Question	MATERIAL COST
1	HW Typed
2	HW Typed
3	HW Typed
4	HW Typed
5	HW Handwritten Solution provided
6	CW
7	HW Typed
8	HW Typed
9	CW
10	HW Typed
11	CW
12	HW Handwritten Solution provided
13	HW Handwritten Solution provided
14	HW Typed
15	CW
16	HW Handwritten Solution provided
17	CW
18	CW
19	CW
20	HW Typed
21	CW
22	CW
23	HW Typed
24	CW
25	HW Handwritten Solution provided
26	CW
27	HW Typed
28	HW Typed
29	CW
30	HW Typed

Question	MATERIAL COST
31	CW
32	CW
33	HW Handwritten Solution provided
34	HW Handwritten Solution provided
35	HW Typed
36	HW Handwritten Solution provided
37	HW Typed
38	CW
39	HW Handwritten Solution provided
40	Theory Discussed in class
41	CW
42	CW
43	CW
44	Theory Discussed in class
45	Theory Discussed in class
46	CW
47	HW Typed
48	CW
49	CW
50	Theory Discussed in class
51	Theory Discussed in class
52	CW
53	CW
54	HW Handwritten Solution provided
55	Theory Discussed in class
56	CW
57	CW
58	CW
59	CW
60	CW

Question	MATERIAL COST
61	HW Typed
62	CW
63	CW
64	CW
65	HW Handwritten Solution provided
66	HW Handwritten Solution provided
67	CW
68	HW Typed
69	CW
70	CW
71	CW
72	CW
73	CW
74	CW
75	HW Handwritten Solution provided + Video 16. added at end
76	Same as question 28 of chapter Cost Accounting system
77	HW Typed
78	HW Typed
79	HW Typed
80	HW Typed
81	HW Typed
82	HW Typed
83	CW
84	HW Typed
85	CW
86	HW Typed
87	HW Typed
88	HW Typed
89	HW Typed
90	HW Typed
91	HW Typed

Sol (5) Monthly demand for Raw Material = 7500 units

Annual Demand for Raw Material = A = 7500 × 12 = 90,000 units

Ordering cost per order = O = ₹500

Reorder Period or Lead Time = 5 – 8 weeks → $\frac{5+8}{2}$ = 6.5

Purchase Price of Raw Material = ₹60

Carrying cost Per unit Per annum = C = ₹60 × 10% = ₹6 · P.U.P.A

Usage / Consumption = 250 – 750 units/week

Average Consumption = 500 units/week

(i) ROQ = EOQ = $\sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 90{,}000 \times 500}{6}}$ = 3873 units

(ii) ROL = Maximum Con × Max Lead Time

= 750 × 8 = 6000 units

(iii) Minimum Stock level = ROL – (Average Con × Av Lead Time)

= 6000 – (500 × 6.5) = 2750

(iv) Maximum Stock level = ROL – (Min Con × Min Lead Time) + ROQ

= 6000 – (250 × 5) + 3873

= 8623

(v) Average Stock level = $\left(\frac{2750 + 8623}{2}\right)$ = 5687 units (approx)

Sol (6)

ROL = 160000 units
EOQ = 90,000 units
Minimum Stock Level = 1,00000 units
Maximum Stock Level = 1,90000 units
Average lead Time = 6 days
Diff between max & min lead Time = 4 days

Let Maximum lead Time = x days = 8 days
Let Minimum lead Time = y days = 4 days

$\frac{x+y}{2} = 6$, $x - y = 4$

$x+y = 12$, $x-y=4$

$x+y = 12$
$x-y=4$
$2x = 16$

$\therefore \boxed{x=8}$

$8+y = 12$
$\boxed{y=4}$

(i) Maximum Consumption per day = 20,000 kg/day

ROL = Max Con x Max lead Time
1,60000 = Max Con x 8days
20,000 kg/day = Max Consumption.

(ii) Minimum Consumption per day = 15000 kg/day

cont

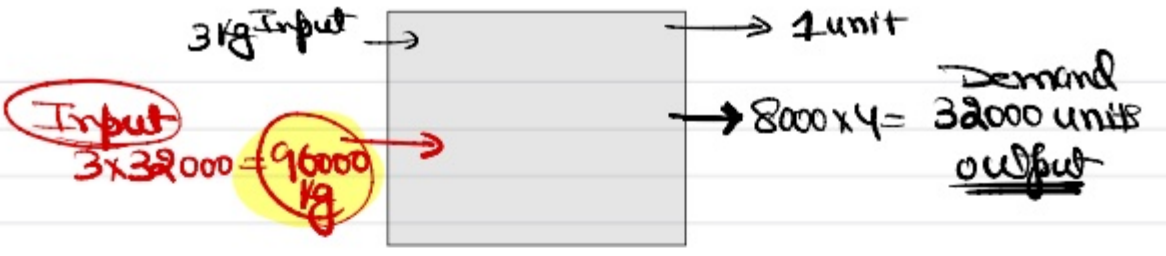
Maximum Stock level = ROL − (Min Con × Min LT) + ROQ

1,90,000 = 1,60,000 − (Min Con × 4 days) + 90,000

Min Con × 4 = 2,50,000 − 1,90,000

Min Con = 15000 kg/day

Sol 9



A = 96000 kg
Price = ₹20/kg
O = ₹1000 per order
C = 15% × ₹20 = ₹3/kg Per annum.

Note:
New Carrying Cost
⇒ (₹20 − 2%) × 15%
⇒ ₹19.6 × 15% = 2.94

(i) $EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 96000 \times 1000}{3}}$ = 8000 kgs

(ii) Statement for Evaluation of Proposals.

Particulars	At EOQ (8000 kgs)	At ROQ = 24000 kgs (4 orders in a year)
ordering cost	$\left(\frac{96000}{8000}\right) \times ₹1000$ = ₹12,000	$\left(\frac{96000}{24000}\right) \times ₹1000$ = ₹4000
Carrying cost	$\left(\frac{SS + \frac{1}{2} ROQ}{2}\right) \times C$ $\left(0 + \frac{1}{2} \times 8000\right) \times 3$ = ₹12,000	$\left(0 + \frac{1}{2} \times 24000\right) \times 2.94^{*}$ = ₹35,280
Purchase Value	₹20 × 96000 kg = ₹19,20,000	₹19.6 × 96000 kg = ₹18,81,600
Total Relevant cost	= ₹19,44,000	₹19,20,880

Yes, the company should accept the discount offer because over overall cost has reduced by ₹23,120.

Sol 11

Price of Raw Material = ₹80/kg ✓

ordering cost = O = ₹370 + 380 = ₹750 per order.

Carrying cost = 0.25 per kg per month × 12 = ₹3 per kg per annum.
+₹12
⇒ ₹15/kg per annum.

(Iss question mei 'C' price par based nahi hai, isliye agar price change bhi hua toh bhi 'C' change ni hogi.)

1 kg Input → 2.5 units.

A → 40000 kg Input → Production 1,00,000 units

$\left(\frac{1,00,000}{2.5} \times 1\right)$

A = 40,000 kg

(i) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 40000 \times 750}{15}} = 2000$ kgs.

(ii)

Number of orders in a year = $\frac{A}{EOQ} = \frac{40000}{2000} = 20$ orders

How frequently orders are placed = $\frac{360 \text{ days}}{20 \text{ orders}} = 18$ days
(Time Gap between two order)

So, we place order after every 18 days.

dd11 (iii) Let price for discounted purchase be ₹x.

Particulars	At EOQ = 2000 kg	At ROQ = 10,000 kg (quarterly sales)
ordering cost	$\left(\frac{40000}{2000}\right) \times 750 =$ ₹15000	$\left(\frac{40000}{10000}\right) \times 750 =$ ₹3000 (4 orders)
carrying cost	$\left(0+\frac{1}{2}\times 2000\right) \times 15 =$ ₹15000	$\left(0+\frac{1}{2}\times 10000\right) \times 15 =$ ₹75000
Purchase Value	40000 kg × ₹80 = 32,00,000	40000 × x = 40,000x
Total	= 32,30,000	= 40000x + 78000

To get minimum discount, we will ask supplier to give discount such that the cost remains equal as before.

$$3230000 = 40000x + 78000$$

$$x = ₹78.8$$

So, Price originally = 80
− Price demanded = 78.8
Discount Demanded = 1.2

$$\text{Discount \%} = \frac{\text{Discount}}{\text{original price}} \times 100 = \frac{1.2}{80} \times 100 = 1.5\%$$

1.5% Discount

So, minimum discount rate demanded to accept the suppliers proposal is 1.5%

Solution 12

ordering cost per order = O = ₹20 per order
Annual Demand of RM = A = 5000
Purchase Price of RM = ₹50 per unit
Carrying cost Per unit Per annum = C = ₹5 p.u.p.a

Lead Times = 6 – 15 days
Minimum Maximum
Average Lead Time = 10 days

Lead Time for emergency purchase = 4 days

Consumption = 10 – 20 units/day

Average Consumption = 15 units/day

WKT Min Consumption = x Max Consumption = 20 Av Consumption = 15

$$\frac{x+20}{2} = 15$$

$$x + 20 = 30$$

$$x = 10$$

So, Minimum Consumption = 10 units/day

WON(2) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 5000 \times 20}{5}} =$ **200 units**

Main Solution:

(a) Reorder level = Maximum Consumption × Maximum lead Time
= 20 units/day × 15 days
ROL = 300 units

(b) Maximum level = ROL − (Min Con × Min lead Time) + ROQ
= 300 − (10 × 6) + 200
Maximum level = 440 units

(c) Minimum level = ROL − (AV Con × AV lead Time)
= 300 − (15 × 10)
Minimum level = 150 units

(d) Danger level = Normal Consumption × Emergency Purchase time
= 15 units × 4 days
Danger level = 60 units

(e) Average Stock level = $\left(\frac{\text{Maximum Stock level} + \text{Minimum Stock level}}{2}\right)$

Average Stock level = $\left(\frac{440 + 150}{2}\right) =$ **295**

Lead Time = 1–3 weeks
ROL = 8000
ROQ = 10,000 kg
Price = 0.10/kg

Q6/13 For A

Consumption
Average Input = 200x10 = 2000 kg/week
Consumption = 1750–2250 kg/week

Average output = 200 units/week
output 175–225 units/week

(a) Minimum Stock level of A = ROL − Average con x Av Lead Time

= 8000 − 2000 × (1+3)/2

(200x10 units kg)

⇒ 8000 − 2000 x 2

⇒ 4000

(d) Average stock level of A ⇒ (Maximum Stock level + Minimum Stock level) / 2

⇒ (16,250 + 4000) / 2

Average Stock level of A ⇒ 10,125

Q.No ①

Maximum Stock Level $= ROL - (Min\ Con \times Min\ d.T) + ROQ$

$\Rightarrow 8000 - (1750 \times 1) + 10,000$

$\Rightarrow 8000 - 1750 + 10,000 = 16250$

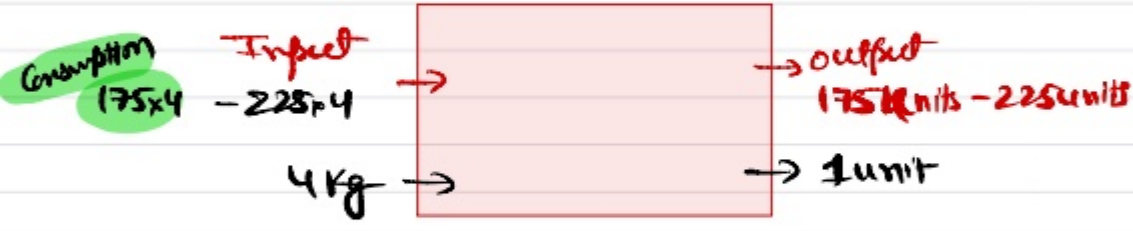
For Raw Material B

Maximum Stock level = Reorder level − (Minimum Consumption × Minimum Lead Time) + Reorder Quantity

= 4750 − ((175×4) × 3 weeks) + 5000

Maximum Stock Level of B ⇒ 7650 Kg

WN



For Raw material C

Reorder level = Maximum Consumption × Maximum lead Time

= (225×6) × 4 weeks

ROL of C = 5400 Kgs

Sol 15 A = Annual Demand of Raw Material = 60,000 units
Price of Raw Material = ₹10 per unit
O = ordering cost per order = ₹800.
C = Carrying cost per unit per annum = ₹10 × 15% = ₹1.5 P.U.P.A
Reorder period = Lead Time = 10 days
Safety stock = SS = 600 units
Average Consumption = 60,000 ÷ 300 days = 200 units/day

(i) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 60{,}000 \times 800}{1.5}}$ = 8000 units

---

(ii) ~~ROL = Maximum Con × Maximum Lead Time~~
ROL = Safety Stock + Average Cons × Av Lead Time
= 600 + 200 unit/day × 10 days
⇒ 2600 units

(iii) Maximum Stock level = ROL − (Min Con × Min Lead Time) + ROQ
= 2600 − (200 × 10 days) + 8000
= 8600 units

(iv) Average Stock Level = Safety Stock + $\frac{1}{2}$ ROQ (or EOQ)
= 600 + $\frac{1}{2}$ × 8000 = 4600 units

Sol (16) ROQ = 5000 kg.

Maximum Level = 8000 kg.

Minimum usage (consumption) = 50 kg per hour × 8 hrs = 400 kg Per day

Minimum Lead time = 4 days

ROL = ?

Maximum Stock level = ROL − (Min Con × Min dT) + ROQ

8000 = ROL − (400 kg Per day × 4 days) + 5000

ROL = 4600 kgs

Sol 18

For A

ROQ = 12000 kg
Price = ₹12
Lead time = 2–4 weeks →
ROL = 60,000 kg

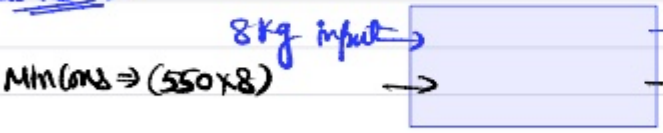
Minimum Stock level = ROL − (AV Con × AV Lead Time)
= 60000 − (10,800 × 3 weeks)

(900 × 12 kg Units Per Unit)

(Qty / 2)

Minimum Stock level = 27600 kgs

Sol 18 (b)



ROQ = 8000 kg, Lead Time (5–7 weeks), ROL = 70000

Maximum Stock level = ROL − (Min Con × Min LT) + ROQ
= 70000 − (4400 kg × 5 weeks) + 8000

(550 units × 8) Min output

Maximum Stock level = 56000

Sol 18 (iii)

ROL = 10,000 kg, Lead Time = 3-7 weeks,
Minimum Stock level = 25,500 , AOL = ?

Method ①

Minimum Stock level = ROL − (Av Con × Av Lead Time)

25,500 = ROL − (5400 × 5 weeks)

(3+7)/2

(900 × 6kg Av output)

25,500 = ROL − 27000

52500 = ROL

Method ②

ROL = Maximum Con × Max Lead Time
= (1250×6) × 7 weeks

ROL = 52,500 kg

Q.17 Item A

Normal usage / Consumption = 50 units/week

Consumption = 25 units/week — 75 units/week

ROQ for A = 300 unit

Reorder period = 4 – 6 weeks.

(a) ROL = Maximum Consumption × Maximum lead Time

= 75 units/week × 6 weeks

ROL = 450 units

(b) Minimum level = ROL – (Average Consumption × Av lead Time)

= 450 – (50 × 5)

$\left(\frac{25+75}{2}\right)$ $\left(\frac{4+6}{2}\right)$

= 200

(c) Maximum Stock level = ROL – (Min Con × Min lead Time) + ROQ

= 450 – (25 × 4) + 300

= 650 units

(d) Average Stock level = $\left(\frac{\text{Maximum Stock level} + \text{Minimum Stk.}}{2}\right)$

= $\left(\frac{650+200}{2}\right)$ = 425 units

Sol (19)

(i) Minimum stock level = 4000 ⇒ Considered as Safety Stock
Average stock level = 9000
Reorder qty = ROQ = ?

This can't be used
Min Stock level = ROQ − (AV Con × AV lead time)

Average stock = safety stock + $\frac{1}{2}$ ROQ

$9000 = 4000 + \frac{1}{2} ROQ$

$9000 - 4000 = \frac{1}{2} ROQ$

19,000 = ROQ

Sol 19(ii) Total Annual Carrying Cost = Average Stock × Carrying Cost P.U.P.a

£9000 = $\left(£s + \frac{1}{2} EOQ\right) \times 3.6$

$\frac{9000}{3.6} = \left(0 + \frac{1}{2} EOQ\right)$

5000 units = EOQ

Sol 19(iii) Monthly Average demand = 390 × 12 = 4680

O = ₹40 Per order

C = ₹25 × 35% = ₹8.75.

$$EOQ = \sqrt{\frac{2 \times 4680 \times 40}{8.75}} = 206.85 \sim \boxed{207 \text{ units}}$$

Sol 21

O = Cost of Placing an order = ?

C = Carrying cost = % ___ ?

(i)

Ordering cost		Carrying Cost	
Procurement cost	4,00,000	Store warehouse personal salary	4,00,000
Purchase Dept Expenses	4,00,000	obsolescence / Spoilage	1,20,000
collection Cost	80,000	Floor charges	2,80,000
Recurring Cost	20,000	Material handling	3,00,000
Inspection Cost	1,00,000	Interest 12.5% x 200L	25,00,000
Bill Payment cost	1,50,000	Insurance 2% x 200L	4,00,000
Total ordering cost	₹12,00,000	Total Carrying cost	₹40,00,000

Ordering cost per order = ₹12,00,000 / 12000 orders

O = ₹100 per order

Carrying cost % = ₹40,00,000 x 100 / ₹200L (Average stock)

Carrying cost % = 20%

(ii) A = 34560 units

O = ₹100 per order

C = 20% x ₹24 = ₹4.8 per unit p.a

$$EOQ = \sqrt{\frac{2 \times 34560 \times 100}{4.8}} = 1200 \text{ units}$$

Sol 22

Rice → [ ] → Bread.

A = Annual demand of Raw Material = 52 m Kg = 52,00,000 Kgs (52 × 1000000)

O = ordering cost per order = ₹ 10,000
- ₹ 7000 disp. charges
- ₹ 3000 other ordering charges.

Purchase Price = ₹ 10 / Kg

C = carrying cost = ₹ 10 × 4% = ₹ 0.40 P. Kg per annum.

SS = Safety Stock = 4,00,000 Kgs.

Lead Time = 6 weeks.

Average Consumption = $\frac{52,00,000}{52}$ = 1,00,000 Kg per week.

(a) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 52L \times 10,000}{0.40}}$ = 5099.02 Kg. ~ 5,10,000 Kgs.

(b) ROL = Safety Stock + Average Cons × Av Lead Time

= 4,00,000 + 1,00,000 Kg/week × 6 weeks.

ROL = 10,00,000 Kg

(c) Statement for Calculation of Total Inventory Cost

- ordering cost = $\left(\frac{A}{EOQ}\right) \times O = \left(\frac{52,00,000}{5,10,000}\right)$ = 10.19 ~ 11 Orders × 10000 = ₹ 1,10,000
- Carrying cost = Average Stock × C = $\left(\frac{4,00,000 + 1 \times 5,10,000}{2}\right) \times 0.4$ = ₹ 2,62,000
- Purchase Value = 52,00,000 × ₹ 10 = ₹ 5,20,00,000

Total Inventory cost = ₹ 5,23,72,000

Sol 22 (d)

Particulars	At EOQ = 5,10,000 kgs		At ROQ = 6,50,000 kg.
ordering cost	(Solved above)	₹1,10,000	$\left(\frac{52L}{6.5L}\right) = 8 \times 3000^{*} = ₹24,000$
carrying cost	(Solved above)	₹2,62,000	$\left(400000 + \frac{1}{2} \times 650000\right) \times 0.40 = ₹2,90,000$
purchase value	52L × 10 = ₹5,20,00,000		52L × 10 = ₹5,20,00,000
Relevant cost	= ₹3,72,000		₹3,14,000

we should accept the quantity ROQ 6,50,000 kg because we are able to save ₹58000 because of it.

Hw ⇒ Q 89, 91, 88,

Q24 $A = ?$, $O = ₹100$ per order, $C = ₹20$ p.u.p.a

Total ordering & carrying cost $= \sqrt{2 \times A \times O \times C} =$

$₹4000 = \sqrt{2 \times A \times 100 \times 20}$

Squaring both sides

$(4000)^2 = 4000\,A$

$\frac{(4000)^2}{4000} = A$, So, Annual Demand $A = 4000$ kgs

@ EOQ $= \sqrt{\frac{2 \times 4000 \times 100}{20}} =$ 200 units.

(b) Calculating Total Relevant Cost of Inventory.

Particulars	EOQ = 200 units	ROL = 2000 units, (2% DIS)	ROL = 4000, (5% DIS)
ordering cost	$\left(\frac{4000}{200}\right)^{20\text{ orders}} \times 100 = ₹2000$	$\left(\frac{4000}{2000}\right)^{2\text{ orders}} \times 100 = ₹200$	$\left(\frac{4000}{4000}\right)^{1\text{ order}} \times 100 = ₹100$
Carrying cost $\left(SS + \frac{1}{2}\text{Reg}\right)C$	$\left(0 + \frac{1}{2} \times 200\right) \times 20 = ₹2000$	$\left(0 + \frac{1}{2} \times 2000\right) \times 20^{*} = ₹20,000$	$\left(0 + \frac{1}{2} \times 4000\right) \times 20^{*} = ₹40,000$
Purchase Value	$4000 \times ₹200 = 800000$	$4000 \left(\frac{200}{-2\%}\right) = 784000$	$4000 \times \left(\frac{200}{-5\%}\right) = 760000$
Total	₹804000	804200 Reject	₹809100 Accept offer

Sol 25 $A = 36{,}000$

Price per unit = ₹1

O = ordering cost = ₹25 per order.

C = Carrying cost = 20% × 1 = ₹0.20 per unit per annum.

$$EOQ = \sqrt{\frac{2 \times 36000 \times 25}{0.2}} = 3000$$

	Current Policy ROQ = 6000 units		EOQ = 3000 units.	
Total ordering cost	$\left(\frac{36000}{6000}\right) \times 25 =$	150	$\left(\frac{36000}{3000}\right) \times 25 =$	300
Total carrying cost	$\left(0 + \frac{1}{2} \times 6000\right) \times 0.2 =$	600	$\left(0 + \frac{1}{2} 3000\right) \times 0.2 =$	300
		750		600

Money saved by using EOQ = 750 − 600 = ₹150

8e126

ordering cost = O = ₹250 per order ✓

Carrying cost = C = ₹12.5 p.u.p.a

Annual demand = A = 9600

$$EOQ = \sqrt{\frac{2 \times 9600 \times 250}{12.5}} = 619.67 \sim 620$$

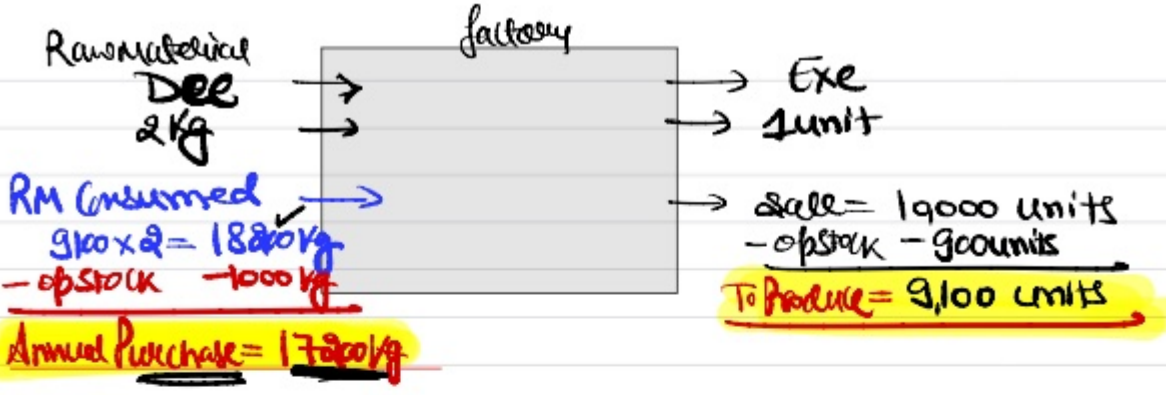
order size	Price	
1 - 2000	₹40	
2001 - 4000	₹38	(₹40 - 5%)
4001 - onwards	₹36	(₹40 - 10%) Extra Profit

Particulars	ROQ 400 units	ROQ 800 unit	ROQ 2400 unit	ROQ 4800 unit	ROQ 9600 unit	ROQ (EOQ) 620 unit
ordering cost	$\left(\frac{9600}{400}\right) \times 250$ = ₹6000	$\left(\frac{9600}{800}\right) \times 250$ = ₹3000	$\left(\frac{9600}{2400}\right) \times 250$ = ₹1000	$\left(\frac{9600}{4800}\right) \times 250$ = ₹500	$\left(\frac{9600}{9600}\right) \times 250$ = ₹250	$\left(\frac{9600}{620}\right) \sim 16 \times 250$ = ₹4000
Carrying cost	$\left(\frac{0+1}{2} \times 400\right) \times 12.5$ = ₹500	$\left(\frac{0+800}{2}\right) \times 12.5$ = ₹5000	$\left(\frac{1}{2} \times 2400\right) \times 12.5$ = ₹15000	$\left(\frac{4800}{2}\right) \times 12.5$ = ₹30000	$\left(\frac{9600}{2}\right) \times 12.5$ = ₹60000	$\left(\frac{620}{2}\right) \times 12.5$ = ₹3875
Purchase Value	9600 × ₹40 = 3,84,000	9600 × ₹40 = 3,84,000	9600 × ₹38 = 3,64,800	9600 × ₹36 = 3,45,600	9600 × ₹36 = 3,45,600	9600 × ₹40 = 3,84,000
Total	392,500	392000	380,800	3,76,100	405,850	391,875

So, optimum order size = 4800 units per order (2 orders in a year)

because it has lowest total cost.

Q1.29



(i) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 17200 \times 720}{17.2}} =$ 1200 Kgs

$ROQ = EOQ - 200 = 1200 - 200 =$ 1000 Kg

O = ordering cost per order = ₹720

C = Carrying cost P.U.Pa = ₹125 x 13.76% = ₹17.2 PUPa

(ii) Maximum Stock level = RoL - (Min Cons x Min lead Time) + ROQ

$= 560 - (30 \text{ Kg/day} \times 4 \text{ days}) + 1000 \text{ Kg}$

Maximum stock level = 1440 Kgs.

(WN) Annual Consumption = 18200 kg

Average Daily Consumption = $\frac{18200 \text{ kg}}{364}$ = 50 kg Per day

Maximum Consumption = 50 kg + 20 = 70 kg/day

$\Rightarrow \frac{\text{Min Con} + \text{Max Con}}{2} = \text{Average Consumption}$

$\frac{\text{Min Con} + 70}{2} = 50$,

Min Con = 30 kg/day

(WN) ROL = Maximum Con × Max LeadTime

= 70 kg/day × 8 days

ROL = 560 kgs ✓

Sol 29(iii) Minimum Stock level = ROL − Av Con × Av LeadTime

$= 560 - \left(\left(\frac{30+70}{2}\right) \times \left(\frac{4+8}{2}\right)\right)$

$= 560 - 50 \times 6$

Minimum Stock level = 260 kg

Sol 24 (iv)

Particulars	At ROQ = 1000 Kg	At EOQ = 1200 Kg.
ordering cost	$\frac{17200}{1000} \sim 18$ orders $\times 720 = 12960$	$\frac{17200}{1200} \sim 15$ orders $\times 720 = 10,800$
Carrying cost $(SS + \frac{1}{2}ROQ) \times C$	$(0 + \frac{1}{2} \times 1000) \times 17.2 = 8600$	$(0 + \frac{1}{2} \times 1200) \times 17.2 = 10320$
Total Relevant cost	₹21,560	₹21,120

negative

Impact on profit (less suffered) due to not ordering EOQ level is ₹440

(₹21560 − ₹21120)

Sol 31 WON ①

Raw Material Ae

A = 600,000 kgs

5:3

Input 960000 kg

→ Product AB

output 50000 kg Pro

×12

6,00,000 kg

Be

A = 360,000 kg

WON ②

$\frac{\text{Input}}{\text{output}} = \frac{8}{5} = \frac{\text{Total Input}}{600000 \text{ kg}}$

$\frac{8}{5} \times 600000 = 960000 \text{ kg} = \text{Total Input}$

So, Input of Ae = $960000 \times \frac{5}{8} = 600000$ kgs

Input of Be = $960000 \times \frac{3}{8} = 360000$ kg

WON ③ Raw Material Ae

A = Annual Demand = 600000 kgs

Price = ₹150/kg

Lead Time = 2-3 days

C = Carrying cost = 12% × 150 = ₹18 P.u.P.a

O = ordering cost = ₹375 per order

ROL = Reorder qty (Currently used) = 7500 kgs

Perishable life = 3.5 days

Main Solution 31

① $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 600000 \times 375}{18}} =$ **5000 Kgs** < 7000 kg

② Maximum Stock level = ROL − (Min con × Min dead Time) + ROQ

$= \left(\text{Maxim}_{\text{con}} \times \text{Max}_{\text{dead Time}}\right) - \left(\text{Min con} \times \text{Min}_{\text{Time}}^{\text{dead}}\right) + ROQ$

$= \left(\frac{2000\ kg}{day} \times 3\ day\right) - \left(\frac{2000\ kg}{day} \times 2\right) + 7500$

Maximum Stock Level = 9500 kg > 7000 kg So, not possible.

As material A/c is perishable in nature, so, we cannot keep its stock for more than 3.5 days.
$(3.5 \times 2000) = 7000$ kg, Thus

Correct Maximum Stock Level = 7000 kg

Annual requirement of A/c = 6,00,000 kg

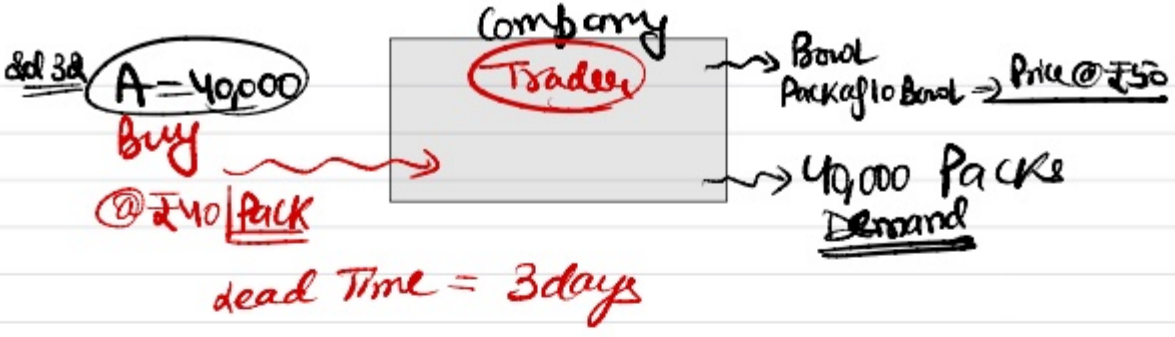
Working Days in a year = $\frac{25}{\text{day p.m}} \times 12 =$ 300 days

Average Consumption per day = $\frac{600000}{300} =$ **2000 kg / day**

Perishable life = 3.5 days

So, we cannot order more than 7000 kg or we cannot have Stock level of more 7000 kg.

Sol 38



Lead Time = 3 days

O = ordering & related cost = ₹8/order.

C = Carrying Cost = 10% × ₹40 = ₹4 p.u.p.a.

A = 40,000 Packs

(i) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 40000 \times 8}{4}} =$ 400 Packs.

(ii) No of orders each year $= \frac{A}{EOQ} = \frac{40000}{400} =$ 100 orders

(iii) Method ①

Calculating Total ordering & Carrying (Storage) Cost

Total ordering Cost = No of orders × O

= 100 × 8 = ₹800

Total Carrying Cost = Average Stock × C

$= \left(\frac{Q}{2} + \text{ROL}\right) \times C$

$= \left(\frac{400}{2} + 0\right) \times 4 =$ ₹800

Total ordering & Carrying Cost = ₹1600.

Method ②

Calculating Total ordering & Carrying (Storage) cost =

$\sqrt{2 \times A \times O \times C} = \sqrt{2 \times 40000 \times 8 \times 4} =$ ₹1600

Yeh formulae sirf tab apply hota hai jab hum EOQ par calculation kar rahe ho aur safety stock na ho.

(iv) Annual requirement of Packs = 40,000 Packs
Days in a year = 360 days

Consumption in 1 day = $\frac{40000}{360}$ = 111 packs.

Existing stock level = 333 packs.

Available stock will last for 3 days.
− Lead Time − 3 days
Time available for next order 0 days.

So, next order should be placed immediately.

(v) Stock available 555 Packs.
Available stock will last for $\frac{555}{111}$ = 5 days
− 3 days
− Lead Time
Time available for placing next order 2 days.

Sol 33 Purchase Price = ₹60/Kg

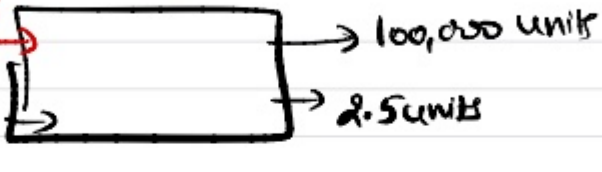
O = ordering cost = 360 + 390 = ₹750/order

C = Carrying cost = 0.50 × 12 + 9

⇒ 6 + 9 = ₹15 Kg Per annum

A = 40,000 Kg

A = $\frac{1,00,000}{2.5}$ = 40,000 Kg



(i) $EOQ = \sqrt{\frac{2 \times 40,000 \times 750}{15}}$ = 2000 Kg

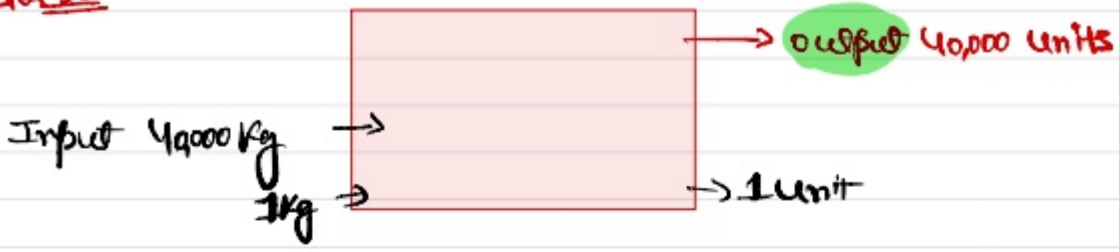
(ii) Number of orders = $\frac{A}{EOQ} = \frac{40000}{2000}$ = 20 orders

Time Gap between orders / frequency = $\frac{365}{20}$ = 18.25 days.

(iii) Let Price for quarterly purchase be ₹ β.

Particulars	At EOQ = 2000 Kg	At ROQ = 10,000 Kg ($\frac{40000}{4}$)
	20 orders in a year	4 orders in a year
ordering cost (No of orders × O)	20 × 750 = 15000	4 × 750 = 3000

Sol 36



A = 40000 Kg
O = ₹1000
C = ₹20 P.Kg.P.a.
Lead Time = 36 days
Safety Stock = SS = 1000 Kgs.

$$\Rightarrow EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 40{,}000 \times 1000}{20}} = 2000 \text{ Kgs}$$

(i) ⇒ RoL / Reorder Point = Safety Stock + Average Con × Average Lead Time

$$= 1000 + \left(\frac{40000}{360 \text{ days}}\right) \times 36 \text{ days}$$

self Note: Days in a year in this question = ~~365~~ 12×30 = 360

RoL / Reorder Point = 5000 Kgs

(ii) Statement of Relevant Cost

Particulars	one order Roq = 40,000	Two orders Roq = 20,000	Four orders Roq = 10,000	Five orders Roq = 8000
ordering cost (n × 1000)	1 × 1000 = 1000	2 × 1000 = 2000	4 × 1000 = 4000	5 × 1000 = 5000
Carrying cost (Avg stock × 20)	$\left(1000 + \frac{1}{2} \times 40{,}000\right)$ $(21000 \times 20) = 420000$	$\left(1000 + \frac{1}{2} \times 20000\right)$ $(11000 \times 20) = 220000$	$\left(1000 + \frac{1}{2} \times 10{,}000\right)$ $(6000 \times 20) = 1{,}20{,}000$	$\left(1000 + \frac{1}{2} \times 8000\right)$ $(5000 \times 20) = 1{,}00{,}000$
Purchase value	₹	₹	₹	₹
− Discount	− 40,000	− 32000	− 20,000	− 4000
Relevant cost	381000	190000	104000	101000

(iii) At EOQ (2000 units)

ordering cost = $\left(\frac{40{,}000}{2000}\right) \times 1000 = 20000$

carrying cost = $\left(1000 + \frac{1}{2} \times 2000\right) \times 20 = 40000$

− Discount	0
Relevant cost	₹ 60,000.

As Relevant cost is minimum at EOQ so we should select EOQ 2000 kg/ as optimum order size.

A = 500, O = 6250₹

Q of 34

Statement of Total cost

Particulars	ROQ = 25 Price = 4800	ROQ = 50 Price = 4580	ROQ = 100 Price = 4560	ROQ = 200 Price = 4440	ROQ = 300 Price = 4320
ordering cost	$\frac{500}{25} = 20$ 20 × 6250 125000	$\frac{500}{50} = 10$ 10 × 6250 62500	$\frac{500}{100} = 5$ 5 × 6250 31250	$\frac{500}{200} \approx 3$ 3 × 6250 18750	$\frac{500}{300} = 1.\ldots \sim 2$ 2 × 6250 12500
Carrying cost	$\frac{1}{2} \times 25 \times (4800 \times 25\%)$ 15000	$\frac{1}{2} \times 50 \times (4580 \times 25\%)$ 28625	$\frac{1}{2} \times 100 \times (4560 \times 25\%)$ 57000	$\frac{1}{2} \times 200 \times (4440 \times 25\%)$ 111000	$\frac{1}{2} \times 300 \times (4320 \times 25\%)$ 162000
Purchase Value	(500 × 4800) 24,00,000	(500 × 4580) 22,90,000	(500 × 4560) 22,80,000	(500 × 4440) 22,20,000	(500 × 4320) 21,60,000
	2540000	2381125	2368250	2349750	2334500

ROQ = 300 units should be selected.
Thus most economical purchase level = 300 units

(ii) A = 500 units, Price = ₹5250, O = ₹6250, C = 25%

$C = 25\% \times 5250 = ₹1312.5$

$$EOQ = \sqrt{\frac{2 \times 500 \times 6250}{1312.5}} = 69 \text{ units}$$

Sol 38

Annual demand = A = 54000 units
Price of Raw Material = ₹800 per unit
No of days in a year = 360

Average Consumption = $\frac{54000}{360}$ = 150 units per day.

ordering cost = O = ₹9000 per order
Carrying cost = C = ₹300 p.u.p.a
Average lead Time = 6 days
Maximum lead Time = 10 days.

(i) $EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 54000 \times 9000}{300}}$ = 1800 units

(ii)

As we are willing to accept 15% risk of stockout, Thus we must be keeping stock for 7 days

(For 8th, 9th & 10th day, we are willing to accept stockout)
(5% + 5% + 5%)

ROL = Safety stock + Av Con x Av lead Time
7 x 150 = Safety stock + 150 x 6 days

Safety stock = 150 units

(iii) As we are willing to accept 5% risk of stockout, Thus we must be keeping stock for 9days.
(For 10th day we are willing to accept stockout)

$$ROL = SS + AU \times Av$$
$$9 \times 150 = SS + 6 \times 150$$

SS = 450 units

(iv) At 5% Risk of stockout,

ROL = 9day × 150 = 1350. (As calculated in (iii) above)
SS = 3day × 150 = 450

Total ordering cost $= \left(\frac{A}{EOQ}\right) \times O = \left(\frac{54000}{1800}\right) \times 9000 =$ ₹2,70,000

Total carrying cost $= \left(SS + \frac{1}{2}EOQ\right) \times C = \left(450 + \frac{1}{2} \times 1800\right) \times 300 =$ 405000

Total ordering & carrying cost = ₹6,75,000.

(v)

	Old Policy	New Policy
ordering cost	O = ₹9000	O = ₹600
carrying cost	C = ₹300	C = ₹720
EOQ	$\sqrt{\frac{2 \times 54000 \times 9000}{300}}$ = 1800 units	$\sqrt{\frac{2 \times 54000 \times 600}{720}}$ = 300 units

No of orders $= \frac{54000}{1800} = 30$ orders

Time Gap between orders $= \frac{360 \text{ days}}{30 \text{ orders}} = 12$ days

No of orders $= \frac{54000}{300} = 180$ orders

Time Gap between orders $= \frac{360}{180} = 2$ days

old purchasing policy aims to place order after 12 days.
New purchasing policy is to place order after 2 days

∴ Time Gap between orders is reduced by 10 days. (12 − 2)

Q139 Let Maximum lead Time = x days
Minimum lead Time = y days

⇒ Maximum lead Time − Minimum lead Time = 3

$x - y = 3$ ...(i)

⇒ Average lead Time = $\frac{x+y}{2} = 2.5$

$x + y = 5$ ...(ii)

$x + y = 5$
$x - y = 3$
$2x = 8$
$x = 4$

$x + y = 5$
$4 + y = 5$
$y = 1$

So, Maximum lead Time = 4 days
Minimum lead Time = 1 day

⇒ ROL = Maximum Con × Maximum lead Time
64000 = Maximum Con × 4 days

Maximum Consumption = 16000 units

⇒ Maximum Stock level = ROL − (Min Con × Min lead Time) + ROQ

$$94000 = 64000 - \left(\frac{\text{Min}}{\text{Con.}} \times 1\right) + 49000$$

Minimum Consumption = 19000 units

Sol 41 A = Annual demand = 36000

Number of days = 360.

Average daily demand = $\frac{36000}{360}$ = 100 units/day.

EOQ = 3600 units, Lead Time = 6 days

Number of orders in a year = $\frac{36000\ (A)}{3600\ (EOQ)}$ = 10 orders

C = Carrying cost per unit per annum = ₹450 p.u.p.a

Stockout cost = ₹900 p.u.

ROL = Safety stock + Average Con × N Lead Time

ROL = Safety stock + 100 × 6 days.

Sol (i)

Demand during Lead Time.	Frequency	Probability
540	6	6/200 = 0.03
560	12	12/200 = 0.06
580	16	16/200 = 0.08
600	130	130/200 = 0.65
620	20	20/200 = 0.10
640	10	10/200 = 0.05
660	6	6/200 = 0.03
	200	

Q41 Main Selection

Statement for stockout cost & carrying cost

Safety stock	ROL = SS + Av × Av	Stock out	Prob.	No of Orders	Stockout cost (A)	Extra carrying cost (B)	Total (A) + (B)
(i) 0	ROL = 0 + 100 × 6 = 600	620 − 600 = 20	0.10	10	20 × 0.10 × 10 × 900 = 18000	0 × 450 = 0	
		40	0.05	10	40 × 0.05 × 10 × 900 = 18000		
		60	0.03	10	60 × 0.03 × 10 × 900 = 16200		
					52,200	+ 0	52,200
(ii) 20	ROL = 20 + 100 × 6 = 620	640 − 620 = 20	0.05	10	20 × 0.05 × 10 × 900 = 9000	20 × 450 = 9000	
		660 − 620 = 40	0.03	10	40 × 0.03 × 10 × 900 = 10800		
					19800	+ 9000 =	28,800
(iii) 40	ROL = 40 + 100 × 6 = 640	660 − 640 = 20	0.03	10	20 × 0.03 × 10 × 900 = 5400	40 × 450	
					5400	+ 18000 ⇒	23,400
(iv) 60	ROL = 60 + 100 × 6 = 660	0	0	10	0	60 × 450	
					0	+ 27000	27000

So, 40 units of safety stock should be maintained to get minimum stockout & carrying cost.

(ii)

Reorder Point = ROL = SS + Av (om) × Av lead time
= 40 + 100 × 6 = 640

(iii) Factors to be considered in estimating stockout cost -

- opportunity cost of foregone profits due to lost sales.
- loss of reputation when customer leaves.
- Extra ordering cost in case of emergency purchase.

Sol 42

Statement of Probability

Stockout	No of Times	Probability
100	2	2/100 = 0.02
80	5	5/100 = 0.05
50	10	10/100 = 0.10
20	20	20/100 = 0.20
10	30	30/100 = 0.30
0	33	33/100 = 0.33
	100	1

Statement of Stockout & Carrying Cost.

Safety Stock	Stockout	Prob	Cost of Stockout (A)	Cost of Extra Carrying (B)	Total Cost (A+B)
(i) 0	100 - 0 = 100	0.02	100 x 0.02 x 150 = 300	0 x 50	
	80 - 0 = 80	0.05	80 x 0.05 x 150 = 600		
	50 - 0 = 50	0.10	50 x 0.10 x 150 = 750		
	20 - 0 = 20	0.20	20 x 0.2 x 150 = 600		
	10 - 0 = 10	0.30	10 x 0.3 x 150 = 450		
			2700	+ 0	2700
(ii) 10	100 - 10 = 90	0.02	90 x 0.02 x 150 = 270	10 x 50	
	80 - 10 = 70	0.05	70 x 0.05 x 150 = 525		
	50 - 10 = 40	0.10	40 x 0.10 x 150 = 600		
	20 - 10 = 10	0.20	10 x 0.2 x 150 = 300		
			1695	+ 500 =	2195
(iii) 20	100 - 20 = 80	0.02	80 x 0.02 x 150 = 240	20 x 50	
	80 - 20 = 60	0.05	60 x 0.05 x 150 = 450		
	50 - 20 = 30	0.10	30 x 0.10 x 150 = 450		
			1140	+ 1000 ⇒	2140

(iv) 50	100 − 50 = 50 80 − 50 = 30	0·02 0·05	50×0·02×150 = 150 30×0·05×150 = 225 375 +	50×50 2500 ⇒	2875
(v) 80	100 − 80 = 20	0·02	20×0·02×150 = 60 60	80×50 + 4000 ⇒	4060
(vi) 100	0	0	0 0	100×50 + 5000	5000

So, optimum safety stock level = 20 units.
because it has lowest total cost.

Q43 Annual Demand = A = 800 units

EOQ = 200 units

No of orders = $\frac{800}{200}$ = 4 orders.

Price per unit = ₹5/unit

Carrying cost = 20% × ₹5 = ₹1 p.u.p.a

Shortage cost = ₹2 p.u.

CI	x (Mid point)	f	Probability	fx
25-29	27	1	1/50 = 0.02	27
30-34	32	8	8/50 = 0.16	256
35-39	37	10	10/50 = 0.20	370
40-44	42	12	12/50 = 0.24	504
45-49	47	9	9/50 = 0.18	423
50-54	52	5	5/50 = 0.10	260
55-59	57	5	5/50 = 0.10	285
		Σf = 50		2125 = Σfx

Average Consumption in lead Time = $\frac{\Sigma fx}{\Sigma f} = \frac{2125}{50} = 42.5$

Average Consumption × Average lead Time = 42.5

ROL = Safety stock + Average con × Average lead Time

(i) 45 = SS + 42.5, SS = 2.5 units.

Statement of Stockout & Carrying Cost

	RoL	Safety Stock	Stockout units.	P.b	No of times	Stockout cost (A)	Extra Carrying cost (B)	Total (A)+(B)
(i)	45	(45-42.5) 2.5	47-45 = 2	0.18	4	2x0.18x4x2 = 2.88	2.5x1	
			52-45 = 7	0.10	4	7x0.10x4x2 = 5.6		
			57-45 = 12	0.10	4	12x0.10x4x2 = 9.6		
						18.08	+ 2.5	20.58
(ii)	RoL 50	(50-42.5) SS 7.5	52-50 = 2	0.10	4	2x0.10x4x2 = 1.6	7.5x1	
			57-50 = 7	0.10	4	7x0.10x4x2 = 5.6		
						7.2	+ 7.5	14.7
(iii)	RoL 55	55-42.5 12.5	57-55 = 2	0.10	4	2x0.10x4x2 = 1.6	12.5x1	
						1.6	+ 12.5 =	14.1
(iv)	RoL 60	60-42.5 17.5	-	-	-	-	17.5x1	
						0	17.5	17.5

So, optimal safety stock level is 12.5 units when RoL is 55 units because, then the overall stockout & extra carrying cost is minimum.

Sol 46

$$\text{COGS} = \text{op stock} + \text{Purch} - \text{Cl stock}$$
$$= 90000 + 2700000 - 1,10000$$
$$\text{COGS} = ₹2,59000.$$

$$\text{Average stock} = \frac{\text{opening stock} + \text{closing stock}}{2} = \frac{90000 + 1,10000}{2} = 1,00,000.$$

① Inventory Turnover ratio $= \frac{\text{COGS}}{\text{Av stock}} = \frac{₹2,59000}{₹\ 1,00,000} = 2.5$ Times

② Number of days Inventory is held $= \frac{365 \text{ days}}{\text{ITR}} = \frac{365}{2.5} = 146$ days

Sol 48 @

Material X	Material Y
Average Stock = $\frac{\text{Max} + \text{Min}}{2}$	Average Stock
$= \frac{2500 + 1000}{2} = 1750$ kg	$= \frac{1200 + 600}{2} = 900$ kg
COGS = Issues = 31250 kgs	COGS = Issues = 5400 kgs
$ITR = \frac{\text{COGS}}{\text{Avg Stock}} = \frac{31250}{1750} = 17.85$ Times	$ITR = \frac{\text{COGS}}{\text{Avg Stock}} = \frac{5400}{900} = 6$ Times

Material X is fast moving stock because it has high Inventory Turnover ratio.

(b) How to deal with Slow moving items →

→ Sell / dispose off slow moving extra items
→ Diversify production and produce new products which can use these slow moving inventories.
→ use these inputs as a substitute for some other material.

Sol 49

Evaluation of Inventory Turnover Policies

Particulars	Current ITR = 10	A ITR = 8	B ITR = 6	C ITR = 4
Sales	4,50,000	5,00,000	5,40,000	5,62,500
− Variable cost (70%)	− 3,15,000	− 3,50,000	− 3,78,000	− 3,93,500
− Fixed cost	− 10,000	− 10,000	− 10,000	− 10,000
Profit before Tax	1,25,000	1,40,000	1,52,000	1,59,500
− Tax 40%	− 50,000	− 56,000	− 60,800	− 63,800
Profit after Tax	75,000	84,000	91,200	95,700
− Carrying Cost	− 8125	− 11250	− 16167	− 25344
Net Benefit	66,875	72,750	75,034	70,356

Decision → Select policy B (ITR = 6 Times) as it has highest Net Benefit.

Working Particulars	Current	A	B	C
ITR	10 Times	8 Times	6 Times	4 Times
Cogs (VC + FC)	3,25,000	3,60,000	3,88,000	4,05,500
Average Stock = Cogs / ITR	32,500	45000	64667	101375
× Carrying cost 25%	× 25%	× 25%	× 25%	× 25%
	₹ 8125	₹ 11,250	₹ 16,167	₹ 25,344

$$ITR = \frac{Cogs}{Av\,Stock}, \quad Av\,Stock = \frac{Cogs}{ITR}$$

ABC Analysis of items in Stock.

A Category

Item with 15 no of varities should be classified as A category stock because -

- → It has minimum % of volume of inventory (0.375%).
- → It has maximum % of value in inventory (50%)
- → It has highest % of inventory usage (85%)

B Category

Item with 110 no of varities should be classified as B category stock because -

- ⇒ It has moderate % of volume in inventory ie. 2.750%.
- → It has moderate % of value in inventory i.e. 30%.
- ⇒ It has moderate % of inventory usage ie. 10%.

C Category

Item with 3875 no of varities should be classified as C category stock because -

- ⇒ It has highest % of volume in inventory (96.875%)
- ⇒ It has minimum % of value in inventory ie. (20%)
- → It has minimum % of inventory usage ie (5%).

Sol 53

Statement for classifying stock items.

Item code	units	cost	value (units × cost)	% of qty	% of value	Rank	Category
101	25	50	1250	$\frac{25}{750} \times 100 = 3.33\%$	$\frac{1250}{7500} \times 100 = 16.66\%$	II	A
102	300	01	300	$\frac{300}{750} \times 100 = 40\%$	$= 4\%$	VI	C
103	50	80	4000	$\frac{50}{750} \times 100 = 6.67\%$	$= 53.33\%$	I	A
104	75	08	600	$\frac{75}{750} \times 100 = 10\%$	$= 8\%$	IV	B
105	225	02	450	$\frac{225}{750} \times 100 = 30\%$	$= 6\%$	V	C
106	75	12	900	$\frac{75}{750} \times 100 = 10\%$	$= 12\%$	III	B
	750		7500				

dol 54

Statement for Categorization of Stock

Item	units	Cost	Total Value	% of Qty	% of Value	Category
1	7000	5	35000	7000 × 100 / 219000 = 32.0 %	35000 × 100 / 355770 = 98%	B
2	24000	3	72000	10.96%	20.24%	A
3	1500	10	15000	0.68%	4.22%	B
4	600	22	13200	0.27%	3.71%	C
5	38000	1.5	57000	17.35%	16.02%	A
6	40000	0.5	20,000	18.26%	5.62%	B
7	60000	0.2	12000	27.40%	3.37%	C
8	3000	3.5	10500	1.37%	2.95%	C
9	300	8	2400	0.14%	0.67%	C
10	29000	0.4	11600	13.24%	3.26%	C
11	11500	7.10	81650	5.25%	22.95%	A
12	4100	6.20	25420	1.87%	7.14%	B
	2,19000		355770	100%	100%	

Sol 56

Statement of Net Profit from JIT.

Particulars	Amount (₹)
Benefits	
• Saving in Interest cost on reduced Stock level (7,00,000 × 12%) (Saving in carrying cost)	84,000
• Savings in Insurance Spoilage (2,00,000 × 30%)	60,000
• Saving in Reusk cost (350,000 × 20%)	70,000
• Increase in Price (30,000×3)	90,000
– Cost of JIT	
(Annual tooling cost)	(150000)
Net Benefit	₹ 1,54,000.

Accept JIT because it leads to higher Net Benefits.

Q57

Statement for Net Benefit from JIT

Particulars	Amount (₹)
Benefits.	
• Reduction in carrying cost due to lower stock (28L - 8L) ⇒ (2,00,000 × 15%)	3,00,000
• Saving in rent	36,000
• Saving in Prop Tax	12,000
• Saving in staff salary (2 × 3000 × 12m)	72,000
Costs	
Stockout cost (only in year 1)	−3,40,000
Annual opeating cost of JIT	− 48,000
opportunity cost of interest of capital invested in JIT (6,00,000 × 15%)	− 90,000
Net Benefit	− 64000

Advice:

- If JIT has to be implemented only for 1 year, then it should be rejected, because it has loss of ₹64000.
- If JIT is implemented beyond 1 year, it should be accepted because from 2nd year Net benefit of ₹ 276000 will be gained. (as Stockout cost is only for year 1)
  (−64000 + 340,000) = 276000.

Common Sense Note:

We charge Dep on capital cost or Int on capital cost in Revenue Statements & not full capital cost.

Q.no 58(i)

Stores ledger (FIFO)

Date	Receipts			Issues			Balance		
Dec	Units	@	Amt	Units	@	Amt	Units	@	Amt
1	–	–	–	–	–	–	300	9.7	2910
3	250	9.80	2450	–	–	–	300	9.7	2910
							250	9.8	2450
11	–	–	–	300	9.7	2910	–	–	–
				100	9.8	980	150	9.8	1470
15	300	10.05	3015	–	–	–	150	9.8	1470
							300	10.05	3015
20	–	–	–	150	9.8	1470	–	–	–
				60	10.05	603	240	10.05	2412
25	150	10.30	1545	–	–	–	240	10.05	2412
							150	10.30	1545
29	–	–	–	100	10.05	1005	140	10.05	1407
							150	10.30	1545
						6968	290		2952

- Closing stock is 290 units, Value of ₹2952.
- Value of Issues = (Cost) = ₹6968.

(ii) 20158

Stores ledger (LIFO)

Date	Receipts			Issues			Balance		
Dec	Units	@	Amt	Units	@	Amt	Units	@	Amt
1	–	–	–	–	–	–	300	9.7	2910
3	250	9.80	2450	–	–	–	300	9.7	2910
							250	9.8	2450
11	–	–	–	250	9.8	2450	150	9.7	1455
				150	9.7	1455	–	–	–
15	300	10.05	3015	–	–	–	150	9.7	1455
							300	10.05	3015
20	–	–	–	210	10.05	2111	150	9.7	1455
							90	10.05	904
25	150	10.30	1545	–	–	–	150	9.7	1455
							90	10.05	904
							150	10.30	1545
29	–	–	–	100	10.30	1030	150	9.7	1455
							90	10.05	904
							50	10.30	515
						7046	290		2874

RM issued

Value of closing stock

So 158 (iii)

Stores ledger (WAM)

Date	Receipts			Issues			Balance		
Dec	Units	@	Amt	Units	@	Amt	Units	@	Amt
1	–	–	–	–	–	–	300	9.7	2910
3	250	9.80	2450	–	–	–	300	9.7	2910
							250	9.8	2450
							550	9.75	5360
11	–	–	–	400	9.75	3900	150	9.75	1460
							150	9.75	1460
15	300	10.05	3015	–	–	–	300	10.05	3015
							450	9.94	4475
20	–	–	–	210	9.94	2087	240	9.94	2388 (B/F)
25	150	10.30	1545	–	–	–	240	9.94	2388
							150	10.30	1545
							390	10.08	3933
29	–	–	–	100	10.08	1008	290	10.08	2925
				Raw material Issued		= 6995			Value of closing stock

WN①
$WAM_1 = \frac{₹5360}{550} = 9.75$

WN②
$WAM_2 = \frac{₹4475}{450} = 9.94$

WN③
$WAM_3 = \frac{₹3933}{390} = 10.08$

2015 (iv)

Stores ledger (Periodic weighted Average)

Date	Receipts			Issues			Balance		
Dec	Units	@	Amt	Units	@	Amt	Units	@	Amt
1	–	–	–	–	–	–	300	9.7	2910
3	250	9.80	2450	–	–	–	250	9.8	2450
15	300	10.05	3015	–	–	–	300	10.05	3015
25	150	10.30	1545	–	–	–	150	10.30	1545
							1000	9.92	9920
11	–	–	–	400	9.92	3968			
20	–	–	–	210	9.92	2083			
29	–	–	–	100	9.92	992			
				RM Issued ⇒		7043	290	9.92	2877

2877 → Value of Closing Stock

Sn 59

Stores ledger of A.T ltd for Sept 2002 (FIFO)

Date	Receipts				Issues				Balance		
Sept	GRN No.	qty	@	Amt	Req No.	qty	@	Amt	qty	@	Amt
1	-	-	-	-	-	-	-	-	25	6.5	162.5
4	-	-	-	-	85	8	6.5	52	17	6.5	110.5
6	26	50	5.75	287.50	-	-	-	-	17	6.5	110.5
									50	5.75	287.5
7	-	-	-	-	97	12	6.5	78	5	6.5	32.50
									50	5.75	287.50
10	-	-	-	-	Return	10	5.75	57.5	5	6.5	32.50
									40	5.75	230
11	-	-	-	-	108	5	6.5	32.50	-	-	-
						10	5.75	57.50	30	5.75	172.50
13	-	-	-	-	110	20	5.75	115	10	5.75	57.50
15	33	25	6.10	152.5	-	-	-	-	10	5.75	57.50
									25	6.10	152.50
17	-	-	-	-	121	10	5.75	57.5	-	-	-
									25	6.10	152.50
19	38	10	5.75	57.5	-	-	-	-	25	6.10	152.50
									10	5.75	57.5
20	4	5	5.75	28.75	-	-	-	-	5	5.75	28.75
(Return from factory)									25	6.10	152.50
									10	5.75	57.5
26	-	-	-	-	146	5	5.75	28.75	-	-	-
						5	6.10	30.5	20	6.10	122
									10	5.75	57.5
30	-	-	-	-	Shortage	2	6.10	12.20	18	6.10	109.8
									10	5.75	57.5
									28		167.3

⇒ Closing Stock units = 28

⇒ Closing Stock Value = ₹167.3

⇒ Issue of Raw material (Cost of goods issued) = 451.75 − 28.75 = ₹423

[(52 + 78 + ~~57.5~~ + 32.5 + 57.5 + 115 + 57.5 + 28.75 + 30.5 + ~~12.20~~

~~57.5~~ → Return to Suppliers

~~12.20~~ → Abnormal Shortage loss

− Return from factory − 28.75]

or

Material sent to factory = 52 + 78 + ~~57.5~~ + 32.5 + 57.5 + 115 + 57.5 + 28.75 + 30.5 + ~~12.20~~

− Material Returned from factory = − 28.75

Material issued = ₹ 423.

Note: Shortage has been treated as abnormal loss, thus debited to costing P&L A/c.

Q.60 Working Notes:

(I)

① Lead Time for order 008. 15/12 to 5/01 ⇒ Dec + Jan: 16 day + 5 day = 21 days

② Lead Time for order 009. 30/12 to 13/01 ⇒ Dec + Jan: 1 day + 13 day = 14 days

③ Lead Time for order 010. 07/01 to 25/01 ⇒ Jan: 18 days = 18 days

Maximum Lead Time = 21 days.
Minimum Lead Time = 14 days.
Average Lead Time = $\frac{21+14}{2}$ = 17.5 days.

Self Note: While calculating Lead Time, we have to exclude the day order was placed, but we include the date of receipt of order in lead Time

(II) Reorder Qty = 10,000 units
(Kyunki hum jab bhi order place karte hai hamesha 10,000 units ka hi order place hota hai)

(III) Maximum usage = 4500 units
Minimum usage = 1500 units
Average usage = $\frac{4500+1500}{2}$ = 3000 units

} from units sent (issued) from store to factory.

Sol60 (IV) Stores ledger for Arrow Etc. (January) (WAM)

Date	Receipts				Issues				Balance			
Jan	GRN/MRN	qty	@	Amt	MRN/MR	qty	@	Amt	qty	@	Amt	(in lacs)
1	–	–	–	–	–	–	–	–	3500	9810	34335	
5	008	10000	9930	99300	003	500	9930	4965	3500	9810	34335	
									9500	9930	94335	
									13000	9898	128670	★1
6	–	–	–	–	011	3000	9898	29694	10000	9898	98976	(BR)
10	–	–	–	–	012	4500	9898	44541	5500	9898	54435	(BR)
13	009	10000	9780	97800	004	400	9780	3912	5500	9898	54435	
									9600	9780	93888	
									15100	9823	148323	★2
15	–	–	–	–	013	2200	9823	21611	12900	9823	126712	(BR)
24	–	–	–	–	014	1500	9823	14734	11,400	9823	111978	(BR)
25	010	10000	9750	97500	–	–	–	–	11400	9823	111978	
									10000	9750	97500	
									21,400	9789	209478	★3
28	–	–	–	–	015	4000	9789	39156	17400	9789	170322	(BR)
31	–	–	–	–	016	3200	9789	31325	14200	9789	138997	(BR)

18400 units ₹181061

Material issued except for returns

Con① $WAM_1 = \bar{X}_1 = \frac{₹128670000}{13000} = 9898$

Con② $WAM_2 = \bar{X}_2 = \frac{₹148323000}{15100} = 9823$

Con③ $WAM_3 = \bar{X}_3 = \frac{₹209478000}{21,400} = ₹9789$

Sol 60

Main Solution

(i) ROL = Maximum Consumption × Maximum Lead Time

= 4500 units × 21 days

ROL = 94500 units

(ii) Maximum Stock level = ROL − (Min Con × Min d.T) + ROQ

= 94500 − (1500 × 14 days) + 10,000

Maximum Stock level = 83500 units ✓

(iii) Minimum Stock level = ROL − (Av Con × Av Lead Time)

= 94500 − (3000 × 11.5)

Minimum stock level = 42000 units ✓

(iv) Value of components used during the month = ₹ 181061

[29694 + 44541 + 21611 + 14734 + 39156 + 31325]

(vi) $ITR = \frac{COGS}{Av\ stock} = \frac{181061}{\left(\frac{83500+42000}{2}\right)} = \frac{₹181061}{62750\ units} = 2.88$ Times

This is Incorrect

(Savdhani hatti durghatna ghati)

(Because Numerator was in '₹' & Denominator is in units).

$$\text{Correct ITR} = \frac{\text{CoGS}}{\text{Av Stock}} = \frac{18400 \text{ units}}{\left(\frac{83500 + 14000}{2}\right) \text{ units}}$$

$$= 0.293 \text{ Times}$$

Sol 62

Statement of Material Cost

Particulars	Amount (₹)
Price of Raw material 1200 kg x ₹20	24,000
less Trade discount @ 20%	- 4,800
	19,200
+ Drum charges (Container) 1200 kg / 25 kg = 48 Drums x ₹10	480
+ Sales Tax	
• on goods = 19200 x 10% = 1920	1944
• on Drums = 480 x 5% = 24	
Net Invoice Value	21,624
+ Freight inwards	240
+ Insurance charges (21624 x 2.5%)	540.60
- credit for returned Containers (48 Drums x ₹8)	(384)
(a) Total cost of material purchased	22,020.60
+ Stores overhead (5% x 22020.60)	1101.03
Cost of material issued to Production	23121.63
÷ units issued	÷ 1200 kg
(b) Unit cost of material issued	₹ 19.27/kg.

Sol 63 Calculation of Cost per unit

Particulars				Amount (₹)
Listed price of material				₹2,50,000
− Trade Discount 10%				− ₹25000
				₹225000
+ GST	6% CGST	(6% × 225000)		₹13,500
	6% SGST	(6% × 225000)		₹13,500
+ Toll Tax				₹5000
+ Freight & Insurance				₹17000
+ Commission & Brokerage				₹10,000
+ Cost of Returnable containers (Paid ₹30,000 − Returned ₹20,000)				₹10,000
			98x	₹294000
+ Other expenses 2% of Total			2x	₹ 6000
Total Cost		(WN ①)	100x	₹3,00,000

$$\text{Cost per unit of Material purchased} = \frac{\text{Total cost}}{\text{Total Units} - \text{Returned Units}} = \frac{₹\,3,00,000}{5000 - 1000\ (20\% \times 5000)} = ₹75/\text{unit}$$

WN ① $\frac{294000}{98x} \times 100x = 3,00,000$

Ref(GS)

Stores Ledger

Date	Receipts			Issues			Balance		
April 1	—	—	—	—	—	—	200	10	2000
5	250	8	2000	—	—	—	200	10	2000
							250	8	2000
8	150	8.5	1275	—	—	—	200	10	2000
							250	8	2000
							150	8.5	1275
10	—	—	—	100	8.5	850	200	10	2000
							250	8	2000
							50	8.5	425
15	50	10	500	—	—	—	200	10	2000
							250	8	2000
							50	8.5	425
							50	10	500
20	—	—	—	10	10	100	190	10	1900
				(Taken to overhead)			250	8	2000
							50	8.5	425
							50	10	500
21	60	9	540	—	—	—	190	10	1900
							250	8	2000
							50	8.5	425
							50	10	500
							60	9	540
22	—	—	—	190	10	1900	40	8	320
				210	8	1680	50	8.5	425
							50	10	500
							60	9	540

Note: → Shortage is charged as issues and its amount will be added to overhead cost, not in costed issue.

Sol 64

Stores Ledger (FIFO)

Date	Receipts			Issues			Balance		
April									
1	—	—	—	—	—	—	100	5	500
5	300	6	1800	—	—	—	100	5	500
							300	6	1800
6	—	—	—	100	5	500	—	—	—
				150	6	900	150	6	900
8	500	7	3500	—	—	—	150	6	900
							500	7	3500
10	—	—	—	150	6	900	—	—	—
				250	7	1750	250	7	1750
12	600	8	4800	—	—	—	250	7	1750
							600	8	4800
14	—	—	—	250	7	1750	—	—	—
				250	8	2000	350	8	2800
						7800	350		2800
				Total issued			Cl stock Units		Cl stock Value

	under FIFO	under LIFO (new)
Value of Material Consumed	₹ 7800	₹ 8300
Value of Cl stock units	₹ 2800	₹ 2300
Closing stock units	350 units	350 units

Sol 64 (B) Explaining the difference in values under FIFO & LIFO.

	Under FIFO	Under LIFO
Issued on 6th April	100×5 + 150×6 = ₹1400	250×6 = ₹1500
Issued on 10th April	150×6 + 250×7 = ₹2650	400×7 = ₹2800
Issued on 14th April	250×7 + 250×8 = ₹3750	500×8 = ₹4000
Total Issues	₹ 7800	₹ 8300

Explaining difference in closing stock value.

	In FIFO	In LIFO
Closing stock	350×8 = ₹2800	100×5 = 500 50×6 = 300 100×7 = 700 100×8 = 800
	₹2800	₹2300

→ As Lifo shows older units (which were purchased two) thus value of closing stock is lowest in Lifo.

Sol 66 Note to self: Rates for cost / OH are decided on basis of budgeted data, as actual data is available at end of year.

(Yani rates nikale jaate hai Budgeted data ke basis par)
→ Aur vo rate apply kiye jaate hai actual data par

(i) Material receiving & handling rate = Budgeted Total Exp / Budgeted Total units

(5000 + 2500 + 2000 + 1000 + 150) = 12000 / 1,00,000 × 100 = 12% of purchases.

(ii) Receiving and handling charge chargeable to purchases = Budgeted rate × Actual Base

= 12% of Purchase × 75000 Actual purchase

= ₹9000

(iii) Absorbed OH = ₹9000
Actual OH Exp = − ₹7750

Overabsorbed OH exp = ₹1250

Sol 67

Statement of Cost.

(Amount in ₹)

Particulars	A	B	C
Purchase value	12,600	19000	9500
+ Sales Tax (on basis of value) (5% of value)	630	950	475
+ Freight (on weight basis) @ 0.10/kg	(0.10 × 3000) 300	(0.10 × 5000) 500	(0.1 × 2000) = 200
Total Cost	13530	20,450	10,175
+ octroi @ ₹ 0.10/kg	(2800 × 0.1) 280	(4720 × 0.1) 472	(1900 × 0.1) = 190
+ Cartage	—	63.12	31.8
Total cost upto Column	13,810	20985.12	10396.8
÷ usable qty	÷ 2660	÷ 4484	÷ 1805
Cost per kg	₹ 5.20/kg	₹ 4.68/kg	₹ 5.76/kg.

Working ① Sales Tax = $\frac{2055}{(12600+19000+9500)} \times 100$ = 5% of value = $\frac{\text{Sales Tax}}{\text{Total value}}$

Working ② Freight rate (per kg) = $\frac{\text{Total freight}}{\text{Total weight}} = \frac{₹1000}{10000 \text{ kg}}$ = ₹ 0.10/kg

Q20

Statement of effective weight (in Kgs)

Particulars	A	B	C
Qty Purchased	3000	5000	2000
− Normal Shortage	− 200	− 280	− 100
Qty received in Store	2800	4720	1900
− 5% Deterioration	− 140	− 236	− 95
Net Qty in hand (usable qty) (Good units)	2660	4484	1805

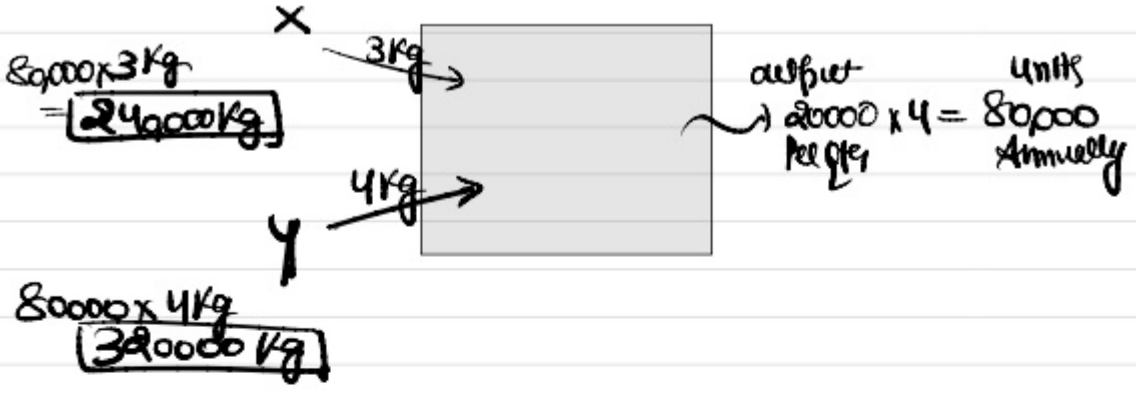
Sol 69

Statement of Cost

Particulars	Amount (₹)
Rent A 32 (200 unit × ₹5)	1000
− Trade Discount	− 200
~~− Cash Discount 2%~~	
+ GST	
+ Packing Cost	+50
Total Cost	850
÷ units	200 units
Cost per unit	₹4.25/unit.

Note: Cash Discount is not shown in cost books.
: GST is not a part of cost, if its credit is available.

Sol 7a WN ①



WN ②

	X	Y
Material lost	4%	2%+5% = 7%
Material usable	96%	93%
Material used	240000 Kg	320000 Kg
A = Material Purchased	$\frac{240000}{96} \times 100 = 250000$ Kg	$\frac{320000}{93} \times 100 = 344086$ Kg

Sol 7a (i)

Main Selection

Statement for cost per Kg

Particulars	X	Y
Purchase Price	250000 Kg x 140 = ₹ 3,50,00,000	344086 x 640 = ₹ 22,02,15,040
+ ordering cost	0	$\left(\frac{344086}{10000 Kg} = 344 \sim 35 \text{ orders}\right)$ 35 x 28000 = ₹ 9,80,000
Total Cost	₹ 3,50,00,000	₹ 22,11,95,040
÷ Good Units	÷ 240000 Kgs	÷ 320000 Kg
Cost Per Unit	₹ 145.83/Kg	₹ 691.2345/Kg

Note: Carrying cost is never included in cost per unit

Note: 1 ton = 1000 kg

Truck capacity = 10 Ton = 10 × 1000 = 10000 kgs

Note: We have assumed that we will be ordering Truck full (10000 kg) at RoQ each time to calculate number of orders.

(ii)

	X	Y
Annual Requirement =	25,000 kg	A = 344086 kg
O =	0	O = ₹ 28000
C = (15% × 145.83)	₹ 21.87	C = (691.23 × 15%) = 103.68
EOQ =	NA	$EOQ = \sqrt{\frac{2 \times 344086 \times 28000}{103.68}}$
		= EOQ 13638.64 kg

Sol 71

(ii) Reorder level = Maximum Con × Max dead Time

= 7 × 10days = 70

Reorder Level = 70

(i) Buffer stock = safety stock = ?

RoL = safety stock (Buffer Stock) + Average Con × Average dead time

↓

70 = safety stock (Buffer Stock) + 3 units/day × 6days

&, **Buffer stock = 52 units**

Lead Time

x Days	f frequency	f·x
3	2	6
4	3	12
5	4	20
6	4	24
7	2	14
8	2	16
9	2	18
10	1	10
	20	120
	Ef	Efx

Average dead time = $\frac{Efx}{Ef} = \frac{120}{20}$ = 6 days

Usage (Consumption)

y Consumption	f frequency	f·y
0	2	0
1	4	4
2	5	10
3	5	15
4	4	16
5	2	10
6	1	6
7	2	14
	25	75
	Ef	Efx

Average Consumption = $\frac{Efx}{Ef} = \frac{75}{25}$ = 3 units/day

Sol 7a

Source 1	Source 2
Defective = 2%	Defective = 2.8%
No of Defectives in 1 lot = 1000 × 2% = 20 units	No of Defectives in 1 lot = 1000 × 2.8% = 28 units
	Discount = ₹100

Statement for Decision making

Benefit from Source (II) Discount = ₹100

Extra cost due to Source (II) = (₹40)

Extra Defective × Rectification cost

8 units × ₹5

Net Benefit = ₹60.

Decision → Purchase from Source (II)

Maharaja Thali — 500

[Roti, Rice, Sweet dish, Raita]

Maharani Thali — 430

[Roti Rice, Sweet, Raita]

Q173 Ans①

Purchase (Buy)	Make
Price offer = ₹9/unit	Raw material A = 20000 unit C = ₹0.25/unit per annum Safety stock level of Raw Material = 400 units EOQ = 2000 units ROQ Labour cost = ₹6/unit Fixed charge = ₹3/unit for 20000 units. Hire charges = ₹200 p.m.

Ans②

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

$$2000 = \sqrt{\frac{2 \times 20000 \times O}{0.25}}$$

Squaring & Solving

O = ₹225 per order ★

Sol 73
Main Selection

Statement for Decision Making

Buy Part	Make Component
20000 × ₹9 = ₹1,80,000	Raw Material Purchase 20,000 Unit × ₹2 = ₹40,000
	+ RM carrying cost = $\left(SS + \frac{1}{2} ROQ\right) \times C$ $\Rightarrow \left(400 + \frac{1}{2} \times 2000\right) \times 0.25 = ₹350$
	+ RM ordering cost $\Rightarrow \left(\frac{A}{ROQ}\right) \times O = ₹250$ $\Rightarrow \left(\frac{20000}{2000}\right) \times$
	+ Labour charges 20,000 × 6 = ₹1,20,000
	+ Fixed charges = 20000 × 3 = 60000
	+ Machine Hire = 200 × 12 m = ₹2400
Total Buy Cost = ₹1,80,000	Total Make Cost = ₹1,63,000

Decision → Make the Component because it is Cheaper for us (₹17000)

Note → Fixed cost is not considered for decision making.

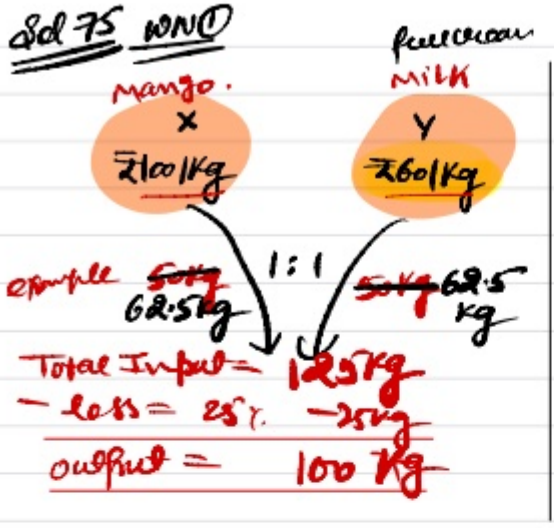
Q.74 Let us assume output is 100 kg.

Statement for Decision Making

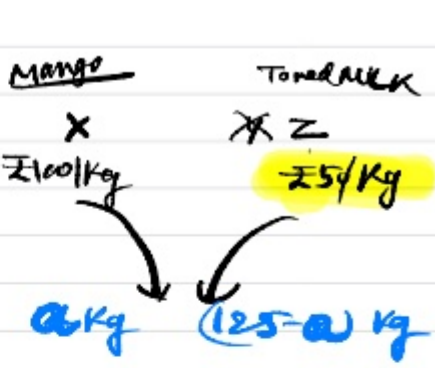
Particulars	H	H-1	H-2
Rate	₹20/kg	₹30/kg	₹24/kg
I-O Ratio	125%	110%	140%
Input for 100 kg output	125kg	110kg	140kg
× Rate	× ₹20/kg	× ₹30/kg	× ₹24/kg
Input acquired for 100 kg	₹2500	₹3300	₹3360
	Unavailable	Selected	Rejected

Decision → If H is unavailable, we will prefer to use H-1 as a substitute.

Sol 75 WN①



WN②



$a \times 100 + (125-a) \times 50 = 10{,}000$

$100a + 6250 - 50a = 10{,}000$

$50a = 3750$

$a = 75\ kg$

So, $a = 75\ kg$

Input of X = 75 kg

Input of Z = 125 - 75 = 50 kg

Statement of Cost

Particulars	Current Situation		New Situation	
Assumed output		100 kg		100 kg
Material	X = 62.5kg × 10 =	₹6250	X 75kg × 100 =	7500
	Y = 62.5kg × 60 =	₹3750	Z 50kg × 50 =	2500
Total Material Cost		₹10000		₹10,000
+ Production Cost	50% × 10000 =	₹5,000		₹5000
Total Cost		₹15000	Same as before	₹15000
+ Profit	(15000 × 33⅓%)	₹5000		₹5000
Sale value of 100 kg =		₹20,000		₹20,000

Sol 83

(i) RoL = Safety stock + Av Con x Av lead Time

3750 = 1250 + 625 x 4

(ii) Maximum stock level = RoL − (Min Con x Min lead Time) + ROQ

= 3750 − 1250 + 6750

= 9250

(iii) Minimum stock level = RoL − (Average Con x Av lead Time)

1250 = 3750 − (625 x 4)

Q.No 85 (i)

@ By WAM

Date	Receipts			Issue			Balance		
July 1	—	—	—	—	—	—	25000	200	50,00,000
1	50000	191	95,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
30 Sept	25000	210	52,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
							25000	210	52,50,000
Between 1 July to 30 Sept	—	—	—	68000	198*	1,34,64,000	100000	198*	1,98,00,000
							32000	198	63,36,000

(i) Value of Inventory on 30th Sept = ₹ 63,36,000 (32000 units)

WN ① op stock + Pur − Cl stock = Sold units

25000 + 75000 − 32000 = 68000 units

WN ② $WAM_1 = \frac{\text{Total cost}}{\text{Total unit}} = C.P.U = \frac{1,98,00,000}{1,00,000} = ₹ 198$

(ii) P&L A/c

Sales	₹ 1,46,20,000
− COGS (Issues) (68000 × 198)	− ₹ 1,34,64,000
− Admin exp	− ₹ 3,75,000
Profit	= ₹ 7,81,000

Q.No 85 (ii) @ By FIFO

Date	Receipts			Issue			Balance		
July 1	—	—	—	—	—	—	25000	200	50,00,000
1	50000	191	95,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
30 Sept	25000	210	52,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
							25000	210	52,50,000
Before 1 July to 30 Sept	—	—	—	25000	200	50,00,000	—	—	—
				43000	191	82,13,000	7000	191	13,37,000
							25000	210	52,50,000
				68000		1,32,13,000	32000		65,87,000

(i) Value of Inventory = ₹ 65,87,000
(32000 Units)

(ii) Profit & Loss A/c

Sales	₹ 1,46,20,000
— COGS	— ₹ 1,32,13,000
— Admin exp	— ₹ 3,75,000
Profit	₹ 10,32,000

do 185 (iii) @ By LIFO

Date	Receipts			Issue			Balance		
July									
1	—	—	—	—	—	—	25000	200	50,00,000
1	50000	191	95,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
30 sept	25000	210	52,50,000	—	—	—	25000	200	50,00,000
							50000	191	95,50,000
							25000	210	52,50,000
Between 1 July to 30 sept	—	—	—	25000	210	52,50,000	25000	200	50,00,000
				43000	191	82,13,000	7000	191	13,37,000
				68000		1,34,63,000	32000		63,37,000

(i) Value of Inventory on 30th Sept = ₹ 63,37,000
(32000 units)

(ii) P&L A/c

Sales	₹ 1,46,20,000
− Cogs (Issues)	− ₹ 1,34,63,000
− Admin exp	− ₹ 3,75,000
Profit	= ₹ 7,82,000

Chapter 1

Solution 1:

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

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

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

(b) Re-Order Level (ROL) = (Maximum consumption Rate × Maximum Procurement Time)

= 50 kgs per day × 9 days

= 450 kgs

(c) Maximum Stock Level = Recorder Level + Recorder Quantity – (Minimum Consumption Rate × Minimum Procurement Time)

= 450 kgs + 646 kgs - (30 kgs X 5 days)

= 946 kgs

(d) Minimum Stock Level = Recorder Level – (Average consumption Rate × Average Procurement Time)

= 450 kgs – (40 kgs X 7 days)

= 170 kgs

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

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

= 558 kgs

(f) Number of Orders to be placed per year

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

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

= 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.

Solution 2:

(i) Calculation of Economic Order Quantity (E.O.Q)

Annual requirement (usage) of raw material in kg. (A) = $\frac{1,50,000\ units}{3\ units\ per\ kg.}$ = 50,000kg.

Ordering Cost (Handling & freight cost) (O) = ₹1,470 + ₹770 = ₹2,240
Carrying cost per unit per annum (C) i.e. inventory carrying cost + working capital cost= (₹3 × 12 months) + ₹20 = ₹56 per kg.

E.O.Q = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times50,000\ kg\times2,240}{₹56}}$ = 2,000 kg.

(ii) Frequency of placing orders for procurement :

Annual consumption (A) = 50,000 kg.
Quantity per order (E.O.Q) = 2,000 kg.

No. of orders per annum = E.O.Q = $\frac{A}{EOQ}$ = $\frac{50,000\ kg.}{2,000\ kg.}$ = 25 orders

Frequency of placing orders (in days) = $\frac{360\ days}{25\ orders}$ = 14.4 days

(iii) Percentage of discount in the price of raw materials to be negotiated:

Particulars	On Quarterly Basis	On E.O.Q Basis
1. Annual Usage (in Kg.)	50,000 kg.	50,000 kg.
2. Size of the order	12,500 kg.	2,000 kg.
3. No. of orders (1 ÷ 2)	4	25
4. Cost of placing orders or Ordering cost (No. of orders × Cost per order)	₹ 8,960 (4 order × ₹ 2,240)	₹ 56,000 (25 orders × ₹ 2,240)
5. Inventory carrying cost (Average inventory × Carrying cost per unit)	₹3,50,000 (12,500 kg. × ½ × ₹ 56)	₹56,000 (2,000 kg. × ½ × ₹ 56)
6. Total Cost (4 + 5)	₹ 3,58,960	₹ 1,12,000

When order is placed on quarterly basis the ordering cost and carrying cost increased by ₹2,46,960 (₹3,58,960 - ₹1,12,000). So, discount required = ₹ 2,46,960
Total annual purchase = 50,000 kg. × ₹190 = ₹95,00,000 So, Percentage of discount to be negotiated = $\frac{2,40,900}{95,00,000}$ ×100 = 2.60%

Solution 3:

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

A = Units consumed during year = 10,000
O = Ordering cost per order = 50
C = Inventory carrying cost per unit per annum. = 8% of ₹ 2

EOQ = $\sqrt{\frac{2\times10,000\times50}{\frac{2\times8}{100}}}$ = $\sqrt{\frac{2\times10,000\times50\times25}{4}}$ = 2,500 kg

No. of orders to be placed in a year
= $\frac{Total\ consumption\ of\ materials\ per\ annum}{EOQ}$ = $\frac{10,000\ kg}{2,500\ kg}$ = 4 orders per year

Solution 4:

(i) Carrying cost (C) = Storage rate = 2%
Interest Rate = 12%
Obsolescence Rate = 6%
Total = 20% per annum

C = 20% of ₹ 20 = ₹4 per unit per annum.

E.O.Q = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times5000\times16}{4}}$ = $\sqrt{40,000}$ = 200 units

Total cost:

Purchase price of 5,000 units @ ₹ 20.00 per unit = ₹ 1,00,000

Ordering cost = $\frac{5000}{200}$ =25 orders @ ₹ 16 = ₹ 400

Carrying cost of average Inventory

= $\frac{200}{2}$ =100 units @ ₹ 4 = ₹ 400

Total cost **₹ 1,00,800**

(ii) If the new price of ₹ 12.80 is used:

C = 20% of 12.80 = ₹ 2.56 per unit per annum.

E.O.Q. = $\sqrt{\frac{2\times5,000\times16}{2.56}}$ = 250 units

Total cost:

Purchase price of 5,000 units @ ₹ 12.80 per unit = ₹ 64,000

Ordering cost = $\frac{5,000}{250}$ = 20 orders @ ₹ 16 = ₹ 320

Carrying cost (of average inventory) =$\frac{250}{2}$ =125 units @ ₹ 2.56= ₹ 320

Total variable cost **₹ 64,640**

Solution 7.

C = 3.6 p.u.

Total carrying cost = Rs 9,000

EOQ =?

Total carrying cost = [EOQ/ 2] x C

9,000 = $\frac{EOQ}{2}$ x 3.6

$\frac{9,000\ x\ 2}{3.6}$ = EOQ

3.6

5000 units = EOQ

Solution 8.

A = 2,000 units Price = 20

0 = 20 per order

Storage = 2% +Interest = 8% = 10% carrying cost

Carrying cost = 20 x 10% = 2

Lead time = 0.5 month

EOQ = $\sqrt{\frac{2\times2000\times20}{2}}$ = 200 units

Total inventory cost

= Total ordering cost Amount

$\frac{A}{EOQ}$ x O = $\frac{2000}{200}$ x 20 = 200

= Total carrying cost

$\frac{EOQ}{2}$ x C = $\frac{200}{2}$ x 2 = 200

= Total purchase Cost

(20 x 2000) = 40,000

Total inventory cost = 40,400

Solution 10.

(i) EOQ = $\sqrt{\frac{2 \times 60,000 \times 800}{1.5}}$ = 8,000 units

C = 10 x 15%

Re order period hi lead time leta hai. Hum ussi ko max aur min lead time bolenge

A = 60,000

Price = 10

O = Rs 800 per order

C = 10 x 15% = 1.5 pu p.a.

Reorder period = lead time = 10 days Safety stock = 600 unit

(ii) ROL = Safety stock + Avg. consumption /Normal consumption x Avg. lead time / normal lead time
= 600 + (200 x 10 days)
= 2,600 units

Normal consumption = $\frac{60,000}{300}$ = 200 units per day

(iii) Maximum stock level = ROL – (Minimum consumption x minimum lead time) + ROQ
= 2,600 – (200 x 10) + 8000
= 8,600 units

(iv) Average stock level = Safety stock + $\frac{ROQ / EOQ}{2}$ = 600 + $\frac{8000}{2}$ = 4,600 units

Solution 11.

(i) EOQ = $\sqrt{\frac{2 \times 40,000 \times 750}{15}}$ = 2000 unit

(ii) No. of orders = $\frac{A}{EOQ}$ = 20

= $\frac{360}{20}$ = 18 days

At EOQ = 2000

O = $\frac{40,000}{2,000}$ x 750 = 15,000

C = $\frac{2,000}{2}$ x 15 = 15,000

P = 40,000 x 80 = 32,00,000

32,30,000

At ROQ = 10,000

O = $\frac{40,000}{10,000}$0,000 x 750 = 3000

C = $\frac{40,000}{2}$ x 15 = 75,000

P = 40,000 x X

= 3,000 + 75,000 + 40,000X = 32,30,000

X = 78.8

= $\frac{80 - 78.8}{80}$ x 100

= 1.5%

Solution 14:

A = 48,000 units
O = ₹ 45 per order
C = 15% × 1.20 = ₹ 0.18 per unit p.a.

(i) EOQ = $\sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 48{,}000 \times 45}{0.18}}$ = 4,899 units

(ii) (a) Re-order level = Safety Stock + (Normal consumption × Normal Delivery time)
= 500 + ($\frac{48{,}000}{300}$ × 12) = 500 + 1,920 = 2,420 units

(b) Maximum Level = Re-order level + Re-order Quantity – (Min. Consumption × Min. Period)
= 2,420 + 4899 – ($\frac{48{,}000}{300}$ × 12) = 5,399 units

(c) Minimum Level = Re-order Level – (Normal Consumption × Normal Period)
= 2,420 – ($\frac{48{,}000}{300}$ × 12) = 500 units

(d) Average inventory = Minimum level + $\frac{1}{2}$ of EOQ = 500 + $\frac{1}{2}$ (4899) = 2,950 units

Solution 17:

(a) Re-order level	=	Minimum usage per week × Maximum delivery period	
Component A	=	75 units × 6 weeks	= 450 units
Component B	=	75 units × 4 weeks	= 300 units
(b) Minimum level	=	Re-order level – (Normal usage × Average period)	
Component A	=	450 units – 50 units × 5 weeks	= 200 units
Component B	=	300 units – 50 units × 3 weeks	= 150 units
(c) Maximum level	=	ROL + ROQ – (Minimum usage × Minimum period)	
Component A	=	(450 units + 300 units) – (25 units × 4 weeks)	= 650 units
Component B	=	(300 units + 500 units) – (25 units × 2 weeks)	= 750 units
(d) Average stock level	=	½ (Minimum stock level + Maximum stock level)	
Component A	=	½ (200 units + 650 units)	= 425 units
Component B	=	½ (150 units + 750 units)	= 450 units

Solution 18:

(i) Minimum stock of A
Re-order level – (Average consumption × Average time required to obtain delivery)
= 60,000 kg. – (900units × 12 kg. × 3 weeks) = 27,600 kg.

(ii) Maximum stock of B
Re-order level + Re-order quantity– (Min. Consumption × Min. Re-order period)
= 70,000 kg.+ 8,000 kg– (550units ×8 kg.× 5 weeks).
=78,000–22,000 = 56,000 kg.

(iii) Re-order level of C
Maximum re-order period × Maximum Usage
= 7 weeks × (1,250units × 6 kg.) = 52,500 kg.
OR
= Minimum stock of C+(Average consumption × Average delivery time)
= 25,500 kg.+ [(900 units ×6 kg.)×5 weeks] =52,500 kg.

(iv) Average stock level of A
= (Minimum stock + Maximum stock)/2 (Refer to Working Note)
= (27,600 + 58,800)/2 = 43,200 kg.

Working note:
Maximum stock of A = ROL + ROQ – (Minimum consumption × Minimum re-order period)
= 60,000 kg. + 12,000 kg. – [(550units × 12 kg.) × 2 weeks] = 58,800 kg.

(v) Re-order level of D
Maximum re-order period × Maximum Usage
= 3 weeks × (1,250 units × 5 kg.) = 18,750 kg

(vi) Minimum stock of D
Re-order level – (Average consumption × Average time required to obtain delivery)
= 18,750 kg. – (900units × 5 kg. × 2 weeks) = 9,750 kg.

Solution 19.
(i) Minimum stock = 4,000
Average stock = 9,000

Average stock = $\frac{minimum + maximum}{2}$

9,000 = $\frac{4{,}000 + Maximum}{2}$

14,000 = Maximum stock
Maximum stock = ROL – min stock x min lead + ROQ
14,000 – 0 – 4000 + ROQ

(ii) C = 3.6
Total carrying = 9,000
EOQ = ?
Total carrying = $\frac{EOQ}{2}$x C
9,000 = $\frac{EOQ}{2}$ x 3.6
EOQ = $\frac{9{,}000}{3.6}$x 2 = 5,000 units

(iii) Price = 25, O = 40, C = 35%
A = 4,680 (390 x 12) = $\sqrt{\frac{2 \times 4680 \times 40}{8.75}}$ = 207 units

Solution 20:
(i) A = 52,000 × 12 × 2 = 12,48,000 O = ₹ 350

C = 12% × ₹ 15 = ₹ 1.80
EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$ = $\sqrt{\frac{2 \times 12{,}48{,}000 \times 350}{1.8}}$ = 22,030 units of components

(ii) Extra cost incurred by the company
Total cost (when order size is 52,000 units) = Total ordering cost + Total carrying cost

= $\left(\frac{52{,}000 \times 12 \times 2}{52{,}000} \times ₹\ 350\right) + \left(\frac{52{,}000}{2} \times \times 15 \times 12\%\right)$

= ₹ 8,400 + ₹ 46,800 = ₹ 55,200

Total cost when order size is 22,030 units (i.e. EOQ) = $\sqrt{2 \times A \times O \times C} = \sqrt{2 \times 12,\ 48,\ 000 \times 350 \times 1.8}$
= ₹ 39,655
Extra cost incurred = ₹ 55,200 – ₹ 39,655 = ₹ 15,545

(iii) Minimum carrying cost, the company has to incur = $\frac{22{,}030}{2}$ × ₹ 1.80 = ₹ 19,827

Solution 23:
(i) A = 8,000 units
O=₹200
C=₹400 per unit × 20%=₹80

EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$ = $\sqrt{\frac{2 \times 8,000 \times 200}{80}}$ = 200 units

(ii) **Statement showing evaluation of proposal**

Particulars	Order 200 Units (₹)	Order 4,000 Units (₹)
Annual Purchase cost (₹ 400/ 384 p.u.)	32,00,000	30,72,000
Annual Ordering Cost (₹ 200 per order)	8,000	400
Annual Carrying cost (₹ 80/ 76.80 per unit)	8,000	1,53,600
Total Cost	**32,16,000**	**32,26,000**

Solution 25:

Refer to Icai Study material question 1 at end of chapter

Solution 27:

	Particulars	Super Grow	Nature's Own
(i)	A = Annual Requirement	2,000 Bags	1,280 Bags
	O = Ordering Cost per order	₹ 1,200	₹ 1,400
	C = Carrying Cost/unit/annum	₹ 480	₹ 560
	EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$	$\sqrt{\frac{2 \times 2,000 \times 1,200}{480}}$ = 100 Bags	$\sqrt{\frac{2 \times 1,280 \times 1,400}{560}}$ = 80 Bags
(ii)	Total Annual Ordering & Carrying Cost at EOQ:		
	Total relevant cost = $\sqrt{2 \times A \times O \times C}$	$\sqrt{2 \times 2000 \times 1200 \times 480}$ = ₹ 48,000	$\sqrt{2 \times 1280 \times 1400 \times 560}$ = ₹ 44,800
(iii)	No. of Deliveries i.e.; No. of orders to be placed per year $\frac{A}{Re\ order\ Quantity}$	$\frac{2000}{100}$ = 20 orders p.a.	$\frac{1280}{80}$ = 16 orders p.a.

Solution 28:

A = 24,000 units
O = 4,000 per set-up
C = (₹ 20 × 15%) = ₹ 3 per unit p.a.

EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$ = $\sqrt{\frac{2 \times 24,000 \times 4,000}{3}}$ = 8,000 units

No. of Set-ups = $\sqrt{\frac{Annual\ Requirement}{EOQ}}$ = $\frac{12,000}{4,000}$ = 3 set-ups

Total relevant costs = $\sqrt{2 \times 24000 \times 4000 \times 3}$ = ₹ 24000

Solution 30:

A = (250 days × 60 calculator) = 15000 calculators
O = ₹ 120 + ₹ 500 = ₹ 620
C = ₹ 1.20 + 4% × 12 × 10
= ₹ 1.20 + 48% × 10
= ₹ 1.20 + 4.80 = ₹ 6

(a) EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$ = $\sqrt{\frac{2 \times 15,000 \times 620}{6}}$ = 1,761 calculators

(b) No. of orders p.a. = $\frac{15,000}{1,761}$ = 9 orders (approx.)

Time between 2 orders = $\frac{360\ days}{9\ orders}$ = 40 days

Solution 35.

(a)

Total annual requirement (A)	Order size (Tonne) (q)	No. of orders A/q	Cost of inventory A ´ Per tonne cost (₹)	Ordering cost A/q ´ ₹ 1200 (₹)	Carrying cost p.t. p.a 1/2´ q ´ 20% of cost p.t. (₹)	Total Cost (4+5+6) (₹)
1	2	3	4	5	6	7
5,000	400	12.5 (13)*	60,00,000	15,600	48,000	60,63,600
Ton			(5,000´₹1200)		(200 ´ ₹ 240)	
	500	10	59,00,000	12,000	59,000	59,71000
			(5,000 ´ ₹ 1180)		(250 ´ ₹ 236)	
	1,000	5	58,00,000	6,000	1,16,000	59,22,000
			(5,000´ ₹ 1160)		(500 ´ ₹ 232)	
	2,000	2.5 (3)*	57,00,000	3,600	2,28,000	59,31,600
			(5,000´₹ 1140)		(1,000´₹228)	
	3,000	1.666 (2)*	56,00,000	2,400	3,36,000	
			(5,000´₹ 1120)		(1,500´₹224)	59,38,400

* Since number of orders cannot be in decimals, thus 12.5 orders are taken as 13 orders, 2.5 are taken as 3 order and 1.66 orders are taken as 2 orders.

The above table shows that the total cost of 5,000 units including ordering and carrying cost is minimum (₹ 59,22,000) when the order size is 1,000 units. Hence the most economical purchase level is 1,000 units.

(b) If there will are no discount offer then the purchase quantity should be equal to EOQ. The EOQ is as follows:

EOQ = = 200 units

Solution 37.

A = 12,000 Average consumption = $\frac{12,000}{360}$ = 33.33

P = 1

O = 12

C = 24% of 1 = 0.24

Lead time = 15 days

Safety stock = 30 days consumption

= $\frac{12,000}{360}$ x 30 = 1000 (approx.)

Per day consumption x no. of days

(i) EOQ = $\sqrt{\frac{2 \times A \times O}{C}}$ = $\sqrt{\frac{2 \times 12000 \times 12}{0.24}}$ = 1095 (approx.)

(ii) ROL = 55 + Average consumption x Average lead time
= 1000 + 33.33 x 15 = 1500 units (approx.)

(iii) Min stock = ROL – Average consumption x Average lead time
= 1500 – 33.33 x 15 = 1000 units

Solution 47:

Cost of materials consumed	Material A (₹)	Material B (₹)
Opening stock	10,000	9,000
Add: Purchases	52,000	27,000
	62,000	36,000
Less: Closing stock	6,000	11,000
Materials Consumed	56,000	25,000
Average inventory: (Opening Stock + Closing Stock) ÷ 2	8,000	10,000
Inventory Turnover ratio: (Consumption ÷ Average inventory)	7 times	2.5 times
Inventory Turnover (Number of Days in a year/IT ratio)	52 days	146 days

Solution 61:

The Closing Stock at the end of six months' period i.e., on 30th June, 20X8 will be 200 units, whereas up to the end of May 20X8, total purchases coincide with the total issues i.e., 1,900 units. It means that at the end of May 20X8, there was no closing stock. In the month of June 20X8, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of June, 20X8 and there was no opening stock on 1st June 20X8, the Closing Stock of 200 units is to be valued at ₹ 20 per unit.

In view of this, the argument of the Chief Accountant appears to be correct. Where there is only one purchase and one issue in a month with no opening stock, the method of pricing of material issues becomes irrelevant. Therefore, in the given case one should agree with the argument of the Chief Accountant that the value of Closing Stock remains the same no matter which method of pricing the issue is used.

It may, however, be noted that the argument of the Chief Accountant would not stand if one finds the value of the Closing Stock at the end of each month.

Solution 65.

Store Ledger

Date	Particulars	Receipts			Issue			Balance		
2011 April		Qty	@	Amt	Qty	@	Amt	Qty	@	Amt
1	Opening stock							200	10	2000
5	Receipts	250	8	2000				200	10	2000
								250	8	2000
8	Receipts	150	8.5	1275				200	10	2000
								250	8	2000
								150	8.5	1275
10	Issue				100	8.5	850	200	10	2000
								250	8	2000
	LIFO							50	8.5	425
15	Receipts	50	10	500				200	10	2000
								250	8	2000
								50	8.5	425
								50	10	500
20	Issue				10	10	100	190	10	1900
								250	8	2000
	FIFO							50	8.5	425
								50	10	500
21	Receipts	60	9	540				190	10	1900
								250	8	2000
								50	8.5	425
								50	10	500
								60	9	540
22	Issues				190	10	1900	40	8	320

					210	8	1680	50	8.5	425
	FIFO							50	10	500
								60	9	540
RM consumed 4530								Closing stock 1785		

Solution 68:

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@ ₹10per 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

Solution 76:

1. The action points consists of the following:-

(a) Re-check the Stock Card and the Stock Ledger, for the accuracy of entries recorded therein.

(b) Reconcile the differences between Stock Card and Stores Ledger and pass rectification entries, if required.

(c) Investigate the reason for differences (i.e. gains or losses). Classify them into normal causes.

(d) Record the Losses as under –

Due to Normal Reasons	Due to Abnormal Reasons	Due to non-recording or short-recording of material issues
Factory OH Control Dr. To RM Control A/c	Costing P & L A/c Dr. To RM Control A/c	WIP Control A/c Dr. To RM Control A/c

(e) Record the Gains as under –

Due to Normal Reasons	Due to Abnormal Reasons	Due to non-recording or short-recording of Materials issues
RM Control A/c Dr. To Factory OH A/C	RM Control A/c Dr. To Costing P & A/c	RM Control A/c Dr. To WIP Control A/c

In the above case, the nature of loss/gain should be investigated and appropriate entry should be passes.

2. Reasons for shortage and discrepancies:

(a) Storage and Handling Losses, evaporation etc.

(b) Pilferage and Theft of stores items.

(c) Omission of certain entries in the Bin Card or Stores Ledger and issue of materials without recording.

(d) Wrong entries in the Bin Card so Stores Ledger.

(e) Errors during the course of physical count in stock-taking.

3. Suggestions to control discrepancies and losses:

(a) Proper scheme of documentation for recording inward and outward materials movements from stores.
(b) System of sanction and proper authorization for issue of materials.
(c) Restriction on entry to stores to authorized personnel only.
(d) Control over proper accounting of material movements in Bin Card.
(e) Proper forwarding of Goods Received Notes, Material Requisition Notes, etc. to Accounts Department for recording in stores Ledger.

Solution 77:

From the point of view of cost of material charged to each job, it is minimum under FIFO and maximum under LIFO (Refer to Tables). During the period of rising prices, the use of FIFO give 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 tables 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 hands 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 Job W 16	—	—	—	60	1	60	40	1	40
								100	2	200
Jan. 23	Issue to Job W 17	—	—	—	40	1	40	80	2	160
					20	2	40			

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 Job W 16	—	—	—	60	2	120	100	1	100
								40	2	80
Jan. 23	Issue to Job W 17	—	—	—	40	2	80	80	1	80
					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 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

Solution 78:

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):

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

$$= \sqrt{\frac{2 \times 70{,}800\ kg. \times \text{`}1{,}340}{\text{`}250 \times 14\%}} = \sqrt{\frac{2 \times 70{,}800\ kg. \times \text{`}1{,}340}{\text{`}35}}$$

= 2,328 kg.

(i) Re- Order level:

= (Maximum consumption per day × Maximum lead time)

= [{ (Annual consumption of "D"/ 300 days) + 40kg. } × 8 Days]

= [{ (70,000 kg. / 300 days) + 40 kg. } × 8 Days] =2208 kg.

(ii) 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 = (Min.consumption + Max.consumption) / 2

Or, 236 kg. = (Min.consumption + 276 kg.)

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	70,800kg / 1,928 kg = 36.72 or 37 orders	70,800kg. / 2,328 kg. = 30.41 or 31 orders
III. Ordering Cost	37 orders × ₹1,340= ₹ 49,580	31 orders × ₹ 1,340= ₹ 41,540
IV. Average Inventory	1,928kg. / 2 = 964 Kg.	2,328kg. / 2 = 1,164 kg.
V. Carrying Cost	964 kg. × ₹35 = ₹ 33,740	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

Solution 79:

(i) Minimum stock of Pi
Re-order level – (Average consumption × Average time required to obtain delivery)
= 8,000 kg. – (400 units × 5 kg. × 2 weeks) = 4,000 kg.

(ii) Maximum stock of Qu
Re-order level – (Min. Consumption × Min. delivery period) + Re-order quantity
= 4,750 kg. – (350 units × 2 kg. × 3 weeks) + 5,000 kg.
= 9,750 - 2,100 = 7,650 kg.

(iii) Re-order level of Ar
Maximum delivery period × Maximum Usage
= 4 weeks × (450 units × 3 kg.) = 5,400 kg.
OR
= Minimum stock of Ar + (Average consumption × Average delivery time)
= 2,000 kg. + [(400 units × 3 kg.) × 3 weeks] = 5,600 kg.

(iv) Average stock level of Pi
= Minimum stock level of Pi + ½ Re-order quantity
= 4,000 kg. + ½ 10,000 kg. = 4,000 + 5,000 = 9,000 kg.
OR
= Minimum stock + Maximum stock /2
= (4,000 + 16,250)/ 2 = 10,125 kg.
Working note
Maximum stock of Pi = ROL + ROQ – (Minimum consumption × Minimum delivery period)
= 8,000 kg. + 10,000 kg. – [(350 units × 5 kg.) × 1 week] = 16,250 kg.

Solution 80:

(i) Reorder Quantity (ROQ) = 1,691 kg. (Refer to working note)

(ii) Reorder level (ROL) = Maximum usage × Maximum re-order period
= 900 kg. × 8 weeks = 7,200 kg.

(iii) Maximum level = ROL + ROQ – (Min. usage × Min. re-order period)
= 7,200 kg. + 1,691 kg. – (200 kg.× 4 weeks)
= 8,091 kg.

(iv) Minimum level = ROL – (Normal usage × Normal re-order period)
= 7,200 kg. – (550 kg. × 6 weeks)
= 3,900 kg.

(v) Average stock level = ½ (Maximum level + Minimum level)
= ½ (8,091 kg. + 3,900 kg.) = 5,995.5 kg.
OR
= Minimum level + ½ (ROQ)
= 3,900 kg + (1/2) 1,691 kg.
= 4,745.5 kg.
Working Note:
Annual consumption of raw material (A) = (550 kg. × 52 weeks) = 28,600 kg.
Cost of placing an order (O) = ₹ 200

Carrying cost per kg. per annum (C) = ₹ 20 × 20% = ₹ 4

Economic order quantity (EOQ) = $\sqrt{\frac{2AO}{C}}$

$\sqrt{\frac{2\times28,600\ kgs\times`200}{`4}}$ = 1,691 Kg. (Approx)

Solution 81:

Working Notes:

Annual requirement (A)	= 27,000 units
Cost per order (O)	= ₹ 240
Inventory carrying cost (i)	= 12.5%
Cost per unit of spare (c)	= ₹ 50
Carrying cost per unit (i × c)	= ₹ 50 × 12.5% = ₹6.25

Economic Order Quantity (EOQ) = $\sqrt{\frac{2\times A\times O}{i\times c}}$

= $\sqrt{\frac{(2\times27,000\times240)}{6.25}}$ = 1440 units

(i) Calculation of saving by opting EOQ:

	Existing Order policy	EOQ Model
No. of orders	9 (27,000 / 3,000)	18.75 or 19 (27,000 /1,440)
A. Ordering Cost (₹)	2160 (₹ 240 × 9)	4,500 (₹240 × [27,000 / 1,440])
B. Carrying cost (₹)	9,375 (3,000 × ₹6.25)/ 2	4,500 (1,440 × ₹6.25)/2
Total cost (A+B) (₹)	11,535	9,000

Savings of Cost by opting EOQ Model = ₹ 11,535 – ₹ 9,000 = ₹ 2,535

(ii) Re-order point under EOQ:

Re-order point/ Re-order level = Maximum consumption × Maximum lead time

Consumption per day = 27,000units / 360days = 75 units

Re-order point/ Re-order level = 75 units × 12 days = 900 units

(iii) Frequency of Orders (in days):

360days / No.of orders a year = 360 days / 19 = 18.95 days or 19 days

Solution 82:

Working:

Calculation of Annual demand of raw material

= 4,000 Litres (per quarter) x 4 (No. of Quarter in a year) x 2 kg. (raw material required for each Litre of paint)

= 32,000 kg.

Calculation of Carrying cost

Storage rate	= 2%
Interest Rate	= 6%
Total	= 8% per annum

Carrying cost per unit per annum = 8% of ₹ 50 = ₹ 4 per unit per annum

(i) EOQ = $\sqrt{\frac{2\times Annual\ Demand\ (A)\times Ordering\ Cost\ per\ order\ (O)}{Carrying\ Cost\ per\ unit\ per\ annum(C)}}$

= $\sqrt{\frac{2\times32,000\ Kg\times`40}{`4}}$ = 800 Kg

(ii) Total Annual Inventory Cost

Purchasing cost of 32,000 kg @ ₹ 50 per kg	= ₹ 16,00,000
Ordering Cost [(32,000 kg / 800 kg) × ₹40)	= ₹1,600
Carrying Cost of Inventory [(15 days / 30 days) × 800 kg × ₹4]	= ₹1600
	Total = ₹16,03,200

Solution 83:

(a) Re-order level

= Minimum stock + (Average consumption x average delivery time)
= 1,250 units + [625 units x 4 weeks] = 3,750 units

(b) Maximum Stock Level
= Re-order level + Re-order quantity – (Min. consumption x Min. re-order period)
= 3,750 units + 6,750 units – 1,250 units
= 9,250 units

(c) Minimum Stock Level
= Re-order level – (Average consumption x Average delivery time)
= 3,750 units – (625 units x 4 weeks) = 1,250 units
(Note: It has been assumed that average delivery time and minimum delivery time is same i.e. 4 weeks)

Solution 84:

Annual requirement of raw material in kg. (A) = $\frac{2,00,000\ units}{5\ units\ per\ kg.}$ = 40,000 kg.
Ordering Cost (Handling & freight cost) (O) = ₹ 1,500
Carrying cost per unit per annum = (₹ 7.5 × 4) = ₹ 30 per kg.
(i) E.O.Q. = $\sqrt{2 \times 40,000\ kgs \times `1,500}/\sqrt{`30}$ = 2,000 Kg.
(ii) Percentage of discount in the price of raw materials to be negotiated:

Particulars	Yearly order	EOQ
Size of the order	40,000 kg.	2,000 kg.
No. of orders	1	20
Cost of placing orders	₹ 1,500 (1 order × ₹ 1500)	₹ 30,000 (20 orders × ₹ 1500)
Inventory carrying cost	₹ 6,00,000 (40,000 kg. × ½ × ₹ 30)	₹ 30,000 (2,000 kg. × ½ × ₹ 30)
Total Cost	₹ 6,01,500	₹ 60,000

When order is placed on yearly basis, the ordering cost and carrying cost increased by ₹ 5,41,500 (₹ 6,01,500 - ₹ 60,000). This increase in total cost should be compensated by reduction in purchase price per kg. to make yearly order placement rational.
Reduction per kg. in the purchase price of raw material:
= $\frac{Increase\ in\ total\ cost}{Annual\ requirement}$ = $\frac{`5,41,500}{40,000\ kg}$ = `13.54 per kg.
Discount in the price of raw material to be negotiated = $\frac{`13.54}{`96}$ = 14.10%

Solution 85:

(i) Computation of Value of Inventory as on 30th September 2019:

Date	Particulars	Units	WAM (₹)	FIFO (₹)	LIFO (₹)
01-07-19	Opening Stock	25,000	50,00,000 (₹ 200×25,000)	50,00,000 (₹ 200×25,000)	50,00,000 (₹ 200×25,000)
01-07-19	Purchases	50,000	95,50,000	95,50,000	95,50,000
			(₹ 191×50,000)	(₹ 191×50,000)	(₹ 191×50,000)
30-09-19	Purchases	25,000	52,50,000(₹210×25,000)	52,50,000(₹210×25,000)	52,50,000(₹210×25,000)
01-07-19 to 30-09-19	Issues/ Consumption (Balancing figure)	68,000	1,34,64,000*	1,32,13,000**	1,34,63,000***
30-09-19	Closing Stock	32,000	63,36,000	65,87,000	63,37,000

Weighted average rate = $\frac{`50,00,000+`95,50,000+52,50,000}{(25,000+50,000+25,000)units}$
* ₹ 198 x 68,000

** ₹ 200 × 25,000 + ₹ 191 × 43,000 = ₹ 50,00,000 + ₹ 82,13,000
*** ₹ 210 × 25,000 + ₹ 191 × 43,000 = ₹ 52,50,000 + ₹ 82,13,000

(ii) Computation of Profit or Loss for the Quarter ended 30th September 2019

Particulars	WAM (₹)	FIFO (₹)	LIFO (₹)
Sales	1,46,20,000	1,46,20,000	1,46,20,000
Less: Consumption	1,34,64,000	1,32,13,000	1,34,63,000
Less: Administrative Exp.	3,75,000	3,75,000	3,75,000
Profit or Loss	7,81,000	10,32,000	7,82,000

[Assumption: Issue/ consumption pattern was even throughout the quarter]

Solution 86:

(i) (a) Inventory turnover ratio (Refer to working note)

$= \frac{Cost\ of\ Stock\ of\ raw\ materials\ consumed}{Average\ stock\ of\ raw\ material}$

$= \frac{`1,68,00,000}{`10,00,000}$ = 16.8

(b) Average number of days for which the average inventory is held

$= \frac{365}{Inventory\ turnover\ ratio}$ $= \frac{365\ days}{16.8}$ = 21.73 days

Working Note:

Particulars	(₹)
Opening stock of raw material	9,00,000
Add: Material purchases during the year	1,70,00,000
Less: Closing stock of raw material	11,00,000
	1,68,00,000

(ii) The Inventory turnover ratio for material X is 16.8 which mean an inventory item takes only 21.73 or 22 days to issue from stores for production process. The rate is better than the industry rate which is 10 time or 36.5 days. This inventory turnover ratio indicates better inventory management system and good demand for the final product in market.

Solution 87:

(i) Calculation of Inventory Turnover ratios and number of days:

	Material A (₹)	Material B (₹)
Opening Stock	30,000	32,000
Add: Purchases	90,000	51,000
	1,20,000	83,000
Less: Closing Stock	20,000	14,000
Materials Consumed	1,00,000	69,000
Average inventory: (Opening stock + Closing stock) ÷ 2	25,000	23,000
(a) Inventory Turnover ratio: (Consumption ÷ Average Inventory)	4 times	3 times
(b) Number of days for which the average inventory held (Number of days in a year/IT ratio)	90 days	120 days

(ii) Comments: Materials A is moving faster than Material B. Or Material A has a less holding period.

Solution 88:

(i) Optimal order quantity i.e. E.O.Q.

$= \sqrt{\frac{2 \times 48,000 \times 1,350}{15}}$ $= \sqrt{86,40,000}$ = 2,939 units

Relevant cost of this order quantity

Ordering Cost = 48,000/2,939 = 16.33, say 17 orders at ₹ 1,350	22,950.00
Carrying Cost = ½ x 2,939 x 15	22,042.50
Relevant Cost	44,992.50

(ii) Revised EOQ $= \sqrt{\frac{2 \times 48,000 \times 800}{15}}$ = 2,263 units

Relevant Cost of this order quantity

Ordering Cost = 48,000/2.263 = 21.21, says 22 orders at ₹ 800	17,600.00
Carrying Cost = ½ x 2,263 x 15	16,972.50
Relevant Cost	34,572.50

Differential Cost = 44,992.50 – 34,572.50 = ₹ 10,420

(iii) In case of discount in purchase price, the total cost of Purchase Cost, ordering cost and carrying cost should be compared.

Original offer at ₹ 80 per unit		Supplier offered at ₹ 72 per unit	
	₹		₹
Purchase Cost (48,000 x 80)	38,40,000.00	Purchase Cost (48,000 x 72)	34,56,000.00
Ordering Cost	22,950.00	Ordering Cost	0.00
Carrying Cost	22,042.50	Carrying Cost (1/2 x 48,000 x 15)	3,60,000.00
Total Cost	38,84,992.50		38,16,000.00

This special offer at ₹ 72 per unit should be accepted as it saves ₹ 68,992.50 as compared to original offer.

Solution 89:

Annual requirement of raw material in kg. (A) = $\frac{60{,}000\ units}{5\ units\ per\ kg.}$ = 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)EOQ = $\sqrt{\frac{2\times 12{,}000\ kgs.\times ₹\ 750}{₹18}}$ = 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 ($\frac{A}{EOQ}$) = $\frac{12{,}000\ kg}{1{,}000\ kg}$ = 12

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

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

Solution 90:

Stores Ledger Account

for the three months ending 30th June, 2022 (Weighted Average Method)

Date	**Receipts**				**Issues**				**Balance**		**Rate for further Issue (Rs.)**
	GRN No.	**Qty. (Kg.)**	**Rates (Rs.)**	**Amounts**	**MR No.**	**Qty. (Kg.)**	**Rates (Rs.)**	**Amount (Rs.)**	**Qty. (Kg.)**	**Amount (Rs.)**	
April 1									1,500	72,000	48.00
April 4						1,100	48.00	52,800	400	19,200	48.00

April 10		1,600	50.00	80,000					2,000	99,200	$\frac{99,200}{2,000}$ = 49.60
April 20		2,400	49.00	1,17,600					4,400	216,800	$\frac{2,16,800}{4,400}$ = 49.30
April 24						1,600	49.30	78,880	2,800	137,920	$\frac{1,37,920}{2,800}$ = 49.30
May 5		1,000	51.00	51,000					3,800	188,920	$\frac{1,88,920}{3,800}$ = 49.70
May 10						1,500	49.70	74,550	2,300	114,370	$\frac{1,14,370}{2,300}$ = 49.70
May 17		1,100	52.00	57,200					3,400	171,570	$\frac{1,71,570}{3,400}$ = 50.50
May 25		800	52.50	42,000					4,200	213,570	$\frac{2,13,570}{4,200}$ = 50.90
May 26						1,700	50.90	86,530	2,500	127,040	$\frac{1,27,040}{2,500}$ = 50.90
May 31					Shortage	80			2,420	127,040	$\frac{1,27,040}{2,420}$ = 52.50
June 11		900	54.00	48,600					3,320	175,640	$\frac{1,75,640}{3,320}$ = 52.90
June 15						1,500	52.90	79,350	1,820	96,290	$\frac{96,290}{1,820}$ = 52.90
June 21						1,200	52.90	63,480	620	32,810	$\frac{32,810}{620}$ = 52.90
June 24		1,400	55.00	77,000					2,020	109,810	$\frac{1,09,810}{2,020}$ = 54.40
June 30					Shortage	60			1,960	109,810	$\frac{1,09,810}{1,960}$ = 56.00

Solution 91:

(i) Calculation of Economic Order Quantity

Annual requirement (A) = 7500×12= 90,000 Valves
Cost per order (O) = ₹ 15
Inventory carrying cost (i) = 20%
Cost per unit of spare (c) = ₹ 1.5
Carrying cost per unit (i × c) = ₹ 1.5 × 20% = ₹ 0.30

Economic Order Quantity (EOQ) $= \sqrt{\frac{2 \times A \times O}{i \times c}}$

$= \sqrt{\frac{2 \times 90,000 \times 15}{0.3}}$ = 3,000 Valves

Frequency of order or Number of Orders = 90,000/3,000 = 30 orders.
So Order can be placed in every 12 (360days/30) days

(ii) Re-order Quantity = {Maximum Consumption X Maximum lead time} + safety Stock
= {7500X1.5} + 3200 = 14,450 Valves

(iii) Calculation of Economic Order Quantity if valve costs ₹ 4.50

Carrying cost is 20% of ₹ 4.50 = ₹ 0.90

Economic Order Quantity (EOQ) $= \sqrt{\frac{2 \times A \times O}{i \times c}}$

$= \sqrt{\frac{2 \times 90,000 \times 15}{0.9}}$

= 1732.0508 units or 1733 Valves