,000 UNITS, (ii) 15,000 UNITS)

(SOLVE PROBLEM NO.11 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if re order level is 12000 units?

Note: _____

PROBLEM 12: M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during 2011:

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

Compute from the above:

1. Economic order quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting?
2. Maximum level of stock.
3. Minimum level of stock
4. Re-order level
5. Danger level

(A) (OLD PM, M98 – 10M, M00 – 4M, SIMILAR (BTP N18 (N&O)) (ANS.: EOQ = 102 UNITS, MAXIMUM LEVEL = 1,402 TUBES, MINIMUM LEVEL = 900 TUBES, ROL = 1600 TUBES, DANGER LEVEL = 200 TUBES)
 SOLVE PROBLEM NO.12 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

(1) Suppose consumption of raw material (usage) is not given then EOQ

Note: _____

PROBLEM 13: (PRINTED SOLUTION AVAILABLE) A company uses three raw materials A, B, and C for which the following data apply:

Raw Material	Usage per product (Kgs.)	ROQ Kgs.	Price/ Kg.	Delivery period (W)			ROL	Min. Level
				Min.	Average	Max.		
A	10	10,000	10	1	2	3	8,000	?
B	4	5,000	30	3	4	5	4,750	?
C	6	10,000	15	2	3	4	?	2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. Compute Minimum Stock of A, Maximum Stock of B, Re-order level of C & Average stock of A.

(A) (NEW SM, OLD PM, MTP N13) (ANS.: A. 4000, B. 7650, C. 5400 OR 5600, D. 9000 OR 10125)

Concept question:

What would be the impact on the question, if weekly production varies from 500 to 700 units, average units is 600 units?

PROBLEM 14: Primex limited produces product 'p'. it uses annually 60,000 units of a material 'Rex' costing '10 per unit. Other relevant information are:

Cost of placing an order : Rs.800 per order
 Carrying cost : 15% per annum of average inventory
 Re – order period : 10 days
 Safety stock : 600 units

The company operates 300 days in a year.

You are required to calculate:

- Economic order quantity for material 'REX'
- Re – order level
- Maximum stock level
- Average stock level

(A) (OLD PM, N13 – 5M) (ANS.: 8,000 UNITS, 2,600 UNITS, 8,600 UNITS, 4,600 UNITS)
 (SOLVE PROBLEM NO.13 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

(1) Find EOQ if re-order period is 20 days

Note: _____

PROBLEM 15: (PRINTED SOLUTION AVAILABLE) 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 company it will be able to sell 45,600 units of product EMM in the coming year. There is an operating stock of 3150 units of product EMM and company desires to maintain closing stock equal to one months forecasted sale Following is the information regarding material 'REX':

Purchase price per Kg Rs.25

Cost of placing order Rs.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 2100kg and closing stock will be 10% more than opening stock

Required:

- Compute the EOQ and total cost as per EOQ.
- Compute the re order level and maximum level
- If the company places an order of 7500 kg of REX at a time, it gets 2% discount, should the offer accepted

(B) (MAY 19 OLD) (ANS.: (A). 2,440 KG, RS.9,37,570 ., (B).1650 KG, 3640 KG., (C).Accept the offer)
 (SOLVE PROBLEM NO.14 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if closing stock of raw materials is 10,000 kgs.

Note: _____

MODEL 3: INVENTORY TURNOVER RATIO

PROBLEM 16: The following data are available in respect of material X for the year ended 31st March, 2014.

Opening stock : Rs. 90,000
 Purchases during the year : Rs. 2,70,000
 Closing stock : Rs. 1,10,000

Calculate:

- Inventory turnover ratio, and
- The number of days for which the average inventory is held.

(C) (NEW SM, OLD PM) (ANS.: (A) 2.5 TIMES, (B) 146 DAYS)
 (SOLVE PROBLEM NO. 15 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

(1) High inventory turn over ratio (ITR) indicates?

Note:

MODEL 4: RAW MATERIAL VALUATION

PROBLEM 17: An invoice in respect of a consignment of chemicals A and B provides the following information:

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

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

(C) (NEW SM) (ANS.: COST PER KG: A-Rs.12.04, B-Rs.15.43.)
 (SOLVE PROBLEM NO. 16 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if railway freight is Rs. 18000.

Note:

MODEL 5: RM ISSUE METHODS

PROBLEM 18: (PRINTED SOLUTION AVAILABLE) "AT" Ltd furnishes the following store transactions for September, 2011

1-9-11	Opening Balance	25 units value Rs.162.50
4-9-11	Issues Req .No 85	8 units
6-9-11	Receipts from B & Co .GRN No.26	50 units@ 5.75 per unit
7-9-11	Issues Req No.97	12 units
10-9-11	Return to B & co	10units
12-9-11	Issues Req. No .108	15 units
13-9-11	Issues Req. No .110	20 units
15-9-11	Receipts from B&Co .GRN No.33	25 units@ 6.10 per unit
17-9-11	Issues Req. No .121	10 units

19-9-11	Received replacement from B&Co GRN No.38	10 units
20-9-11	Returned from Department, material of M & Co. MRR No.4	5 units
22-9-11	Transfer from Job 182 to Job 187 in the Dept MTR 6	5 units
26-9-11	Issues Req. No .146	10 units
29-9-11	Transfer from Dept. 'A' to Dept 'B' MTR 10	5 units
30-9-11	Shortage in Stock Taking	2 units

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

(C)(NEW SM) (ANS: SHORTAGE: 12.20/-, CLOSING STOCK: RS.167.30/-
(SOLVE PROBLEM NO.17 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if opening stock is 50 units @ Rs 6.

Note: _____

PROBLEM 19: (PRINTED SOLUTION AVAILABLE) The following are the details of receipt and issue of material 'CXE' in a manufacturing Co. during the month of April 2019.

Date	Particulars	Quantity (kg)	Rate per kg
April 4	Purchase	3000	16
April 8	Issue	1000	
April 15	Purchase	1500	18
April 20	Issue	1200	
April 25	Return to supplier out of purchase made on April 15	300	
April 26	Issue	1000	
April 28	Purchase	500	17

Opening stock as on 01-04-2019 is 1000 kg @ Rs 15 per kg

On 30th April, 2019 it was found that 50 kg of material 'CXE' was frequently misappropriated by the store assistant and never recovered by the Company.

Required:

- Prepare a store ledger account under each of the following method of pricing the issue:
 - Weighted Average Method
 - LIFO
- What would be the value of material consumed and value of closing stock as on 30-04-2019 as per these two method?

(B) (M 19(N)) (ANS.: VALUE OF CLOSING STOCK UNDER FIFO -RS. 40,376 ; WEIGHTED AVERAGE METHOD :RS. 38650)

(SOLVE PROBLEM NO.18,19 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if purchase of raw material on April 4 is 5000 kgs

@ Rs 20.

Note: _____

PROBLEM 20: M/s XYZ traders is a distributor of an electronic calculator. A periodic inventory of electronic calculator on hand is taken when books are closed at the end of each quarter. The following summary of information is available for the quarter ended on 30-9-2019:

Sales Rs 1,46,20,000

Opening stock 25000 calculators @ 200 per calculator

Administrative expenses Rs 3,75,000

Purchases (including freight inward):

-July 1, 2019 50000 calculators @ Rs 191 per calculator

-September 30,2019 25000 calculators @ Rs 210 per calculator

Closing stock- September 30,2019 32000 calculators

You are required to compute the following by WAM(Weighted average method) FIFO method and LIFO method.

- i) Value of inventory on September 30,2019.
- ii) Profit or loss for the quarter ended on September 30, 2019.

(SOLVE PROBLEM NO.20 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if sales is Rs 2,00,00,000.

Note:

MODEL 6: ABC ANALYSIS

PROBLEM 21: (PRINTED SOLUTION AVAILABLE) A store keeper has prepared the below list of items kept in the store of the factory.

Item	Units	Unit cost (Rs.)
A	12,000	30.00
B	18,000	3.00
C	6,000	35.00
D	750	220.00
E	3,800	75.00
F	400	105.00
G	600	300.00
H	300	350.00
I	3,000	250.00
J	20,000	7.50
K	11,500	27.50
L	2,100	75.00

The store keeper requires your help to classify the items for prioritization. You are required to APPLY ABC analysis to classify the store items as follows:

Store items which constitutes approx 70%, 20% and 10% of total value as A, B and C respectively.

(A) (*MTP1 M18 (N&O)*)

(SOLVE PROBLEM NO. 21 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question:

What would be the impact on the question, if item G is purchased at Rs 100.

Note:

MODEL 7: STOCK OUT

Nil

PRINTED SOLUTIONS TO SOME SELECTIVE PROBLEMS

PROBLEMS NUMBERS TO WHICH SOLUTIONS ARE PROVIDED: 9, 13, 15, 18, 19, 21

PROBLEM NO 9:

1. Working notes:

(a) Annual purchase quantity for material X and Y:

Annual demand product M – 20,000 units x 4 = 80,000 units.

Particulars	Mat – X	Mat – Y
Quantity required for per unit of Product M	3 kg.	4 kg.
Net quantity for materials required	2,40,000 kg.	3,20,000 kg.
Add: Loss in transit	-	6,881 kg.
Add: Loss in process	10,000 kg.	17,204 kg.
Purchase quantity	2,50,000 kg.	3,44,085 kg.

Note: Input on GST paid is available; hence, it will not be included in cost of material.

(i) Calculation of cost per kg. or material X and Y.

Particulars	Mat – X	Mat – Y
Purchase quantity	2,50,000 kg.	3,44,085 Kg.
Rate per kg.	Rs. 140	Rs. 640
Purchase price	Rs. 3,50,00,000	Rs. 22,02,14,400
Add: Freight	0	Rs. 9,80,000
Total cost	Rs. 3,50,00,000	Rs. 22,11,94,400
Net Quantity	2,40,000 kg.	3,20,000 Kg.
Cost per kg.	Rs. 145.83	691.23

$$* \text{No of trucks} = \frac{3,44,085 \text{ kg}}{10 \text{ ton} \times 1,000} = 34.40 \text{ trucks or 35 trucks}$$

Therefore total freight = 35 trucks x 28,000 = 9,80,000

(ii) Calculation of Economic Order Quantity (EOQ) for Mat – X and Mat – Y

$$EOQ = \sqrt{\frac{2 \times \text{Annual Requirement} \times \text{Order Cost}}{\text{Carrying cost per unit p.a.}}}$$

Particulars	Mat – X	Mat – Y
Annual Requirement	2,50,000 kg.	3,44,085 kg.
Ordering cost	0	Rs. 28,000
Cost per unit	145.83	Rs. 691.23
Carrying cost	15%	15%
Carrying cost per unit p.a.	0	Rs. 103.68
EOQ	0	13,632.62 kg.

PROBLEM NO 13:**a. Minimum stock of A**

Re-order level – (Average rate of consumption × Average time required to obtain fresh delivery)
 $= 8,000 - (200 \times 10 \times 2) = 4,000 \text{ kg}$

b. Maximum stock of B

Re-order level + Re-order quantity – (Minimum consumption × Minimum delivery period)
 $= 4,750 + 5,000 - (175 \times 4 \times 3)$
 $= 9,750 - 2,100 = 7,650 \text{ kgs.}$

c. Re-order level of C

Maximum delivery period × Maximum usage
 $= 4 \times 225 \times 6 = 5,400 \text{ kgs.}$

OR**Re-order level of C**

= Minimum stock of C + [Average rate of consumption × Average time required to obtain fresh delivery]
 $= 2,000 + [(200 \times 6) \times 3] \text{ kgs.}$
 $= 5,600 \text{ kgs.}$

d. Average stock level of A

= Minimum stock level of A + $\frac{1}{2}$ Re-order quantity of A
 $= 4,000 + \frac{1}{2} \times 10,000 = 4,000 + 5,000 = 9,000 \text{ kgs.}$

Average Stock level of A

$\frac{\text{Minimum stock level of A} + \text{Maximum stock level of A}}{2}$ (Refer to workingnote)
 $\frac{4,000 + 16,250}{2} = 10,125 \text{ kgs.}$

Working note:

Maximum stock of A = ROL + ROQ – (Minimum consumption × Minimum re-order period)
 $= 8,000 + 10,000 - [(175 \times 10) \times 1] = 16,250 \text{ kgs.}$

PROBLEM NO 15:**(i) Computation of Economic Order Quantity (EOQ):**

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times \text{Annual Requirement} \times \text{Order Cost}}{\text{Carrying cost per unit p.a.}}} \\ &= \sqrt{\frac{2 \times 37,210 \text{ kgs.} \times \text{Rs. 240}}{\text{Rs. 25} \times (10 + 2)\%}} \\ &= \sqrt{\frac{1,78,60,800}{\text{Rs. 3.}}} = 2,440 \text{ kg} \end{aligned}$$

$$\text{No of orders} = \frac{37,210}{2,440} = 15.25 \text{ or } 16 \text{ order.}$$

Total cost as per EOQ:

Particulars	Amount (Rs.)
Material purchase cost ((Rs. 25 x 37,210 kgs.)	9,30,250
Add: Ordering costs (Rs. 240 x 16 orders)	3,840

Add: Carrying cost $\left(\frac{2,440}{2} \times 3\right)$	3,660
Total Cost	9,37,350

(ii) Computation of Re – order level Maximum level:

$$\begin{aligned}\text{Re – order level} &= \text{Maximum usage} \times \text{Maximum lead time} \\ &= 150 \text{ kg} \times 11 \text{ days} = 1,650 \text{ kg.}\end{aligned}$$

$$\begin{aligned}\text{Maximum level} &= \text{Re – order level} + \text{Re – order quantity (EOQ)} - (\text{Min. usage} \times \text{Min. lead time}) \\ &= 1,650 \text{ kg.} + 2,440 \text{ kg.} - (90 \text{ kg.} \times 5 \text{ days}) \\ &= 4,090 - 450 = 3,640 \text{ kg.}\end{aligned}$$

(iii) Analysis of Offer at order level of 7,500 kgs:

If the company places 7,500 kg REX at a time, number of order and carrying cost per unit would be:

$$\text{No. of orders} = \frac{37,210}{7,500} = 4.96 \text{ or 5 orders}$$

$$\text{Carrying cost per unit per annum} = \text{Rs. } 25 \times 98\% \times 12\% = \text{Rs. } 2.94$$

Total Cost at 7,500 order level:

Particulars	Amount (Rs.)
Material purchase cost ((Rs. 25x98%) x 37,210 kgs)	9,11,645
Add: Ordering costs (Rs. 240 x 5 orders)	1,200
Add: Carrying cost $\left(\frac{7,500}{2} \times 2.94\right)$	11,025
Total Cost	9,23,870

Since, ordering 7,500 kg at a time, the company saves Rs. 13,880 (Rs. 9,37,750 – Rs. 9,23,870) [or Rs. 13,700 (9,37,750 – 9,23,870)]. Hence, the company should accept offer of 2% discount and 7,500 order size.

PROBLEM NO 18:

Working Notes:

1. The material received as replacement from vendor is treated as fresh supply.
2. In the absence of information the price of the material received from within on 20-9-X1 has been taken as the price of the earlier issue made on 17-9-X1. In FIFO method physical flow of the material is irrelevant for pricing the issues.
3. The issue of material on 26-9-X1 is made out of the material received from within.
4. The entries for transfer of material from one job and department to other on 22-9-X1 and 29-9-X1 are book entries for adjusting the cost of respective jobs and as such they have not been shown in the stores ledger account.
5. The material found short as a result of stock taking has been written off.

Stores Ledger of AT Ltd. for the month of September, 20X1 (FIFO Method)

Date	RECEIPT					ISSUE			BALANCE		
	GRN No.	Qty.	Rate	Amount	Requisi- tion No.	Qty.	Rate	Amount	Qty.	Rate	Amount
	MRR No.	Units	(Rs)	(Rs)		Units	(Rs)	(Rs)	Units	(Rs)	(Rs)
1	2	3	4	5	6	7	8	9	10	11	12
1-9-X1	—	—	—	—	—	—	—	—	25	6.50	162.50
4-9-X1	—	—	—	—	85	8	6.50	52	17	6.50	110.50
6-9-X1	26	50	5.75	287.50	—	—	—	—	17	6.50	398.00
									50	5.75	

7-9-X1	—	—	—	—	97	12	6.50	78	5	6.50	320.00
10-9-X1	—	—	—	—	Nil	10	5.75	57.50	5	5.75	262.00
12-9-X1	—	—	—	—	108	5	6.50		40	5.75	
						10	5.75	90	30	5.75	172.50
13-9-X1	—	—	—	—	110	20	5.75	115	10	5.75	57.50
15-9-X1	33	25	6.10	152.50	—	—	—	—	10	5.75	210.00
									25	6.10	
17-9-X1	—	—	—	—	121	10	5.75	57.50	25	6.10	152.50
19-9-X1	38	10	5.75	57.50	—	—	—	—	25	6.10	
									10	5.75	
20-9-X1	4	5	5.75	28.75	—	—	—	—	25	6.10	258.75
									10	7.75	
26-9-X1	—	—	—	—	146	5	5.75		20	6.10	179.50
30-9-X1	—	—	—	—	Shortage	2	6.10	12.20	18	6.10	
									10	5.75	167.30

PROBLEM NO 19:

Stores Ledger Account for the month of April, 2019 (Weighted Average Method)

Date	Receipt			Issue			Balance				
	Qty	Units	Rate (Rs)	Amount (Rs)	Qty	Units	Rate (Rs)	Amount (Rs)	Qty	Rate (Rs)	Amount (Rs)
1-4-19	—	—	—	—	—	—	—	—	1,000	15.00	15,000
4-4-19	3,000	16.00	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	18.00	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	—	—	—	—	800	18.00	14,400	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	17.00	8,500	—	—	—	—	—	2,500	16.48	41,200
30-4-19	—	—	—	—	50	16.48	824	2,450	16.48	40,376	

(b) Stores Ledger Account for the month of April, 2019 (LIFO)

Date	Receipt			Issue			Balance				
	Qty	Units	Rate (Rs)	Amount (Rs)	Qty	Units	Rate (Rs)	Amount (Rs)	Qty	Rate (Rs)	Amount (Rs)
1-4-19	—	—	—	—	—	—	—	—	1,000	15	15,000
4-4-19	3,000	16	48,000	—	—	—	—	—	1,000	15	15,000
									3,000	16	48,000
8-4-19	—	—	—	—	1,000	16	16,000	—	1,000	15	15,000
									2,000	16	32,000
15-4-19	1,500	18	27,000	—	—	—	—	—	1,000	15	15,000
									2,000	16	32,000
									1,500	18	27,000
20-4-19	—	—	—	—	1,200	18	21,600	—	1,000	15	15,000
									2,000	16	32,000
									300	18	5,400
25-4-19	—	—	—	—	300	18	5,400	—	1,000	15	15,000
									2,000	16	32,000
26-4-19	—	—	—	—	1,000	16	16,000	—	1,000	15	15,000
									1,000	16	16,000
28-4-19	500	17	8,500	—	—	—	—	—	1,000	15	15,000
									1,000	16	16,000

							500	17	8,500
30-04-19	-	-	-	50	17	850	1,000	15	15,000
							1,00	16	16,000
							450	17	7,650

(ii) Value of Material Consumed and Closing Stock

	Weighted Average method (Rs)	LIFO method (Rs)
Opening stock as on 01-04-2019	15,000	15,000
Add: Purchases	83,500	83,500
	98,500	98,500
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

PROBLEM NO 21:

item	Units	% of Total units	Unit cost (Rs.)	Total cost (Rs.)	% of Total cost	Ranking
A	12,000	15.30%	30.00	3,60,000	12.97%	2
B	18,000	22.94%	3.00	54,000	1.95%	11
C	6,000	7.65%	35.00	2,10,000	7.57%	5
D	750	0.96%	220.00	1,65,000	5.95%	7
E	3,800	4.84%	25.00	2,85,000	10.27%	4
F	400	0.51%	105.00	42,000	1.51%	12
G	600	0.76%	300.00	1,80,000	6.49%	6
H	300	0.38%	350.00	1,05,000	3.78%	10
I	3,000	3.82%	250.00	7,50,000	27.03%	1
J	20,000	25.49%	7.50	1,50,000	5.41%	9
K	11,500	14.66%	27.50	3,16,250	11.40%	3
L	2,100	2.68%	75.00	1,57,500	5.68%	8
	78,450	100.00%		27,74,750	100.00%	

Statement of Total Cost and Ranking**Statement of classification of Inventory**

Rankin	Item	% of Total units	Cost (Rs.)	% of Total Cost	Category
1	I	3.82%	7,50,000	27.03%	
2	A	15.30%	3,60,000	12.97%	
3	K	14.66%	3,16,250	11.40%	
4	E	4.84%	2,85,000	10.27%	
5	C	7.65%	2,10,000	7.57%	
Total		46.27%	19,21,250	69.24%	A
6	G	0.76%	1,80,000	6.49%	
7	D	0.96%	1,65,000	5.95%	

8	L	2.68%	1,57,500	5.68%	
9	J	25.49%	1,50,000	5.41%	
Total		29.89%	6,52,500	23.53%	B
10	H	0.38%	1,05,000	3.78%	
11	B	22.94%	54,000	1.95%	
12	F	0.51%	42,000	1.51%	
		23.84%	2,01,000	7.24	
	12	100%	27,74,750	100%	

ASSIGNMENT PROBLEMS

MODEL 1: ECONOMIC ORDER QUANTITY

PROBLEM 1: Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum : 10,000 kg.

Order placing cost per order : Rs.50

Cost per kg. of raw materials : Rs.2

Storage costs : 8% on average inventory

(A) (NEW SM, OLD SM) (ANS.: 2,500 UNITS, 4 PER YEAR)

PROBLEM 2: Compute E.O.Q. and the total variable cost for the following:

Annual Demand = 5,000 units

Unit price = Rs. 20.00

Order cost = Rs.16.00

Storage rate = 2% per annum

Interest rate = 12% per annum

Obsolescence rate = 6% per annum

Determine the total variable cost that would result for the items if an incorrect price of Rs.12.80 is used.

(A) (NEW SM, OLD SM) (ANS.: TOTAL VARIABLE COST – 800 (EXCLUDING MATERIAL COST), EOQ – 200 UNITS, TOTAL VARIABLE COST - 640)

PROBLEM 3: Anil & Company buys its annual requirement of 36,000 units in 6 installments. Each unit cost Rs. 1 and the ordering cost is Rs. 25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be saved by Economic Order Quantity?

(A) (NEW SM, OLD SM) (ANS.:RS.750, RS.150)

PROBLEM 4: A company manufactures a product from a raw material, which is purchased at Rs. 80 per kg. The company incurs a handling cost of Rs. 370 plus freight of Rs. 380 per order. The incremental carrying cost of inventory of raw material is Rs. 0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is Rs. 12 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.

Required:

- Calculate the economic order quantity of raw materials.
- Advice, how frequently company should order for procurement be placed.
- 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?

Assume 360 days in a year. (A) (OLD PM, M 14 - 8M) (ANS.: (I) 2,000 KGS, (II) 0.6 MONTHS(OR) 18 DAYS, (III) 1.5%)

PROBLEM 5: JP Limited, manufacturers of a special product, follows the policy of EOQ (Economic Order Quantity) for one of its components. The component's details are as follows:

	(Rs.)
Purchase Price Per Component	200
Cost of an Order	100
Annual Cost of Carrying one Unit in Inventory	10% of Purchase Price
Total Cost of Inventory 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:

- Compute the EOQ
- Advise whether the quantity discount offer can be accepted.
- 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)

(A) (RTP - M16) (ANS.: A) EOQ = 200 UNITS; B) THE QUANTITY DISCOUNT OFFER SHOULD NOT BE ACCEPTED; C) THE QUANTITY DISCOUNT OFFER SHOULD BE ACCEPTED)

PROBLEM 6: ASJ manufacturer produces a product which requires a component costing Rs.1000 per unit. Other information related to the component are as under:

Usage of component	1500 units per month
Ordering cost	Rs.75 per order
Storage cost rate	2% per annum
Obsolescence rate	1% per annum
Maximum usage	400 units per week
Lead time	6 - 8 weeks

The firm has been offered a quantity discount of 5% by the supplier on the purchase of component, if the order size is 6000 units at a time.

You are required to compute

- Economic Order Quantity (EOQ)
- Re order level and advise whether the discount offer be accepted by the firm or not.

(A) (M18 (OLD) – 5 M)

PROBLEM 7: Aditya Brothers supplies surgical gloves to nursing homes and polyclinics in the city. These surgical gloves are sold in pack of 10 pairs at price of Rs. 250 per pack. For the month of November 2015, it has been anticipated that a demand for 60,000 packs of surgical gloves will arise. Aditya Brothers purchases these gloves from the manufacturer at Rs. 228 per pack within a 4 to 6 days lead time. The ordering and related cost is Rs. 240 per order. The storage cost is 10% p.a. of average inventory investment.

Required:

- Calculated the Economic Order Quantity (EOQ)
- Calculate the number of orders needed every year
- Calculate the total cost of ordering and storage of the surgical gloves.
- Determine when the next order to be placed should. (Assuming that the company does maintain a safety stock and that the present inventory level is 10,033 packs with a year of 360 working days).

B) (RTP M-18, RTP, N15, MTP M19 (N), MTP1 N19 (N&O) RTP M19(N& O)) (ANS.: A. 3,894 PACKS, B. 185 ORDERS, C. RS.88, 780.20, D. IMMEDIATELY)

PROBLEM 8: RST Limited has received an offer of quantity discount on its order of materials as under:

Price per tone	Tones number
Rs. 9,600	Less than 50
Rs. 9,360	50 and less than 100
Rs. 9,120	100 and less than 200
Rs. 8,880	200 and less than 300
Rs. 8,640	300 and above

The annual requirement for the material is 500 tonnes. The ordering cost per order is Rs.12,500 and the stock holding cost is estimated at 25% of the material cost per annum.

Required:

- Compute the most economical purchase level.
- Compute EOQ if there are no quantity discounts and the price per tonne is Rs. 10,500.

(B) (OLD PM, N04 - 6M, N10 - 5M) (ANS.: I. 300, II. 69 TONNES)

PROBLEM 9: The quarterly production of a company's product which has a steady market is 20,000 units. Each unit of a product requires 0.5 Kg. of raw material. The cost of placing one order for raw material is Rs. 100 and the inventory carrying cost is Rs. 2 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.

Order quantity (Kgs.)	Discount (Rs.)
Upto 6,000	NIL
6,000 – 8,000	400
8,000 – 16,000	2,000
16,000 – 30,000	3,200
30,000 – 45,000	4,000

You are required to:

- Calculate the re-order point taking 30 days in a month.
- Prepare a statement showing the total cost of procurement and storage of raw material after considering the discount of the company elects to place one, two, four or six orders in the year.
- State the number of orders which the company should place to minimize the costs after taking EOQ also into consideration.

(PM, M02-8M) (Ans.: a. 5,000, c. 20 orders)

MODEL 2: INVENTORY LEVELS

PROBLEM 10: M/s. SJ Private Limited manufactures 20000 units of a product per month. The cost of placing an order is Rs.1500. The purchase price of the raw material is Rs.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.

You are required to calculate;

i) Re-order quantity	iv) Minimum level
ii) Re-order level	v) Average stock level
iii) Maximum level	

(A) (N18 – 5M)

PROBLEM 11: Re-order quantity of material 'X' is 5,000 kg, Maximum level 8,000 kg, Minimum usage 50 kgs per hour; minimum re-order period 4 days; daily working hours in the factory is 8 hours. You are required to calculate the re-order level of material 'X'. (C) (OLD PM, M10 – 2M)(ANS.: 4,600 KGS)

PROBLEM 12: PQR Ltd. manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 2005-06:

1. Monthly demand of ZED : 7,500 units
2. Cost of placing an order : Rs.500
3. Re-order period : 5 to 8 weeks
4. Cost per unit : Rs.60
5. Carrying cost % p.a. : 10%
6. Normal usage : 500 units per week
7. Minimum usage : 250 units per week
8. Maximum usage : 750 units per week

Required:

a) Re-order quantity	d) Maximum stock level
b) Re-order level	e) Average stock level
c) Minimum stock level	

(A) (OLD PM, N06 - 10M) (ANS.: 3,873 UNITS, 6,000 UNITS, 2,750 UNITS, 8,623 UNITS, 5,687 UNITS)

PROBLEM 13: SK Enterprise manufactures a special product "ZE". The following particulars were collected for the year 2004:

Annual consumption 12,000 units (360 days)

Cost per unit	Rs. 1
Ordering cost	Rs. 12 per order
Inventory carrying cost	24%
Normal lead time	15 days
Safety stock	30 days consumption

Required:

i) Re-order quantity	ii) Re-order level
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What should be the inventory level (ideally) immediately before the material order is received?

(B) (M 05 – 4M) (Ans.: ROQ=1,100, ROL= 1,500, Safety Stock= 1000 Units)

PROBLEM 14: Aditya 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 be able to sell 10,000 units of Exe in the coming year. The following is the information regarding the raw material Dee:

1. The Re-order quantity is 200 kg. Less than the Economic Order Quantity (EOQ).
2. Maximum consumption per day is 20 kg. More than the average consumption per day.
3. There is an opening stock of 1,000 kg.
4. Time required to get the raw materials from the suppliers is 4 to 8 days.
5. The purchase price is Rs.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 Rs. 720 on paper and documentation work.

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

a) Re-order Quantity	b) Maximum Stock level	c) Minimum Stock level
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d) Calculate the impact on the profitability of the company by not ordering the EOQ. [Take 364 days for a year]. (OLD PM, MTP2 M18, RTP M15, MTP19, RTP19) (ANS.: (A). 1,000 KG., (B). 1,440 KG., (C). 260 KG., (D). RS.344)

Note: _____

MODEL 3: INVENTORY TURNOVER RATIO

PROBLEM 15: From the following data for the year ended 31st December calculate the inventory turnover ratio of the two items, and put forward your comments on them.

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

(C) (NEW SM) (ANS.: MATERIAL A – 7 TIMES, MATERIAL B – 2.5 TIMES)

MODEL 4: RAW MATERIAL VALUATION

PROBLEM 16: A Manufacturer of Surratt purchased the Chemicals A, B and C from Mumbai.

Chemical A: 3,000 kg. @ Rs 4.20 per kg.	12,600
Chemical B: 5,000 kg. @ Rs 3.80 per kg.	19,000
Chemical C: 2,000 kg. @ Rs 4.75 per kg.	9,500
Sales Tax	2,055
Railway Freight	1,000
Total cost	44,155

A shortage of 200 kgs in chemical A, of 280 kgs in chemical B and of 100 kgs in Chemical C was noticed due to breakages (Assume as normal loss). At Surat, the manufacturer paid Octroi duty @ Rs.0.10 per kg. He also paid cartage Rs.22 for Chemical A, Rs.63.12 for Chemical B and Rs.31.80 for Chemical C. Calculate the stock rate that you would suggest for pricing issue for chemicals assuming a provision of 5% towards further deterioration.

(C) (ANS.: FOR A: 5.2 PER KG, FOR B: 4.68 PER KG, FOR C 5.76 PER KG)

MODEL 5: RM ISSUE METHODS

PROBLEM 17: The following information is provided by DCM for the first fortnight of April, 2002 in respect of Material X.

Stock on 01/04/02	100 units at Rs.5 per unit.
Purchases:	
05/04/02	300 units at Rs.6
08/04/02	500 units at Rs.7
12/04/02	600 units at Rs.8
Issues:	
06/04/02	250 units
10/04/02	400 units
14/04/02	500 units

(A) Calculate using FIFO, LIFO, Simple average, Weighted Average of pricing issues

- The value of materials consumed during the period
- The value of stock of materials on 15/04/02.

(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 Ledgers.

(C) (NEW SM, OLD SM) (ANS.: FIFO – RS. 7,800, RS. 2,800, LIFO – RS. 8,300, RS. 2,300)

PROBLEM 18: The following information is extracted from the Stores Ledger:

Material X

Opening Stock Nil

Purchases:

Jan. 1 100 @ Rs.1 per unit
Jan. 20 100 @ Rs. 2 per unit

Issues:

Jan. 22 60 for Job W 16
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 W 16, Job W 17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

(B) (OLD SM) (ANS.: VALUE OF CLOSING STOCK UNDER FIFO, LIFO AND WEIGHTED AVERAGE IS RS.160,80,220 RESPECTIVELY ; WEIGHTED AVERAGE METHOD IS PREFERRED OVER FIFO AND LIFO)

PROBLEM 19: The following are the details of receipts and issues of a material of stores in a manufacturing company for the period of three months ending 30th June, 2014:

Receipts:

Date	Quantity (kg.)	Rate per kg. (Rs.)
April 10	1,600	5.00
April 20	2,400	4.90
May 5	1,000	5.10
May 17	1,100	5.20
May 25	800	5.25
June 11	900	5.40
June 24	1,2400	5.50

There was 1,500 kg. in stock at April 1, 2014 which was valued at Rs. 4.80 per kg.

Issues:

Date	Quantity (kg.)
April 4	1,100
April 24	1,600
May 10	1,500
May 26	1,700
June 15	1,500
June 21	1,200

Issues are to be priced on the basis of weighted average method.

The stock verifier of the company reported a shortage of 80 kgs. on 31st May, 2014 and 60 kgs. On 30th June, 2014. The shortage is treated as inflating the price of remaining material on account of shortage.

You are required to prepare a Stores Ledger Account.

(PM)(Ans.: Closing balance: 1,960 Kgs, Rs. 10,981 & rate: Rs. 5.60)

PROBLEM 20: The following information has been extracted from the records of a cotton merchant, for the month of March, 2013:

Sales for the month: Rs. 62,00,000

Opening Stock as on 01.03.2013: 22,000 kgs @ Rs. 58.50.

Purchases made during the month

Date	Quantity (kgs.)	Rate (Rs.)
03.03.2013	35,000	59.00
18.03.2013	32,000	59.50
25.03.2013	22,000	60.00

(On all the above purchases, freight is paid @ Rs. 1.75 per kgs)

Closing stock as on 31.03.2013: 23,000 kgs

Salary paid to accountant Rs. 11,000.

From the above information you are required to calculate the following:

- Value of closing stock as on 31.03.2013 (using First In First Out (FIFO) method)
- Cost of goods sold during March, 2013 and
- Profit for the month of March, 2013.

(C) (RTP - M13) (ANS.: VALUE OF CLOSING STOCK = 14,19,750, COST OF GOODS SOLD = 53,12,000, PROFIT 8,77,000)

MODEL 6: ABC ANALYSIS

PROBLEM 21: From the following details, draw a plan of ABC selective control:

Item	Units	Unit cost (Rs.)
1	7,000	5.00
2	24,000	3.00
3	1,500	10.00
4	600	22.00
5	38,000	1.50
6	40,000	0.50
7	60,000	0.20
8	3,000	3.50
9	300	8.00
10	29,000	0.40
11	11,500	7.10
12	4,300	6.20

(D) (NEW SM)

MODEL 7: STOCK OUT

NIL

ADDITIONAL PROBLEMS FOR SELF PRACTICE

MODEL 1: ECONOMIC ORDER QUANTITY

PROBLEM 1: Assume that the following quantity discount schedule for a particular bearing is available to a

Retail store:

Order size (unit)	Discount
0 – 49	0%
50 – 99	5%
100 – 199	10%
200 and above	12%

The cost of a single bearing with no discount is Rs. 30. The annual demand is 250 units. Ordering cost is Rs. 20 per order and annual inventory carrying cost is Rs. 4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed.

(A) (OLD PM) (ANS.: 100 UNITS, RS. 7,000)

PROBLEM 2:

- The annual demand for an item of raw material is 4,000 units and the purchase Price is expected to be Rs. 90 per unit. Cost of processing of an order is Rs. 135 and annual cost of storage is estimated to be Rs. 12 per unit. Find out the optimal order quantity and total relevant cost for the order?
- If the estimated cost of Rs.135 for processing of an order is incorrect and the correct cost is Rs. 80 only, find out the difference in total cost due to error in estimation?
- A supplier is ready to supply the raw materials at a price of Rs. 86 per unit if the entire annual demand is ordered at a time. Suggest the order quantity that should be placed to lower total cost. Information regarding ordering cost and carrying cost given at (i) above is to be taken.

(B) (MTP N18(N&O),N17) (ANS.: (I) ORDER QUANTITY IS 300 UNITS AND TOTAL RELEVANT COST IS RS.3600 ; (II) DIFFERENCE IN TOTAL COST IS RS.829 ; (III) THIS SPECIAL OFFER AT RS.86 PER UNIT SHOULD NOT BE ACCEPTED AS TOTAL COST WILL INCREASE BY RS.4,535)

MODEL 2: INVENTORY LEVELS

PROBLEM 3: (PRINTED SOLUTION AVAILABLE) IPL Limited uses a small casting in one of its finished products. The castings are purchased from a foundry. IPL Limited purchases 54,000 castings per year at a cost of Rs. 800 per casting. The castings are used evenly throughout the year in the production process on a 360-days-per-year basis. The company estimates that it costs Rs.9,000 to place a single purchase order and about Rs.300 to carry one casting in inventory for a year. The high carrying costs result from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance. 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:

- Compute the economic order quantity (EOQ).
- 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?
- 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?
- Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?
- Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only Rs.600. In addition company estimates that when the waste and inefficiency caused by inventories are considered, the true cost of carrying a unit in stock is Rs. 720 per year.
 - Compute the new EOQ.
 - How frequently would the company be placing an order, as compared to the old purchasing policy?
(A) (OLD PM) (ANS.: (A) 1,800 CASTINGS, (B) 1,050 CASTINGS (C) 450 CASTINGS, 1,350 CASTINGS, (D) RS.2,70,000, RS.4,05,000, (E) 300 CASTINGS, 2 DAYS)

Note: _____

MODEL 3: RM ISSUE METHODS

PROBLEM 4: The following transactions in respect of material Y occurred during the six months ended 30th June, 20X1:

Month	Purchase (units)	Price per unit (Rs)	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? Detailed stores ledgers are not required.

b) When and why would you recommend the LIFO method of pricing material issues?

(C) (NEW SM) (ANS.: CHIEF ACCOUNTANT ARGUES IS CORRECT)

MODEL 5: RM ISSUE METHODS**PROBLEM 5:** Prepare a Store Ledger Account from the following transactions of XY Company Ltd.

April, 2011

1	Opening balance 200 units	@ Rs. 10 per unit.
5	Receipt 250 units costing	Rs. 2,000
8	Receipt 150 units costing	Rs. 1,275
10	Issue 100 units	
15	Receipt 50 units costing	Rs. 500
20	Shortage	10 units
21	Receipt 60 units costing	Rs. 540
22	Issue	400 units

The issues upto 10-4-11 will be priced at LIFO and from 11-4-11 issues will be priced at FIFO.

Shortage will be charged as overhead.

(B) (M11 - 5M, OLD PM) (ANS.: CLOSING STOCK = 1,785)

MODEL 6: ABC ANALYSIS**NIL****MODEL 7: STOCK OUT****PROBLEM 6:** M/s Tyro tubes trades in four wheeler tires and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year end 2011-12, the report of sales manager revealed that M/s Tyro tubes experienced stock-out of tyres. The stock-out data is as follows:

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

M/s Tyro tubes loses Rs.150 per unit due to stock-out and spends Rs. 50 per unit on carrying of Inventory.

Determine optimum safest stock level.

*Demand that could not be fulfilled due to insufficient stock of tyres.

(A) (NEW SM) (ANS.: AT SAFETY STOCK LEVEL OF 20 UNITS, TOTAL COST IS LEAST I.E. RS. 2,140.)

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