CHAPTER-10 MATERIAL COST CONTROL, STOCK VALUATION AND STOCK CONTROL

MATERIAL COST CONTROL

Ans.1. (i)

Q in each category i.e. EOQ or nearest to EOQ	Cost of purchase Ax per unit cost	Carrying cost $\frac{A}{Q}$ × ₹ 12500	Carrying cost $\frac{Q}{2}$ × CPU × 25%	Total cost (3 + 4 + 5)
(1)	(3)	(4)	(5)	(6)
49	48,00,000 (500 × 9,600)	1,27,551	58,800	49,86,351
73	46,80,000 (500 × 9,360)	85,616	86,140	48,51,756
100	45,60,000 (500 × 9,120)	62,500	1,14,000	47,36,500
200	44,40,000 (500 × 8,880)	31,250	2,22,000	46,93,250
300	43,20,000 (500 × 8,640)	20,875	3,24,000	46,64,833

The above table shows that the total cost of 500 units including ordering and carrying cost is minimum (₹ 46,64,833) where the order size is 300 units. Hence the most economical purchase level is 300 units.

(ii) $EOQ = \sqrt{\frac{2AO}{c \times i}} = \sqrt{\frac{2 \times 500 \times 12,500}{10,500 \times 25}}$ = 69 tonnes.

Ans.2. (i) **Reorder Quantity (ROQ)**
(Refer to working note) = 1,196 kgs.

(ii) **Reorder level (ROL)** = Maximum usage × Maximum re-order period
450 kgs × 8 weeks = 3,600 kgs

(iii) **Maximum level** = ROL + ROQ – (Min. usage x Min. re-order period)
= 3,600 kgs + 1,196 kgs – [100 kgs.×4 weeks]
= 4,396 kgs.

(iv) **Minimum level** = ROL – (Normal usage x Normal re-order period)
= 3,600 kgs. – [275 kgs × 6 weeks]
= 1,950 kgs.

(v) **Average stock level** = $\frac{1}{2}$ (Maximum level + Minimum level)
= $\frac{1}{2}$ [4,396 kgs. + 1,950 kgs.]
= 3,173 kgs.

OR

$= [\text{Minimum level} \frac{1}{2} + \text{ROQ}]$

$= [1{,}950 \text{ kgs} + \frac{1}{2} \times 1{,}196 \text{ kgs.}]$

$= 2{,}548 \text{ kgs.}$

Working Note :

Annual consumption of raw material (S) (275 kgs. × 52 weeks) = 14,300 kgs.

Cost of placing an order (C_0) = ₹ 100

Carrying cost per kg. Per annum (iC_1) = $\frac{20}{100} \times ₹ 10 = ₹ 2$

Economic order quantity (EOQ) = $\frac{2SC_0}{iC_1}$

$= \frac{2 \times 14{,}300 \text{ kgs.} \times ₹ 100}{₹ 2}$

= 1,196 Kgs.

Ans.3. (i) $EOQ = \sqrt{\frac{2SC0^*}{iC_1}}$

*Here S = Annual demand of fertilizer bags.

C_1 = Cost per bag.

C = Relevant ordering cost per purchase order

iC_1 = Annual relevant carrying cost per bag

EOQ for Super Grow Fertilizer

$\sqrt{\frac{2 \times 2{,}000 \text{ bags} \times ₹ 1{,}200}{₹ 480}} = 100 \text{ bags.}$

EOQ for Nature's Own Fertilizer

$\sqrt{\frac{2 \times 1{,}280 \text{ bags} \times ₹ 1{,}400}{₹ 560}} = 80 \text{ bags.}$

(ii) **Total annual relevant costs for Super Grow Fertilizer**

= Total annual relevant ordering costs + Total annual relevant carrying costs

$= \frac{S}{EOQ} \times C_0 + \frac{1}{2} EOQ \times iC_1$

$= \frac{2{,}000 \text{ bags}}{100 \text{ bags}} \times ₹ 1{,}200 + \frac{1}{2} \times 100 \text{ bags} \times ₹ 480$

= ₹ 24,000 + ₹ 24,000 = ₹ 48,000

Total annual relevant costs for Nature's Own Fertilizer

$$= \frac{1{,}280 \text{ bags}}{80 \text{ bags}} \times ₹\,1{,}400 + \frac{1}{2} \times 80 \text{ bags} \times ₹\,560$$

$$= ₹\,22{,}400 + ₹\,22{,}400 = ₹\,44{,}800$$

(iii) **Number of deliveries for Super Grow Fertilizer per year.**

$$= \frac{S}{EOQ} \text{ (annual demand of fertiliser bags)}$$

$$= \frac{2{,}000 \text{ bags}}{100 \text{ bags}} = 20 \text{ orders}$$

Numbers of deliveries for Nature's Own fertilizers per year.

$$= \frac{1{,}280 \text{ bags}}{80 \text{ bags}} = 16 \text{ orders}$$

Ans.4. (1) S = Annual usage of tubes = Normal usage per week × 52 weeks

= 100 tubes × 52 weeks = 5,200 tubes

C_0 = Ordering cost per order = ₹100/- per order

C_1 = Cost per tube = ₹ 500/-

iC1 = Inventory carrying cost per unit per annum

= 20% × ₹ 500 = ₹ 100/- per unit, per annum

Economic order quantity :

$$E.O.Q = \sqrt{\frac{2SCo}{iC_1}} = \sqrt{\frac{2 \times 5{,}200 \text{ units} \times ₹\,100}{₹\,100}} = 102 \text{ tubes (approx.)}$$

The supplier is willing to supply 1500 units at a discount of 5%, is it worth accepting

Total cost (when order size is 1500 units) = Cost of 5,200 units + Ordering cost + Carrying cost.

$$= 5{,}200 \text{ units} \times ₹\,475 + \frac{5{,}200 \text{ units}}{1{,}500 \text{ units}} \times ₹\,100 + \frac{1}{2} \times 1{,}500 \text{ units} \times 20\% \times ₹\,475$$

$$= ₹\,24{,}70{,}000 + ₹\,346.67 + ₹\,71{,}250$$

$$= ₹\,25{,}41{,}596.67$$

Total cost (when order size is 102 units)

$$= 5{,}200 \text{ units} \times ₹\,500 + \frac{5{,}200 \text{ units}}{102 \text{ units}} ₹\,100 + \frac{1}{2} 102 \text{ units} \times 20\% \times ₹\,500$$

$$= ₹\,26{,}00{,}000 + ₹\,5{,}098.03 + ₹\,5{,}100$$

$$= ₹\,26,\,10{,}198.03$$

Since, the total cost under quarterly supply of 1,500 unit with 5% discount is lower than that when order size is 102 units, therefore the offer should be accepted. While accepting this offer consideration of capital blocked on order size of 1,500 units per quarter has been ignored.

(2) **Minimum level of stock**

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

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

= 1,402 units.

(3) **Minimum level of stock**

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

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

(4) **Reorder level**

= Maximum consumption × Maximum re-order period

= 200 units × 8 weeks

= 1,600 units

Ans.5. (i) How much should be ordered each time i.e., Economic Order Quantity (EOQ)

$$EOQ = \sqrt{\frac{2AB}{CS}}$$

Where A is the annual consumption

B is the ordering cost per order

CS is the carrying cost per unit per annum

$$= \sqrt{\frac{2 \times 12{,}000 \times 12}{1 \times (24 / 100)}} = 12{,}00{,}000$$

= 1095.4 units or 1095 units.

(ii) When should the order be placed i.e., reordering level

Reordering level = *Safety stock + normal lead time consumption

$$\text{Reordering level} = \left[\frac{12{,}000}{360} \times 30\right] + \left[\frac{12{,}000}{360} \times 15\right]$$

= 1,000?500 = 1,500 units.

(iii) What should be the inventory level (ideally) immediately before the material ordered is received i.e. the Safety Stock.

$$\text{*Safety Stock} = \left[\frac{12{,}000}{360} \times 30\right]$$

= 1,000 units.

STOCK VALUATION AND STOCK CONTROL

Ans.6. From the point of view of cost of material charged to each job, it is minimum under FIFO and maximum under LIFO. During the period of rising prices, the use of FIFO gives rise to high profits and that of LIFO low profits. In the case of weighted average there is no significant adverse or favourable effect on the cost of material as well as on profits.

From the point of view of valuation of closing stock it is apparent from the above statement that it is maximum under FIFO, moderate under weighted average and minimum under LIFO.

It is clear from the above that the use of weighted average evens out the fluctuations in the prices. Under this method, the cost of materials issued to the jobs and the cost of material in hand reflects greater uniformity than under FIFO and LIFO. Thus from different points of view, weighted average method is preferred over LIFO and FIFO.

Statement of Receipts and Issues by adopting First-in-First-Out Method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹
Jan 1	Purchase	100	1	100	----	----	----	100	1	100
Jan 20	Purchase	100	2	200	----	----	----	100	1	100
								100	2	200
Jan. 22	Issue to	----	----	----	60	1	60	40	1	40
	Job W 16							100	2	200
Jan. 23	Issue to	----	----	----	40	1	40	----	----	----
	Job W 17	----	----	----	20	2	40	80	2	160

Statement of Receipts and Issues by adopting Last-In-First-Out method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹
Jan 1	Purchase	100	1	100	----	----	----	100	1	100
Jan 20	Purchase	100	2	200	----	----	----	100	1	100
								100	2	200
Jan. 22	Issue to	----	----	----	60	2	120	100	1	100
	Job W 16							40	2	80
Jan. 23	Issue to	----	----	----	40	2	80	80	1	80
	Job W 17				20	1	20			

Statement of Receipt and Issues by adopting Weighted Average method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹	Units No.	Rate ₹	Value ₹
Jan 1	Purchase	100	1	100	—	—	—	100	1	100
Jan 20	Purchase	100	2	200	—	—	—	200	1.50	300
Jan. 22	Issue to Job W 16	—	—	—	60	1.50	90	140	1.50	210
Jan. 23	Issue to Job W 17	—	—	—	60	1.50	90	80	1.50	120

Statement of Material values allocated to Job W 16, Job W 17 and Closing Stock, under aforesaid methods

	FIFO	LIFO	Weighted Average
	₹	₹	₹
Material for Job W 16	60	120	90
Material for Job W 17	80	100	90
Closing Stock	160	80	120
	300	**300**	**300**

Ans.7. **Statement showing the Issue Rate of Chemicals**

	Chemicals		
	A	B	C
	₹	₹	₹
Purchase Price	12,600	19,000	9,500
Add : Sales Tax @ 5% of purchase price *(Refer to Working Note 2)*	630	950	475
Add : Railway Freight in the ratio of 3 : 5 : 2 *(Refer to Working Note 3)*	300	500	200
Add : Octroi @ Re. 0.10 p.per kg. On the quantity of material received *(Refer to Working Note 1)*	280	472	190
Add : Cartage	22	6312	31.80
Total Price	**13,832**	**20,985.12**	**10,396.80**

Rate of issue per Kg = $\frac{\text{Total Price}}{\text{Qty. available for issue}}$ = $\frac{₹\ 13,832}{2,660\ kg.}$ $\frac{₹\ 20,985.12}{4,484\ kg.}$ $\frac{₹\ 10,396.80}{1,805\ kg.}$

(Refer to Working Note 1) = ₹ 5.20 = ₹ 4.68 = ₹ 5.76

Working Notes :

1. Statement showing the quantity of chemicals available for issue :

	Chemicals		
	A	**B**	**C**
	Kg.	**Kg.**	**Kg.**
Quantity purchased	3,000	5,000	2,000
Less : Shortage (Assumed to be normal	200	280	100
Quantity received at the store	2,800	4,720	1,900
Less : Provision for further deterioration 5%	140	236	95
Quantity available for issue	2,660	4,484	1,805

2. Rate of sales Tax = $\frac{\text{Sales Tax}}{\text{Total Purchase price of Cheenai}}$ × 100 = ₹ 2,055 × 100 = 5%

3. **Railway Freight :** It has been charged on the basis of quantity purchased i.e. A : 3000 kg ; B : 5000 kg ; C : 2000 kg in the ratio of 3 : 5 : 2.

Ans.8. Working Note :

(i) Percentage of loss on output : 25

Let 1 kg. be the output of product A,

then, 1.25 kg. will be the input of material X and Y.

Proportion of material X and Y in the output 1 kg. of product A is :

X : 1.25 kg. / 2 = 0.625 kg.

Y : 1.25kg. / 2 = 0.625 kg.

(ii) Cost structure and price :

(for 1 kg. of product A)	₹
Material X :	62.50
(0.625 kg. x ₹ 100)	
Material Y :	37.50
(0.625 kg. x ₹ 60)	
Total Material Cost	100.00
Add : Production expenses	
(50% of material cost)	50.00
Total cost	150.00
Add : Profit 33% of total cost	50.00
Selling price	200.00

Proportion of Materials X and Z in the Product A

Assume the minimum quantity of material Z in the product A as S kg. It means that (1.25-S) kg, of material X is required to be used for producing 1 kg. of Product A.

[Refer to Working Note (i)]

To maintain the level of profit and the selling price has shown by the Working Note (ii) it is necessary that the total cost of material in 1 kg. of product A should not exceed ₹ 100; i.e., S kg. x ₹ 50 + (1.250 - S) kg. x ₹ 100 = ₹ 100 or S = 0.5.

Hence the quantity of X material = 1.25 kg. - 0.50 kg. = 0.75 kg.

Proportion of materials X and Z is: 0.75: 0.50 = 3 : 2.

Ans.9. ***Stores Ledger of AT Ltd. for the month of September, 1982 (FIFO method)***

Date	Receipt				Issue				Balance		
	GRN No. MRR No.	Qty. Units	Rate ₹ P.	Amount ₹ P.	Requisition No.	Qty. Units	Rate ₹ P.	Amount ₹ P.	Qty. Units	Rate ₹ P.	Amount ₹ P.
1	2	3	4	5	6	7	8	9	10	11	12
1.9.82	–	–	–	–	–	–	–	–	25	6.50	162.50
4.9..82	–	–	–	–	85	8	6.50	52	17	6.50	110.50
6.9.82	26	50	5.75	287.50	–	–	–	–	17	6.50	----
									50	5.75	398.00
7.9.82	–	–	–	–	97	12	6.50	78	5	6.50	
									50	5.75	320.00
10.9.82	–	–	–	–	Nil	10	5.75	57.50	5	6.50	
									40	5.75	262.00
12.9.82	–	–	–	–	108	5	6.50				
						10	5.75	90	30	5.75	172.50
1	2	3	4	5	6	7	8	9	10	11	12
13.9.82	–	–	–	–	110	20	5.75	115	10	5.75	57.50
15.9.82	33	25	6.10	152.50	–	–	–	–	10	5.75	
									25	6.10	210.00
17.9.82	–	–	–	–	121	10	5.75	57.50	25	6.10	152.50
19.9.82	38	10	5.75	57.50	–	–	–	–	25	6.10	
									10	5.75	210.00
20.9.82	4	5	5.75	28.75	–	–	–	–	5	5.75	
									25	6.10	
									10	5.75	238.75
26.9.82	–	–	–	–	146	5	5.75		20	6.10	
						5	6.10	59.29	10	5.75	179.50
30.9.82	–	–	–	–	Shortage	2	6.10	12.20	18	6.10	
									10	5.75	167.30

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 20.9.82 has been taken as the price of the earlier issue made on 17.9.82. In FIFO method physical flow of the material is irrelevant for pricing the issues.
3. The issue of material on 26.9.82 is made out of the material received from within.
4. The entries for transfer of material from one job and department to other on 22.9.82 and 29.9.82 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.

Ans.10. Comparative Statement of procuring material from two sources

	Material sourcel	Material sourcell
Defective (in %)	2	2.8
	(Future estimate)	*(Past experience)*
Units supplied (in one lot)	1,000	1,000
Total defective units in a lot	20	28
	(1,000 units × 2%)	*(1,000 units × 2.8%)*
Additional price paid per lot (₹) (A)	100	–
Rectification cost of defect (₹) (B)	100	140
	(20 units ₹ 5)	*(28 units × ₹ 5)*
Total additional cost per lot (₹) : [(A)+(B)]	200	140

Decision : On comparing the total additional cost incurred per lot of 1,000 units, we observe that it is more economical, if the required material units are procured from material source II.

Ans.11. Calculation of Selling Price

Imported item cost	40% OF 6000	2,400.00
ADD : INSURANCE AND FREIGHT		200.00
Add : custom duty 40% of 2400 + 200 landed cost of imported kit		1,040.00
		3,640.00
Add : local manufactured - 60% standard	1,800	
Non-standard	2,700	4,500.00
Total 60% OF 5000 *1.5 TIMES WHERE 5000 IS 6000 - 20% ON COST		
	Total	**8,140.00**
Add : assembling and others overheads		1,000.00
Add : technical know-how and drawing for all non -standard items which Are to be procured locally, kuzuki will provide drawings irrelevant 3000000 / 300000		10.00
		9,150.00
Add : royalty balance figure		685.00
	Total cost	**9,835.00**
Add : 20% of selling price		2,459.00
	Selling price	**12,294.00**

ROYALTY AND SELLING PRICE

let SP be X

royalty = 10% (x - 3640 - 1800)

SP = 9150 + 10% (x - 5440) + 20% of x

x = 12294