Chapter Name :- **Material Cost**

INTERMEDIATE
Chapter Wise Test Series
Suggested Answers

Marks- **40**

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1. Annual requirement of raw material in kg. (A) $= \frac{60{,}000 \text{ units}}{5 \text{ units per kg.}} = 12{,}000$ kg.

Ordering Cost (Handling & freight cost) (O) = ₹ 400 + ₹ 350 = ₹ 750

Carrying cost per unit per annum i.e. inventory carrying cost + working capital cost (c × i)
= (₹ 0.25 × 12 months) + ₹15

= ₹ 18 per kg.

(i) E.O.Q.= $\sqrt{\frac{2x\ 12{,}000\ kgs.\ x\ Rs.750}{Rs.18}}$ = 1,000 kg.

(ii) Frequency of orders for procurement:

Annual consumption (A) = 12,000 kg.

Quantity per order (EOQ) = 1,000 kg.

No. of orders per annum $\left(\frac{A}{EOQ}\right)$ $= \frac{12{,}000 \text{kg.}}{1{,}000 \text{ kg.}} = 12$

Frequency of placing orders (in months) $= \frac{12 \text{ months}}{12 \text{ orders}} = 1$ months

Or, (in days) $= \frac{360 \text{ days}}{12 \text{ orders}} = 30$ days

(iii) Calculation of total ordering cost and total inventory carrying cost as per EOQ:

	Amount/Quantity
Size of the order	1,000 kg.
No. of orders	12
Cost of placing orders	**₹ 9,000** (12 orders × ₹ 750)
Inventory carrying cost	**₹ 9,000** (1,000 kg. × ½ × ₹ 18)
Total Cost	₹18,000

2. Working:

Computation of effective quantity of each chemical available for use

	Chemical A (kg.)	**Chemical B (kg.)**
Quantity purchased	10,000	8,000
Less: Shortage due to normal breakages	500	320
	9,500	7,680
Less: Provision for deterioration 2%	190	153.6
Quantity available	**9,310**	**7,526.4**

Statement showing the computation of rate per kg. of each chemical

	Chemical A (₹)	**Chemical B (₹)**
Purchase price 10,000@ ₹10 per kg, 8,000@₹13 per kg	1,00,000	1,04,000
Add: Basic Custom Duty @10%	10,000	10,400
Add: Railway freight (in the ratio of quantity purchased i.e., 5:4)	2,133	1,707
Total cost (A)	**1,12,133**	**1,16,107**
Effective Quantity (see working) (B)	9,310 kg.	7,526.4 kg.
Rate per kg. (A ÷ B)	**12.04**	**15.43**

3. Working Notes:

(i) Computation of Annual consumption & Annual Demand for raw material 'D':

Sales forecast of the product 'X'	20,000 units
Less: Opening stock of 'X'	1,800 units
Fresh units of 'X' to be produced	18,200 units
Raw material required to produce 18,200 units of 'X' (18,200 units × 4 kg.)	72,800 kg.
Less: Opening Stock of 'D'	2,000 kg.
Annual demand for raw material 'D'	70,800 kg.

(ii) Computation of Economic Order Quantity (EOQ):

$$EOQ = \sqrt{\frac{2 \times \text{Annual demand of 'D'} \times \text{Ordering cost}}{\text{Carrying cost per unit per annum}}}$$

$$= \frac{2 \times 70{,}800\text{kg.} \times \text{Rs. } 1340}{\text{Rs. } 250 \times 14\%} = \frac{2 \times 70{,}800\text{kg.} \times \text{Rs. } 1340}{\text{Rs. } 35} = 2{,}328 \text{ kg.}$$

(iii) Re- Order level:

= (Maximum consumption per day × Maximum lead time)

$$= \left\{\left(\frac{\text{Annual Consumption of 'D'}}{300 \text{ days}} + 40\text{kg.}\right) \times 8 \text{ days}\right\}$$

$$= \left\{\left(\frac{70{,}800\text{kg.}}{300 \text{ days}} + 40\text{kg.}\right) \times 8 \text{ days}\right\} = 2{,}208 \text{ kg.}$$

(iv)Minimum consumption per day of raw material 'D':

Average Consumption per day = 236 Kg.

Hence, Maximum Consumption per day = 236 kg. + 40 kg. = 276 kg.

So Minimum consumption per day will be

Average Consumption $= \frac{\text{Min.consumption} + \text{Max.consumption}}{2}$

Or, 236 kg. $= \frac{\text{Min.consumption} + 276 \text{ kg.}}{2}$

Or, Min. consumption = 472 kg – 276 kg. = 196 kg.

(a) Re-order Quantity :

EOQ – 400 kg. = 2,328 kg. – 400 kg.= 1,928 kg.

(b) Maximum Stock level:

= Re-order level + Re-order Quantity – (Min. consumption per day × Min. lead time)

= 2,208 kg. + 1,928 kg. – (196 kg. × 4 days) = 4,136 kg. – 784 kg. = 3,352 kg.

(c) Minimum Stock level:

= Re-order level – (Average consumption per day × Average lead time)

= 2,208 kg. – (236 kg. × 6 days) = 792 kg.

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

		When purchasing the ROQ	When purchasing the EOQ
I	Order quantity	1,928 kg.	2,328 kg.
II	No. of orders a year	$\frac{70{,}800\text{kg.}}{1{,}928\text{kg.}}$ = 36.72or 37orders	$\frac{70{,}800\text{kg.}}{2{,}328\text{kg.}}$ = 30.41or 31orders
III	Ordering Cost	37 orders × ₹ 1,340	31 orders × ₹ 1,340
IV		= ₹ 49,580	= ₹ 41,540
V	Average Inventory Carrying Cost	$\frac{1{,}928\text{kg.}}{2}$ = 964kg. 964 kg. × ₹ 35 = ₹ 33,740	$\frac{2{,}328\text{kg.}}{2}$ = 1,164kg. 1,164 kg. × ₹ 35 = ₹ 40,740
VI	Total Cost	₹ 83,320	₹ 82,280

Extra Cost incurred due to not ordering EOQ = ₹83,320 - ₹82,280 = ₹1,040

4. As procurement time is given in days, consumption should also be calculated in days:

Maximum Consumption per Day: $\frac{350}{7}$ = 50 Kgs

Minimum Consumption per Day: $\frac{210}{7}$ = 30 Kgs.

Average Consumption per Day: $\frac{(50+30)}{2}$ = 40 Kgs

(a) Calculation of Economic Order Quantity (EOQ)

Annual consumption of Raw Materials (A): 40 Kgs x 365 days = 14,600 Kgs
Storage or Carrying Cost per unit per annum (C):(₹ 100 x 1% x 12 months) + ₹ 2 = ₹ 14
Ordering Cost (O): ₹ 200 per Order

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$$

$$= \sqrt{\frac{2\ x\ 14{,}600\ x\ 200}{14}} = 646 \text{ Kgs.}$$

(b) **Re-Order Level (ROL)** = (Maximum consumption Rate x Maximum Procurement Time)
= 50 kgs per day × 9 days
= 450 kgs

(c) **Maximum Stock Level** = Recorder Level + Recorder Quantity – (Minimum Consumption Rate x Minimum Procurement Time)
= 450 kgs + 646 kgs - (30 kgs X 5 days)
= 946 kgs

(d) **Minimum Stock Level** = Recorder Level – (Average consumption Rate x Average Procurement Time)
= 450 kgs – (40 kgs X 7 days)
= 170 kgs

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

$= \frac{946 \text{ kgs} + 170 \text{ kgs}}{2}$

= 558 kgs

(f) Number of Orders to be placed per year

$= \frac{\text{Annual Consumption of Raw Materials}}{\text{EOQ}}$

$= \frac{14600 \text{ kgs}}{646 \text{ kgs}}$

= 22.60 Orders or 23 Orders

(g) Total Inventory Cost

Cost of Materials (A x Purchase Price) (14600 kgs x ₹ 100)	= ₹ 14,60,000
Total Ordering Cost (No. of Orders x O) (23 Orders x 200)	= ₹ 4,600
Total Carrying Cost (EOQ / 2 x C) (646 kgs / 2 x ₹ 14)	= ₹ 4,522
Total Inventory Cost	₹ 14,69,122

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

Offer Price = ₹ 100 x 99%	= ₹ 99
Revised Carrying Cost = (₹ 99 x 1% x 12 months) + ₹2	= ₹ 13.88
Revised Order Quantity = 14600 kgs / 2 Orders	= 7300 kgs
Total Inventory Cost at Offer Price	
Cost of Materials (A x Purchase Price) (14600 kgs x ₹ 99)	= ₹ 14,45,400
Total Ordering Cost (No. of Orders x O) (2 Orders x 200)	= ₹ 400
Total Carrying Cost (EOQ / 2 x C) (7300 kgs / 2 x ₹13.88)	= ₹ 50,662
Total Inventory Cost	₹ 14,96,462

Advice: As total inventory cost at offer price is ₹ 27,340 (14,96,462 – 14,69,122) higher, offer should not be accepted.

(i) Counter-offer:

Let Discount Rate = z%
Counter-Offer Price = ₹ 100 – z% = ₹ 100 – z
Revised Carrying Cost = [(₹ 100 – z) x 1% x 12 months] + ₹ 2 = ₹ 12 -0.12z + ₹ 2
= ₹ 14 – 0.12z

Total Inventory Cost at Counter-Offer Price

Cost of Materials (A x Purchase Price) [14600 kgs x (₹ 100 – z)] = ₹ 14,60,000 – 14,600z

Total Ordering Cost (No. of Orders x O) (2 Orders x 200) = ₹ 400

Total Carrying Cost (EOQ / 2 x C) [7300 kgs / 2 x (₹ 14 – 0.12z)] = ₹ 51,100 – 438z

Total Inventory Cost ₹ 15,11,500 – 15038z

₹ 14,69,122 = ₹ 15,11,500 – 15038z

Or 15038z = 42,378

Or z = 2.82

Therefore, discount should be at least 2.82% in offer price.

5.

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6. Inventory turnover ratio

(Refer to working note) $= \frac{\text{Cost of stock of raw material consumed}}{\text{Average stock of raw material}}$

$= \frac{\text{Rs.2,50,000}}{\text{Rs.1,00,000}} = 2.5$

Average number of days for which the average inventory is held

$= \frac{365}{\text{Inventory turnover ratio}} = \frac{365 \text{ days}}{2.5}$ **= 146 days**

Working Note:

	(₹)
Opening stock of raw material	90,000
Add: Material purchases during the year	2,70,000
Less: Closing stock of raw material	1,10,000
Cost of stock of raw material consumed	2,50,000