TRANSFER PRICING

Ans.8:

100% capacity 4,000 tones (Maximum)

Distribution market	2,000 Tones
Processing unit	2,000 Tones

80% capacity 3,200 tones

Market	2,000 Tones
Processing unit	12,00 Tones

(a) **80% capacity – price Rs. 400 per ton** (Rs.)

Particulars	**Basic unit**	**Particulars**	**Processing unit**
Sales (3,200 * 400)	12,80,000	(24,000 * 40)	9,60,000
Raw materials (3,200 * 70)	2,24,000	Tr. Price (1,200 * 400)	4,80,000
Variable cost (3,200 * 140)	4,48,000	(1,200 * 170)	2,04,000
Fixed overhead	3,00,000		1,20,000
	9,72,000		8,04,000
Profit	3,08000		1,56,000

Total profit of the company = Rs. 4, 64,000

(b) **100% capacity – price Rs. 400 per ton** (Rs.)

Particulars	**Basic unit**	**Particulars**	**Processing unit**
Sales (4,000 X 400)	16,00,000	(4000 X 320)	12,80,000
Raw materials (4,000 X 70)	2,80,000	Tr. Price (2,000 X 400)	8,00,000
Variable cost (4,000 X 140)	5,60,000	(2,000 X 170)	3,40,000
Fixed overheads	3,00,000		1,20,000
	14,00,000		12,60,000
Profit	4,60,000		20,000

Total Profit of the Company = Rs. 4,80,000

(c) 80% capacity- Market price @ Rs.360 & Transfer price to processing @ Rs. 400 per tonne

(Rs)

Particulars	Basic unit	Particulars	Processing unit
Sales			
(2,000 X 360) + (1,200 X 400)		(24,000 X 40)	
Raw materials (3,200 X 70)	12,00,000	Tr. Price (1,200 X 400)	9,60,000
Variable Cost (3,200 X 140)	2,24,000	(1,200 X 170)	4,80,000
Fixed overheads	4,48,000		2,04,000
	3,00,000		1,20,000
	9,72,000		8,04,000
Profit	2,28,000		1,56,000

Total Profit of the Company = Rs. 3,84,000

(d) 100% capacity- Price Rs. 360 per tonne (Rs.)

Particulars	Basic unit	Particulars	Processing units
Sales (4,000 X 360)			
Raw material (4,0000 X 70)	14,40,000	Tr Price (2,000 X 360)	12,80,000
Variable overheads (4,000 X 140)	2,80,000	(2,000 X 170)	7,20,000
Fixed overheads	5,60,000		3,40,000

	3,00,000 11,40,000		1,20,000 11,80,000
Profit	3,00,000		1,00,000

Total profit o the Company = 4,00,000

Comments :
At Rs. 400 per tonne, the processing unit will not be interested in buying more than 1,200 tonnes because the profitability of the processing unit will be reduce from Rs. 1,56,000 to Rs. 2,000.
When the market price reduce to Rs. 360 per tonne the processing unit will not be interested in purchasing more than 1,200 tonnes because at this level it can maintain the same level of profit.
Even if the price is reduced to Rs.360 for the processing unit, it may not be interested in buying more than 1,200 tonnes as its profitability will be reduced from Rs.1,56,000 to Rs.1,00,000.
When the market price reduced to Rs.360 per tonne and the transfer price is maintained at Rs.400, the processing unit may get its suppliers of 1,200 tonnes via open market at the price less than Rs.400 per tonne. This will increase the profitability of the processing unit but reduced the profitability of the basic unit.
Thus the present policy market price for transfer pricing does not offer incentive to the processing unit. Hence cost plus method should be restored to.

Ans. 9

(i) **(a)** At 80% level (in Rs)

-Textile unit		-Process house	
Sales (4,00,000 × 6)	24,00,000	Sales(1,50,000/100) ×825	12,37,500
Less		Less	
Raw material (4,00,000 × 3)	12,00,000	Transfer Price (1,50,000 × 6)	9,00,000
Variable cost (4,00,000 ×1.2)	4,80,000	Variable cost (1,500 × 80)	1,20,000
Fixed cost	4,12,000	Fixed cost	1,00,000
Profit	3,08,000	Profit	1,17,500

Overall profit = 3,08,000 + 1,17,500 = Rs 4,25,500

At 100% level

Sales (5,00,000 × 6)	30,00,000	Sales (2,50,000/100) ×725	18,12,500
Less		Less	
Raw material (5,00,000 × 3)	15,00,000	Transfer Price (2,50,000 × 6)	15,00,000
Variable cost (5,00,000 × 1.2)	6,00,000	Variable cost	2,00,000
Fixed cost	4,12,000	Fixed cost	1,00,000
Profit	4,88,000	Profit	12,500

Overall profit = 4,88,000+12,500 = Rs 5,00,500

(b) At 80% level (market price 5.60 and transfer price 6/-) (in Rs)

Textile unit		Process house	
Sale (2,50,000 ×5.6)	1400000		
(1,50,000 ×6.0)	900000		
	23,00,000		
Less			
Raw material (4,00,000 ×3)	12,00,000		
Variable cost (4,00,000 ×1.2)	4,80,000		
Fixed cost	4,12,000		
Profit	2,08,000	Profit	1,17,500

Overall profit = 2,08,000+1,17,500 =Rs 3,25,500

(c) Sales 100% level at (5.60) (in Rs)

Sale (5,00,000 × 5.6)	28,00,000	Sales(2,50,000 ×725)	18,12,500
Less		Less	
Raw material (5,00,000 ×3)	15,00,000	Transfer Profit (2,50,000 ×5.6)	14,00,000
Variable cost (5,00,000 ×1.20)	6,00,000	Variable cost (2,500 × 80)	2,00,000
Fixed cost	4,12,000	Fixed cost	1,00,000
Profit	2,88,000	Profit	1,12,500

Overall profit = 2,88,000 + 1,12,500 =4,00,500

(ii) Comments on the profitability of processing units:-

		Transfer price (Rs)	Profit (Rs)
(a)	80% capacity	6.00	1,17,500
	100% capacity	6.00	12,500
(b)	80% capacity	6.00	1,17,500
(c)	100% capacity	5.60	1,12,500

Processing house will not be interested to buy more than 1,50,000 meters from textile units.

Ans.: 10 (Rs.)

Particulars	BRITE	LITE	TITE
Selling Price	300	60	700
Variable costs	150	40	590
Contribution	150	20	110

Alternative I
Division AD

		(Rs)
Contribution		
(15,000 units of BRITE X Rs.150)		22,50,000
(40,000 units of LITE X Rs.20)		8,00,000
Total Contribution		30,50,000
Fixed Expenses		20,00,000
Profit	(a)	10,50,000

Division CD

		(Rs)
Contribution (5,000 units of TITE X Rs.110)		5,50,000
Fixed Expenses		4,00,000
Profit	(b)	1,50,000

Overall profit of the company (a + b) Rs.12,00,000

Alternative II
Division AD

		(Rs)
Contribution		
(15,000 units BRITE outside customer @ Rs.150)		22,50,000
(5,000 units of BRITE Division CD @ 150)		7,50,000
(20,000 units of LITE (limited capacity) @ Rs.20)		4,00,000
Total contribution		34,00,000
Fixed expenses		20,00,000
Profit	(a)	14,00,000

Division CD
Extra cost of labour Rs.50 and variable cost Rs.640
Hence contribution Rs.700 - Rs.640 = Rs.60

		(Rs)
Contribution (5,000 units @ Rs.60)		300,000
Fixed Expenses		400,000
Loss	(b)	100,000
Overall profit of the company	(a-b)	13,00,000

Alternative III
Division AD
Price of BRITE to CD reduced by Rs.50
Hence Contribution/unit Rs.250 – Rs.150 = Rs.100

		(Rs)
Contribution		
(15,000 units of BRITE outside party @ Rs150)		22,50,000
(5,000 units of BRITE to CD @ Rs100)		5,00,000
(20,000 units of LITE to capacity @ Rs20)		4,00,000
Total contribution		31,50,000
Fixed expenses		20,00,000
Profit	(a)	11,50,000

Division CD
BRITE from AD Rs.250 contribution Rs.700-Rs.590 = Rs.110 per unit
Lobour and overhead Rs.340, Variable costs Rs.590

		(Rs.)
Contribution (5,000 units @ Rs.110)		5,50,000
Fixed expenses		4,00,000
Loss	(b)	1,50,000
Overall profit of the company	(a+b)	Rs.13,00,000

Alternative 1V
Division AD

		(Rs.)
Contribution		
(15,000 units BRITE outside customer @ Rs.150)		22,50,000
(10,000 units of BRITE to CD @ Rs.250 i.e., contribution @ Rs.100)		10,00,000
Total contribution		32,50,000
Fixed expenses		20,00,000
Profit	(a)	12,50,000

Division CD

		(Rs.)
Contribution		
(10,000 units with BRITE of AD @ Rs.110)		11,00,000
(2,000 units with imported component @ Rs.110)		2,20,000
Total contribution		13,20,000
Fixed expenses		11,70,000
Profit	(b)	1,50,000

Overall profit of the company (a+b) Rs.14,00,000

Recommendation on best alternative
Alternative (iv) seems to be the best because it leads to the maximum profit of Rs. 1400000 for the company. But management should consider whether stopping the production of Lite altogether will, in any way, be detrimental to company's interests.

Negotiated price of Rs. 240 per unit.
The price of Rs. 240 per unit will be acceptable to AD because it will lead to a contribution of Rs. 22.50 per hour i.e. (Rs. 240-Rs.150)÷4 hours. If this proposal is not accepted AD will have to produce Lite which will yield a contribution of only Rs. 20 per hour, i.e. (Rs. 60-Rs.40)÷1 hour.

Ans 11: B will not pay A anything more than 13, because at 13, it will incur additional cost of Rs.2/- to modify it, 13 + 2 = 15, the outside cost.

	A		***B***	***C***
	Outside sale	***Transfer to B & C***		
Divisional variable cost of production	7	7	19	25
Transfer from A			13	13
Modification			2	
Total Variable Cost of production	7	7	34	38
Selling Price	15	13	40	50
Contribution	8	6	6	12

Option for C, Purchase all units from A @ 13: Any other option is costlier.

	A	B	C
Maximum external demand	3,750	5,000	4,000
Exiting capacity	5,000	2,500	2,500
Maximum capacity that can be added	5,000	1,250	2,250
Total maximum that can be produced	10,000	3,750	4,750
Additional fixed cost on expansion	24,000	6,000	18,700
Units that must be sold/transfer to get this amount as contribution	24,000÷6 = 4,000	6,000÷6 = 1,000	18,700÷6 = 1,558.33
External demand not covered by existing capacity	-		
Decision	Expand make 10,000 units 3,750 – outside 3,750 – B 2,500 – C	Expand make 2,500 + 1,250 = 3,750 units	Do not expand make only 2,500 units.

	A		***B***	***C***
	Outside sale	***Transfer to B & C***		
Units	3,750	3,750 + 2,500 = 6,250	3,750	2,500
Contribution / unit	8	6	6	12
Contribution (Rs.)	30,000	37,500	22,500	30,000
	67,500		22,500	30,000
Additional Fixed Cost	24,000		6,000	-

	43,500	16,500	30,000

Individual strategy is the company's best strategy.

Ans 13

(i) In this case there are two options available –

(a) Sell at the sub assembly stage (after completion of Div. A) @ Rs. 2000/-

Incremental cost in Div. A	Rs 1,200/-
Contribution	Rs 800/-

(b) Sell at the final product stage

Sell at the final product stage	Rs. 3,000
Cost at Div. A and Div. B Rs(1200+1500)	Rs 2,700
Contribution	Rs 300

Therefore it is profitable to sell at the subassembly stage because of higher contribution, provided there is a market.

Hence, if there is market at intermediate stage, first priority is to sell intermediary (sub assembly).Therefore, 800 units should be sold as sale of intermediary.

The balance capacity available of (1000 – 800) = 200 units should be transferred to B and B should complete the assembly and sell as final product, since the company can earn Rs. 300 per unit for each unit of such sale.

(ii) If B Div. receives the subassembly at market price of Rs. 2,000, plus its own incremental cost of Rs. 1,500 will give total cost of Rs. 3,500, thereby yielding a loss of Rs. 3500 – Rs. 3000 = Rs. 500 per unit, whereas the company makes a profit of Rs. 300 per unit.

In order to keep the manager of Div. B motivated, the profit earned of Rs. 300 per unit should be shared between A and B. Hence transfer price will be variable cost of Div. A + 50% of profit earned in the final product = 1200 + 150 = Rs. 1,350

(iii) Both Div. A and the Company make higher contribution by selling to intermediate market. If the market demand increases to 1,000 units, the full quantity should be sold outside as intermediary and nothing should be transferred to Div. B

Ans.14:

Transfer Price is Rs. 4,500 for each consulting day.
Profit mark-up = 150%
Let cost = x

Profit = $x \times \frac{150}{100} = 1.5x$

Cost + profit = Transfer price
$x + 1.5x = 4{,}500$
$2.5x = 4{,}500$
$x = 1{,}800$
$\therefore$ Cost = Rs. 1,800
and profit = $1.5x = 1.5 \times 1{,}800$ = Rs. 2,700

Variable cost (80%) = Rs. 1,800× 80% = Rs. 1,440
Fixed cost (20%) = Rs. 1,800 ×20% = Rs. 360.

Scenario (i):

Every consultancy team is fully engaged. There is no idle time or spare capacity. Hence, transfer price = Marginal cost plus opportunity cost

Marginal cost = Rs. 1,440
Saving for internal work = Rs. 200
Net Marginal Cost = Rs. 1,240

Opportunity cost is the lost contribution.
Lost contribution = Contribution from external client
= Fee charged from external client – Variable cost
= Rs. (4,500 – 1,440)
= Rs. 3,060.
∴Transfer price = Rs. 1,240 + 3,060
= Rs. 4,300 per consulting day per team.

Scenario (ii):
One team is idle. Idle time has no opportunity cost. Variable cost for internal work is Rs. 1,240 per consulting day. Second team is busy. Hence opportunity cost is relevant in case of second team. Hence charge of second team is Rs. 4,300 per consulting day per team.
Average of charge of two teams = Rs. (1,240 + 4,300) / 2
= Rs. 2,770 per consulting day per team.

Scenario (iii):
New client offers a fee of Rs. 15,84,000
Duration: 5 days of 48 weeks ×2 teams = 480 days
Fee per day 15,84,000 / 480 = Rs. 3,300
Variable cost = Rs. 1,440
Contribution Rs. (3,300 – 1,440) = Rs. 1,860

Fee for consulting day for internal work:
Variable cost = Rs. 1,240
Contribution lost = Rs. 1,860
Fee to be charged = Rs. 3,100 per consulting day per team.

Ans.: 15: Alternative I

AJ	Rs.	DJ	Rs.
Sales : outside (18,000x15)	2,70,000	Sales (2,000 x 105)	2,10,000
DJ (2,000x10)	20,000	Variable Costs (2,000 x 99)	1,98,000
Total	2,90,000	Contribution	12,000
Less V. Costs(20,000x8.50)	1,70,000	Interest	1,000
Net Contribution	1,20,000	Net Contribution	11,000

Total Group contribution =Rs.1,31,000

Alternative II

Sales : (20,000x15)	3,00,000	Sales (2,000 x 105)	2,10,000
Variable costs(20,000x8.50)	1,70,000	Variable Costs (2,000 x104)	2,08,000
Contribution	1,30,000	Contribution	2,000
		Interest	1,000
		Net Contribution	1,000

Total Group contribution = Rs.1,31,000

Alternative III

Sales : (20,000x15)	3,00,000	Sales (2,000 x 105)	2,10,000

Variable costs(20,000x8.50)	1,70,000	Variable Costs (2,000x 104)	2,08,000
Contribution	1,30,000	Contribution	2,000
		Interest	1,000
		Net Contribution	1,000

Total Group contribution = Rs.1,31,000

Alternative IV

Sales : (22,000x15)	3,30,000	Sales (2,000 x 105)	2,10,000
Variable costs 1,87,000		Variable Costs(2,000 x 104)	2,08,000
Over time 4,000	1,91,000	Contribution	2,000
Contribution	1,39,000	Interest	1,000
		Net Contribution	1,000

Total Group contribution = Rs.1,40,000

Comments:
Alternative 1: AJ can supply part 35 to DJ at Rs.10 because the variable cost is Rs.8.50 only and by this transaction a contribution of Rs.1.50 is available. But the overall contribution which would have been Rs.13,000 if the part has been sold to outside buyers, would come down to Rs.1,20,000. DJ however, will earn a net contribution of Rs.11,000. Thus the divisional performance of AJ will go down and that of DJ will boost up at the cost of AJ.
Alternative 2: AJ will maintain its performance but DJ's performance will be reduced to a contribution of Rs.1,000 only.
Alternative 3: AJ will maintain its performance but DJ's performance will be reduced to a contribution of Rs.1,000 only. In these three cases the group income will not change but the performance of the individual divisions will vary.
Alternative 4: AJ's performance will boost up but DJ's performance will remain at the low level .DJ cannot show better performance except at the cost of AJ. Hence AJ should not reduce the price particularly when it has an assured market for part 35 at Rs.15 each.

Ans.: 16:

Statement showing profitability of two divisions at two different levels of output using different transfer prices

No. of bottles	8,00,000	12,00,000
	Rs.	Rs.
Sales value (Packed Product) : (A)	91,20,000	1,27,80,000
Less : Costs		
Product Manufacturing Division	64,80,000	96,80,000
Bottle Manufacturing Division	10,40,000	14,40,000
Total costs : (B)	75,20,000	1,11,20,000
Profit :{(A) – (B)}	16,00,000	16,60,000
Profit pro-rated to Bottle Mfg. Division and Product Mfg. Division.		
Share of Bottle Manufacturing Division:		
16,00,000 × 10,40,000/75,20,000	2,21,276	
16,60,000 × 14,40,000/1,11,20,000		2,14,964
Balance profit relates to Product Mfg. Division	13,78,724	14,45,036
	16,00,000	16,60,000

	Rs.	Rs.
Transfer prices of bottles		
Costs	10,40,000	14,40,000
Profit as computed above	2,21,276	2,14,964
Total price	12,61,276	16,54,964
Transfer price per bottle	Rs. 1.577	Rs. 1.379

From the above computations, it is observed that shared profit relative to the cost involved is Rs. 2,21,276 (Re. 0.2766 per bottle) at 8,00,000 production level and Rs. 2,14,964 (Re. 0.179 per bottle) at 12,00,000 production level. The profit of Product Mfg. Division is Rs.13,78,724 (Rs.1.723 per bottle) at 8,00,000 production level and Rs. 14,45,036 (Rs. 1.2042 per bottle) at 12,00,000 production level.

Profitability based on market price

No. of bottles	8,00,000	12,00,000
Bottle Mfg. Division	*Rs.*	*Rs.*
Market price	14,00,000	20,00,000
Less: Cost	10,40,000	14,40,000
Profit (i)	3,60,000	5,60,000
Product Mfg. Division		
Sales	91,20,000	1,27,80,000
Less: Bottle cost	14,00,000	20,00,000
Product cost	64,80,000	96,80,000
Profit (ii)	12,40,000	11,00,000
Total profit : (i) + (ii)	16,00,000	16,60,000

	Profit based on cost (Rs.Lakhs)		*Profit based on Market price (Rs.Lakhs)*	
Production level	*Bottle Mfg. Div.*	*Product Mfg. Div.*	*Bottle Mfg. Div.*	*Product Mfg. Div.*
8,00,000 bottles	2.21	13.79	3.60	12.40
12,00,000 bottles	2.15	14.45	5.60	11.00

Observations:

1. Market price methods gives a better profitability to Bottle Mfg. Division at both the production levels.
2. Market price method gives a lower profitability to Product Mfg. Division as compared to Bottle Mfg. Division.
3. Under Cost-based method, there is a better profit at lower level of production in Bottle Mfg. Division. However in Product Mfg. Division 12,00,000 production level gives a higher profit. But in Market price method, the position is quite reverse.

Ans. 17 (i) Statement of contribution

(a) When component is purchased by Division B from outside

(Rs.)

Division A				Nil
Division B Sales	(2000x 400)		8,00,000	
Less: Cost of Purchase	(2000x 200)	400000		
Variable costs	(200x 150)	300000	3,80,000	1,00,000

Company's total contribution		1,00,000

(b) When component is purchased from Division A by Division B **(Rs.)**

Division A				
Sales	(2000x 220)		4,40,000	
Less: Variable costs	(2000x 190)		7,00,000	60,000
Division B				
Sales	(2000x 400)		8,00,000	
Less: Variable Costs:				
Purchase cost in Division A	(2000x 220)	440000		
Variable cost in Division B	(2000x 150)	300000	7,40,000	60,000
Company's total contribution				1,20,000

Thus, it will be beneficial for the company as a whole to ask Division B to buy the component from Division A.

(ii) Statement of total contribution if Division A could be put to alternative use:

Division A:				
Contribution from alternative use of facilities				30,000
Division B:				
Sales	(2000x 400)		8,00,000	
Less: Variable costs:				
Cost of purchase	(2000x 400)	400000		
Division B	(2000x 150)	300000	7,00,000	1,00,000
Company's total contribution				1,30,000

Since, the company's contribution when component is purchased from outside, shows as increase of Rs.30,000 as compared to when there is inter departmental transfer. Hence, it will be beneficial to purchase the component from outside.

(iii) Statement of total contribution when component is available from outside at Rs. 185

Division A:				Nil
Division B:				
Sales	(2000x 400)		8,00,000	
Less: Variable costs:				
Cost of purchase	(2000x 185)	370000		
Division B	(2000x 150)	300000	6,70,000	1,30,000
Company's total contribution				1,30,000

If the component is purchased by Division B from Division A, the contribution is only Rs.1,20,000 as calculated under above. Hence it will be beneficial to buy the component from outside.

(iv) Fixations of transfer price

(a) When there are no alternative uses of production facilities of Dept. A:
In such a case the variable cost i.e. Rs.190 per component will be charged.

(b) If facilities of Division A can be put to alternative uses:

	(Rs.)
Variable cost	190

Opportunity cost	15
Transfer price	205

(c) If market price gets reduced to Rs.185 and there is no alternative use of facilities of Division A. the variable cost of Rs.190 per component should be charged.

Ans.18 For the budgeted level of activities and expenses of LD the various costs and prices can be worked out as follows:

	(Rs.)
Total overheads	7,56,000
Less: Variable overheads	4,20,000
Fixed overheads per year	3,36,000

	LX	LY
Variable overheads	4,20,000 x 90,000	4,20,000 x 1,20,000
	2,10,000	2,10,000
	1,80,000	2,40,000
Fixed overheads per year	3,36,000 x 90,000	3,36,000 x 1,20,000
At the budgeted level of activities	2,10,000	2,10,000
	1,44,000	1,92,000

The costs and selling prices of the products of LD for normal sale to outside parties will be as under: (Rs.per kg.)

Particulars	LX	LY
Direct material	36	28
Direct wages	30	20
Variable overheads	60	40
Total Variable cost:	126	88
Fixed costs	48	32
Total costs	174	120
Add: Mark-up 50%	87	60
Selling price	261	180

Labour hours calculated as under:

Particulars	LX	LY
Direct wages	30	20
Wages rate (Rs./hr.)	5	5
Direct labour hr.	6	4

Committed production of LY of 6,000 kg. would involve labour of 6000 x 4 = 24,000
Balance labour available for:

Production of LX	= 42,000-24,000	= 18,000 Hrs.
Production of LY	= 18,000 hrs. / 6 DLH	= 3,000 Kg.

Cost estimate of KX it KD purchase Lx from LD at normal prices

	(Rs.)
Cost of LX	261
Processing materials & Wage costs	30
Variable Overheads	4
Total Variable Cost	295

Profit Statement of LD & KD

(1) Transfer price based on total cost

LD	Rs.	KD	Rs.
Sales LX (3000 x 261)	7,83,000	Sales KX (2000 x 300)	6,00,000
LY (6000 x 180)	10,80,000		
Total Sales	18,63,000		
Variable cost		Variable cost (2000 x 295)	5,90,000
LX (2000 x 122)	2,44,000		
(1000 x 126)	1,26,000		
LY (6000 x 88)	5,28,000		
Total variable cost	8,98,000		
Fixed costs	3,36,000		1,00,000
Total costs	12,34,000	Fixed cost	6,90,000
Profit	6,29,000	Total cost	(-)90,000
		Loss	

Total profit for the company = 6,29,000 – 90,000 =Rs.5,39,000

(ii) Transfer price based on total Cost after adjustment for selling expenses

LD	Rs.	KD	Rs.
Sales LX (2000 x 257)	5,14,000	Sales (2000 x 300)	6,00,000
(1000 x 261)	2,61,000		
LY (6000 x 180)	10,80,000		
Total Sales	18,55,000		
Less: Costs as above	12,34,000	Total costs (690000-4 x 2000)	6,82,000
Profit	6,21,000	Less	(-)82,000

(iii) Total profit to the company =6,21,000-82,000 =Rs.5,39,000

LD	Rs.	KD	Rs.
Sales LX (2000 x 122)	2,44,000	Sales KX (2000 x 300)	6,00,000
(1000 x 261)	2,61,000		
LY (6000 x 180)	10,80,000		3,12,000
		Variable cost (2000 x 156)	1,00,000
Total Sales	15,85,000	Fixed costs	4,12,000
Less: Total Costs as above	12,34,000	Total costs	
Profit	3,51,000		1,88,000
		Profit	

(iv) Total profit for the Company =3,51,000 + 1,88,000 =Rs.5,39,000

LD	Rs.	KD	Rs.
Sales LX (3000 x 152)	3,04,000	Sales KX (2000 x 300)(a)	6,00,000
(a)			
(Including Rs.30 oT)	7,83,000		
(3000 x261)	10,80,000		3,72,000
LY (6000 x 180)	21,67,000	Variable cost (2000 x 186)	1,00,000
Total Sales			
Variable cost			
LX (2000 x 152)	3,04,000		
(3000 x 126)	3,78,000		
LY (6000 x 88)	5,28,000		
	12,10,000		
Total variable cost	3,36,000		
Fixed costs	15,46,000		4,72,000
Total costs (b)	6,21,000		1,28,000
Profit (a-b)		Total costs (b)	
		Profit (a-b)	

Total profit for the company =6,21,000 + 1,28,000 Rs.7,49,000

Ans. 19:

(a) (i) AB sells product at external market

Selling price (Rs.)	30	45	60
Less Variable cost	18	18	18
Contribution (per unit)	12	27	42
Demands (units)	60,000	40,000	20,000
Total contribution	7,20,000	10,80,000	8,40,000

Optimal output is 40,000 units at a selling price of Rs.45

AB transfer at Rs.42 to XY division then contribution of XY

Selling price (Rs.)	120	135	150
Less Variable cost V+TP (42+60)	102	102	102
Contribution (per unit)	18	33	48
Demands (units)	15,000	10,000	5,000
Total contribution	2,70,000	3,30,000	2,40,000

Manager will choose out put level 10,000 units at a selling price of Rs.135.

Overall profit when transfer made at Rs.42

Division AB contribution on 10,000 units [42 – (18 -3)]	= 2,70,000
Division XY contribution 10,000 (135 – 102)	= 3,30,000
Total contribution	= 6,00,000
Division AB contribution from external market sale	10,80,000
Total profit	16,80,000

(ii) AB transfer at variable cost

Selling price (Rs.)	120	135	150
Less Variable cost (15+60)	75	75	75
Contribution (per unit)	45	60	75

Demands (units)	15,000	10,000	5,000
Total contribution	6,75,000	6,00,000	3,75,000

Optimal is 15,000 units at the rate of 120 per unit.
If AB transfer at Variable cost (Rs.15) then no contribution will be generated by AB division

XY division choose 15,000 units level gives contribution 15,000 × 45 = 6,75,000
Division AB contribution from external market sale = 10,80,000
Total contribution = 17,55,000

(iii) Contribution AB division by selling 10,000 units to new external market at Rs.32 and XY division purchasing at Rs.31.

Contribution (32 – 18) × 10,000	= 1,40,000
XY contribution [135 – (31 + 60)]	= 4,40,000
Division AB contribution from external market sale	= 10,80,000
Total contribution	= 16,60,000

Ans. 20 (a) The variable costs per unit of output of sale outside the company are Rs.11 for the intermediate product and rs.49(Rs.10 for A+Rs.39 for B) for the final product. Note that selling and packing expenses are not incurred by the supplying division for the transfer of the intermediate product. It is assumed that the company has sufficient capacity to meet the demand at the various selling prices.

Optional output of intermediate product for sale on external market.

Selling Price	(Rs.)	20	30	40
Unit contribution	(Rs.)	9	19	29
Demand	(units)	15,000	10,000	5,000
Total contribution	(Rs.)	1,35,000	1,90,000	1,45,000

Optimal output is 10,000 units at a selling price of Rs.30.

Optimal output for final product

Selling Price	(Rs.)	80	90	100
Unit contribution	(Rs.)	31	41	51
Demand	(units)	7,200	5,000	2,800
Total contribution	(Rs.)	2,23,200	2,05,000	1,42,800

Optimal output is 7200 unit at a selling price of Rs.80.
Optimal output of Division B based on a transfer price of Rs.29.
Division B will regard the transfer price as a variable cost. Therefore, total variable cost per unit will be Rs.68(i.e.,29+39) and Division B's contribution will be as follows:

Selling Price	(Rs.)	80	90	100
Unit contribution	(Rs.)	12	22	32
Demand	(units)	7,200	5,000	2,800
Total contribution	(Rs.)	86,400	1,10,000	89,600

The manager of Division B will choose an output level of 5,000 units at a selling price of Rs.90. This is sub-optimal for the company as a whole. Profit for the company as a whole

from the sale of the final product are reduced from Rs.2,23,200 (72,00 units) to Rs.2,05,000 (5000 units). Rs.2,05,000 profits would be allocated as follows:

Division A Rs.95,000 (5000 units at Rs.19 i.e.,Rs.29-Rs.10)
Division b Rs.1,10,000

(b) At a transfer price of Rs.12 the variable cost per unit produced in Division B contribution will be as follows:

Selling Price	(Rs.)	80	90	100
Unit contribution	(Rs.)	29	39	49
Demand	(units)	7,200	5,000	2,800
Total contribution	(Rs.)	2,08,800	1,95,000	1,37,200

The manager of Division B will choose an output level of 7200 units and a selling price of Rs.80.This is the optimum output level for the company as a whole. Division A would obtain a contribution of Rs.14,400 (7200 units @ Rs.2 (I.e.,Rs.12-Rs.10) from internal transfers of the intermediate product whereas Division B would obtain a contribution of Rs.2,08,800 from converting the intermediate product and selling as a final product. Total contribution for the company as a whole would be Rs.2,23,200. Note that Division A would also earn a contribution of Rs.1,90,000 from the sale of the intermediate product to the external market.

Ans.21 (i) Department 'A'

By product BYEA	Production 3000 Tonnes	(Rs.)
Sales Income	(30% of 3000 Tonnes @ Rs.200)	1,80,000
	(70% of 3000 Tonnes @ Rs.1200)	25,20,000
	Total	27,00,000

(ii) Department 'B'

Production of RESP	(3000 x 200,i.e.,600000 litres)		(Rs.)
Sales	(600000 litres @ Rs.15)	(a)	90,00,000
Costs: Opportunity Cost of BYEA			27,00,000
Variable Costs	(600000 @ Rs.4)		24,00,000
Fixed Costs			12,00,000
Total			63,00,000
(b)			27,00,000
Profit		(a-b)	

(iii) Department 'C' (ltrs.)

Production of POTS	(600000 x 1.6)	9,60,000
5% wastage		48,000
		9,12,000

(a) Sales

Pack (ML)	%	Litres	No.of packs	Price/Pack Rs.	Sales Value Rs
200	75	6,84,000	34,20,000	2.50	85,50,000
300	25	2,28,000	7,60,000	3.50	26,60,000

Total		9,12,000			1,12,10,000

(b) Costs

		(Rs.)
RESP	(600000 x 15)	90,00,000
Mfg. Cost	(912000 x 1.50)	13,68,000
Total		1,03,68,000

Profit (a-b) 8,42,000

(iv) Total Profit under the existing arrangement

A-27,00,000 + B-27,00,000 + C-8,42,000 =Rs.62,42,000

Under the new proposal

		(Ltrs.)
Total quantity of RESP purchased	(3000 x 120)	3,60,000
Production of POTs	(360000 x 1.60)	5,76,000
Amount of Saleable POTs	(576000 x 95/100)	5,47,200

(a) Sales

Pack (ML)	%	Litres	No.of packs	Price/Pack Rs.	Sales Value Rs
200	75	4,10,400	2,05,200	2.50	51,30,000
300	25	1,36,800	4,56,000	3.50	15,96,000
Total		5,47,200			67,26,000

(b) Costs

(Rs.)

RESP	(360000 x 6.25)	22,50,000	
Mfg. Cost	(547200 x 1.50)	8,20,000	
Fixed Overhead of Dept. B		12,00,000	42,70,800

Profit (a)- (b) 24,55,200

Analysis : Since under the new proposal profit gets lowered from Rs.62,42,000 to Rs.24,55,200 the proposal is not acceptable.

Ans.22. The transfer price will be notional revenue to S and notional cost to T.

(a) S will continue to produce more output until the costs of further production exceed the transfer price revenue.

(b) T will continue to want to receive more output from S until its net revenue from further processing is not sufficient to cover the incremental transfer price costs.

Output Units	Division S Incremental Cost Rs.	Division T Incremental Costs Rs.
600	-	-
700	100	300
800	140	280
900	160	250
1000	200	220

1100 1200	250 350	200 150

Since S will continue to produce more output if the transfer price exceeds the incremental costs of production, a price of at least Rs.200 per 100 units (Rs. 2 per unit) is required to 'persuade' the manager of S of produce as many as 1,000 units, but a price in excess of Rs.250 per 100 units would motivate the manager of S to produce 1,100 units (or more). By a similar argument, T will continue to want more output from S if the incremental revenue exceed the transfer costs from S. If T wants 1,000 units the transfer price must be less than Rs.220 per 100 units. How ever, if the transfer price is lower than Rs.200 per 100 units, T will ask for 1100 units from S in order to improve its divisional profit further.

In summary

(a) The total company profit I maximised at 1,000 units of output.
(b) Division S will, want to produce 1,000 units, no more and no less, if the transfer price is between Rs.2 and Rs.2.50(Rs.200 to Rs.250 per 100 units).
(c) Division T will want to receive and process 1,000 units, no more and no less, if the transfer price is between Rs.2 and Rs.2.20
(d) A transfer price must therefore be selected in the range Rs.2.00 to Rs.2.20 per unit(exclusive).

Thus, if a price of Rs.2.10 per unit is selected, profits at 1,000 units of output would be;

(Rs.)

Particulars	Division S	Division T	Total
Sales/Net revenue	2,100	4,000	4,000
Costs	1,200	2,100	1,200
Profit	900	1,900	2,800

At a transfer price of Rs.2.10 any increase in output above 1,000 units, or shortfall in output below this amount, would reduce the profits of company as a whole, but also the divisional profits of S and T.

Ans.23. (a)The problem

The overall company interest is obviously to produce 1,400 units which will given the maximum profit. The problem is to fix the transfer price (TP) with which both X and Y will find 1,400 units to be the optimum output for them severally.

Let us analyse and examine the incremental costs at X and the incremental revenue at Y

Level of output	Incremental Cost for X	Incremental Net revenue for Y Rs.	Company profit
1,000	-	-	3,100
1,100	100	300	3,300
1,200	120	240	3,420
1,300	130	190	3,480
1,400	150	170	3,500
1,500	180	130	3,450
1,600	220	80	3,310

A price of at least Rs. 150 per 100 units (Rs.1.50 per unit) is required to induce the manager of X to produce as many as 1,400 units; but the price must not exceed Rs.180 per 100 units, for in that event X would like to produce 1,500 units (or more)
Similarly, Y will keep producing so long as the incremental revenues exceed the transfer cost from X. in order that Y wants 1,400 units, the TP must be lower than Rs.170 per 100units; but it shall not be lower than Rs.130,for Y will then ask for 1,500 units from X to increase his (Y's) divisional profit further.
If the TP is selected at Rs.1.60 per unit, profits at 1,400 units of output would be

(Rs.)

Particulars	X	Y	Company
Sales / Net revenue	2,240	4,900	4,900
Costs	1,400	2,240	1,400
Profit	840	2,660	3,500

At a TP of Rs.1.60 any increase in output above 1,400 units or shortfall in output below this level would reduce the profits of the company as a whole and also the divisional profits of X and y.
With Rs.1.60 as TP, neither X or Y will like to deviate from 1,400 units, which incidentally is also wanted y the corporate Management.

Ans. 24. (i) Calculation of transfer price to be quoted by Alfa to Beta based on residual income

(Rs.)

Fixed Costs		80
Return on capital employed	(Rs.750 lakhs x 12/100)	90
Residual income desired		100
Total		270

Desired contribution per unit =Selling price p.u.-Variable cost p.u. =Rs.180- Rs.60 =Rs.20 p.u.
Total desired contribution =12,00,000 units x Rs.20 p.u =Rs.240 lakhs
Minimum contribution to be earned from sale of additional 3 lakh units.

Rs.270 lakhs-Rs.240 lakhs =Rs30 lakhs.

Contribution p.u. on additional 3,00,000 units =Rs.30,00,000/3,00,000 units = 10 p.u.

Variable cost of modification per unit =Rs.5

Hence, the minimum transfer price per unit to be quoted will be
=Rs.160 + 10 + 5 =Rs.175
(ii) If Beta can buy from outside at less than the variable cost of manufacture, Rs.165, than only the decision to transfer at the price of Rs.175 will become sub-optimal for the group as a whole.

Ans.25. Working Notes:
(i) Computation of Sales revenue from Foam Division

(Rs.)

Sales of Foam Division to outside customers	(Rs.1,600-Rs.200)	1,400
Less: Variable Mfg. Costs	(Rs.1,200-Rs.200)	1,000

Mark-up on outside Sale	(Rs.400/Rs.1000)x 100=40%	400
Transfer Price of Foam to Upholstery Division		280
Sales of Foam Division to outside Customers		1,400
Total		1,680

(ii) Variable Mfg. Cost of Upholstery Division (Rs.'000)
=(Rs.680-Rs.200 + Rs.280) =Rs.760

(iii) Computation of Traceable Administration Expenses (Rs.'000)

Divisions	Foam	Carpets	Upholstery	Total
Given Administration expenses	134	116	172	422
Less: Common expenses (10% of Gross Profit)	40	40	50	130
Traceable Administration Expenses	94	76	122	292

(iv) Computation of Traceable Selling Expenses (Rs.'000)

Divisions	Foam	Carpets	Upholstery	Total
Given Selling expenses	202	210	232	644
Less: Common expenses (2.5% of Sales)	40	30	30	100
Traceable Selling Expenses	162	180	202	544

(a) Revised operating statement (using Contribution approach) (Rs.000)

Divisions	Foam	Carpets	Upholstery	Total
Sales Revenue	1,680	1,200	1,200	4,080
Less: Variable Mfg. Costs	1,200	700	760	2,660
Contribution (i)	480	500	440	1,420
Traceable Costs:				
Fixed Mfg. Costs	-	100	20	120
Admn. Expenses	94	76	122	292
Selling Expenses	162	180	202	544
Total (ii)	256	356	344	956
Operating Income (i)-(ii)	224	144	96	464
Less: Common expenses				230
Net Income of the Company				234

(b) (i) Computation of contribution Margin (Rs.'000)

$$\text{Contribution Margin Ratio \%} = \frac{\text{Contribution X 100}}{\text{Sales}}$$

			(Ranks)
Foam	(Rs.480/Rs.1680) x100	28.57%	III
Carpets	(Rs.500/Rs.1200) x 100	41.67%	I
Upholstery	(Rs.440/Rs.1200) x 100	36.67%	II

(ii) Computation of Net Contribution Ratio (Rs.'000)

$$\text{Net Contribution Ratio (\%)} = \frac{\text{Net Contribution X 100}}{\text{Sales}}$$

Foam	(Rs.224/Rs.1680) x100	13.33%	III
Carpets	(Rs.144/Rs.1200) x 100	12%	I
Upholstery	(Rs.96/Rs.1200) x 100	8%	II

It is observed from the above analysis that foam Division's Manager argument I correct when we look at the calculation given above which shows that even though contribution margin ratio of Foam Division is lower, the divisions ranking is higher based on the Net Contribution Ration.

The use of contribution approach for reporting is more realistic for assessing the performance of various divisions as it considers variable and traceable costs only and avoids common costs while finding out profitability. This approach enables the management to rightly interpret the information. Further, pricing of internal transfers at market price will give due credit to specific profits centre i.e. transferor.

Ans. 26

The desired rate of return is 28% on investments. Investments include: (i) Fixed assets after depreciation

(ii) Net working capital.

In the question, current assets and debtors are given but current liabilities and creditors are not indicated. Therefore, these are assumed to have nil value.

Investments

Fixed assets		5,00,000
Net working capital	Rs.	
Current assets	3,00,000	
Debtors	2,00,000	5,00,000
Total investments		10,00,000

The desired rate of return is 28%

The profit margin will be	Rs. 280000
Budgeted volume	400000unit
	Rs.
Profit margin per unit (Rs. 280000 ÷ 400000 units)	0.70
Fixed cost per unit	2.00
Variable cost per unit	10.00
Transfer price per unit	**12.70**

Ans.27 (i) Profit =20% return on average assets employed

Average assets	(Rs.Lakhs)
Sundry Debtors	2
Inventories	5
Plant & equipment	5
Total	12

Profit =Rs.12,00,000 x 20 /100 =Rs.2,40,000

(2) Budgeted sales revenue (2,00,000 units of component X) (Rs.Lakhs)

Fixed cost		5.00
Variable cost	(2,00,000 units @ Rs.1)	2.00
Profit		2.40
Total Sales		9.40

Selling price per unit of component X =Rs.9,40,000/2,00,000 units =Rs.4.70 per unit

Options in hand with Division A

Option 1 -Sell 1,50,000 units in market and transfer 50,000 units to Division B

Option 11 -Sell only 1,50,000 units in market.

Statement of profitability of Division A under two options (Rs.)

Particulars		Option-I	Option-II
Sales	(1,50,000 units @ Rs.4.70)	7,05,000	7,05,000
Transfer to Division-B	(50,000 units @ Rs.2)	1,00,000	-
Total Sales revenue		8,05,000	7,05,000
Less: variable overhead		2,00,000	1,50,000
Contribution		6,05,000	5,55,000
Less: Fixed Cost		5,00,000	4,75,000
Profit	(a)	1,05,000	80,000
Capital employed	(b)	12,00,000	10,00,000
Return on capital employed (a)/(b)X100		8.75%	8%

Analysis : From the analysis of the above it is observed that under Option-I, Division A's, Profit and ROCE is increased by Rs.25,000 and 0.75% respectively. Hence Option-I is suggested for Division-A.

Ans. 28

(i) The company as a whole will not benefit if Division C bought the component from an outside supplier at Rs.135/- per unit.

	Rs.
Purchase cost from outside supplier	1,35,000
(1,000 units × Rs.135 per unit)	
Less: Saving in variable cost of division	
A by reducing Division's output	1,20,000
(1,000 units × Rs.120 per unit)	
Net cost (benefit) to the company as a whole	15,000

The company as a while will not benefit, as it will be required to incur an additional cost of Rs.15,000 if Division C bought the component from outside supplier.

(ii) The company will be benefited if C purchased the component from an outside supplier and Division A uses the facilities for other activities.

	Rs.	*Rs.*
Purchase cost from outside supplier		1,35,000

(1,000 units × Rs.135)		
Less: Saving in variable cost of Division A for the units purchased by Division C from outside	1,20,000	
(1,000 units × Rs.120 per unit)		
Cash operating saving of Division A for the use of facilities for other activities	18,000	1,38,000
Net cost (benefit) to the company as a whole		(3,000)

It is advisable that Division C should purchase the component from outside sources as this decision will benefit the company by Rs.3,000.

(iii) The company will be benefited if C purchase the component from an outside supplier and there is no alternative use of Division A's facilities.

	Rs.
Purchase cost from outside supplier	1,15,000
(1,000 units × Rs.115)	
Less: Saving in variable cost of Division A by reducing division's output	1,20,000
(1,000 units × Rs.120)	
Net cost (benefit) to the company	(5,000)

It is advisable that the Division C should buy the component from outside as this decision will benefit the company by Rs.5,000.

Ans 29 (i) Working notes:

1. Contribution per hour of Super-chips and Okay-chips:

	Super-chips	*Okay-chips*
Selling price per unit (Rs.)	600	120
Less: Variable cost per unit (Rs.)	300	80
Contribution per unit (Rs.)	300	40
Hours required per unit	2	0.5
Contribution per hour	150	80
	(Rs.300/2 hrs)	(Rs.40/0.5 hrs)

2. Details of hours utilized in meting the demand of 15,000 units of Super-chips and utilizing the remaining hours for Okay-chips out of available hours of 50,000 per annum:

	Rs.
Hours utilized for manufacturing 15,000 units of Super-chips	30,000
(15,000 units × 2 hours)	
Hours utilized for manufacturing 40,000 units of Okay-chips	20,000
(40,000 units × 0.5 hours)	
	50,000

3. Contribution of a process control unit (using an imported complex circuit board):

Rs.

Selling price per unit: (A)	1,400
Variable costs	
Circuit board (Imported)	600
Other parts	80
Labour cost (5 hours × Rs.100)	500
Total variable costs: (B)	1,180
Contribution per unit (Rs.) : [(A) – (B)]	220

4. Contribution of process control unit (using a Super-chips):

	Rs.
Selling price per unit: (A)	1,400
Variable costs	
Super-chip	300
(Material + Labour costs)	
Other parts	80
Labour (6 hours × Rs.100)	600
Total variable costs: (B)	980
Contribution per unit (Rs.) : [(A) – (B)]	420

5. Incremental contribution per unit of a process control unit, when instead of using imported complex circuit board Super-chip is used:

	Rs.
Incremental contribution per unit (Rs.420 – Rs.220) (Refer to W. N. 3&4)	200

(ii) Super-chips to be transferred to Mini Computer Division to replace Circuit Boards:

Out of 50,000 available hours 30,000 hours are utilized for meeting the demand of 15,000 unit of Super-chips, the rest 20,000 hours may be used for manufacturing 40,000 Okay-chips, which yields a contribution of Rs.40 per unit or Rs.80/- per hour (*Refer to working note 1*) or a contribution of Rs.160 per two equivalent hours.

In case the company decides to forego the manufacturing of 20,000 units of Okay-chips in favour of 5,000 additional units of Super-chips to be used by Mini-Computer division (instead of complex imported Circuit Board) for manufacturing process control units. This decision would increase the existing contribution of Mini-computer Division by Rs.200/- per two-equivalent hours (*Refer to working note 5*).

Hence the entire requirement of 5,000 units of Super-chips be produced and transferred to Mini-Computer Division.

(ii) Minimum transfer price of Super-chip to Mini Computer Division:

Variable cost of a Super-chip + Opportunity cost of foregoing the production of an Okay-chip and using craftsmen time for Super-chip

= Rs.300 + 2 hours × Rs.80

= Rs.460

(iii) Super –chips to be produced for the production of 12,000 units of process control units:

After meeting out the order of 15,000 Super-chips per year, the concern is left out with 20,000 hours. Use of Super-chips for control units production would increase the existing contribution of

Mini-Computer Division by Rs.200/- per unit. Out of the remaining 20,000 craftsmen hours, 10,000 units of Super-chips can be made, which may be used for the production of 10,000 process control units.

Ans 30

(i) Statement of the overall profit of the company

(By harvesting 2,000 kgs of oil seeds, processing it into edible oil & selling the same in 2 kg cans)

	Harvesting Division	*Oil Mill Division*	*Marketing Division*	*Total Rs.*
Output of each department	2,000 kgs of oil seed	1,000 kgs. of oil produced	500 cans of 2 kg each	
Total costs				
Variable cost (Rs.) : (A)	5,000	10,000	1,875	16,875
	(2,000 kgs × Rs.2.50)	(1,000 kgs × Rs.10)	(500 × Rs.3.75)	
Fixed cost (Rs.): (B)	10,000	7,500	4,375	21,875
	(2,000 kgs × Rs.5)	(1,000 kgs × Rs.7.50)	(500 × Rs.8.75)	
Total cost (Rs.): (C) = [(A)+(B)]	15,000	17,500	6,250	38,750
Sales revenue (Rs.): (D)				75,000
(500 cans × Rs.150)				
Profit (Rs.) [(D) – (C)]				36,250

(ii) Working note:

(a) Total Contribution = (Sales revenue – total variable cost)

= Rs.75,000 – Rs.16,875 = Rs.58,125

(b) Amount of shared contribution in relation to variable costs:

Harvesting Division = $Rs.58,125 \times \frac{Rs.5,000}{Rs.16,875} = Rs.17,222$

Oil Mill Division = $Rs.58,125 \times \frac{Rs.10,000}{Rs.16,875} = Rs.34,445$

Marketing Division = $Rs.58,125 \times \frac{Rs.1,875}{Rs.16,875} = Rs.6,458$

Computation of Transfer Price (for internal transfers) under the following pricing methods:

(1) Shared contribution in relation to variable costs:

Transfer price from harvesting Division to Oil Mill Division

= Variable cost of Harvesting Division + Shared contribution of Harvesting Division in relation to variable costs

= Rs.5,000 + Rs.17,222 (Refer to working note 2) = Rs.22,222

Transfer price from Oil Mill Division to Marketing Division

= Transfer price from Harvesting Division to Oil Mill Division + Variable cost of Oil Mill Division + Shared contribution of Oil Mill Division in relation to variable costs (Refer to working note 2)

= Rs.22,222 + Rs.10,000 + 34,445

= Rs.66,667

(2) Market price:

Transfer price from Harvesting Division to Oil Mill Division

= Market price of 2,000 kgs of Oil seeds transferred to Oil Mill Division

= 2,000 kgs. × Rs.12.50 = Rs.25,000

Transfer price from Oil Mill Division to Marketing Division

= Market price of 1,000 kgs of edible oil

= 1,000 of kgs × Rs.62.50 – Rs.62,500

(iii) Statement of profitability (under different transfer prices method)

	From Harvesting Division to Oil Mill Division	*From Oil Mil to Marketing Division*	*From Marketing Division to market (500 cans of 2 Kgs.)*
	Rs.	*Rs.*	*Rs.*
Shared contribution method			
Transfer price:	22,222	66,667	75,000
(Refer to (1) above)			
Less: Transfer price	__	22,222	66,667
(Refer to (ii) above)			
Less: Variable cost	5,000	10,000	1,875
Less: Fixed cost	10,000	7,500	4,375
(Refer to (i) above)			
Profit	7.222	26,945	2,083
Market price method			
Transfer price	25,000	62,500	75,000
(Refer to (2) above)			
Less: Transfer in price	__	25,000	62,500
(Refer to (ii) above)			
Less: Variable cost	5,000	10,000	1,875
(Refer to (ii) above)			
Less: Fixed cost	10,000	7,500	4,375
(Refer to (i) above)			
Profit	10,000	20,000	6,250

Decision: Divisional Manager of Harvesting Division would prefer the use of market price method for transferring 2,000 kgs of oil seeds to Oil Mill Division because its usage increases the profit by Rs.2,778 (Rs.7,222) over the shared contribution method.

Whereas Oil Mill Division manager would prefer the use of shared contribution method over the market price method because its use would increase its profit by Rs.6,945 (Rs.26,945 – Rs.20,000). Similarly Marketing Divisional Manager would be benefited to the extent of Rs.4,167 (Rs.6,250 – Rs.2,083) by using market price method.

Ans 31

(i) Statement of profitability of Division X

No. of components	*Transfer price for the component to Department Y@ Rs.90 per unit*	*Total cost of components (Rs.)*	*Profit / (Loss) (Rs.)*
(a)	*(b)*	*(c)*	*(d) = {(b) – (c)}*
5,000	4,50,000	5,62,500	(1,12,500)
10,000	9,000	9,00,000	—
15,000	13,50,000	12,37,500	1,12,500
20,000	18,00,000	15,75,000	1,25,000
25,000	22,50,000	19,12,500	3,37,500
30,000	27,00,000	22,50,000	4,50,000

Statement of profitability of Division Y

No. of Components	*Sale revenue on average price basis*	*Component cost (Transfer price) to Dept. Y*	*Manufacturing cost in division Y*	*Total cost*	*Profit/(Loss)*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*
(a)	*(b)*	*(c)*	*(d)*	*(e)={(c)+(d)}*	*(f)={(b)-(e)}*
5,000	19,68,750	4,50,000	14,06,250	18,56,250	1,12,500
10,000	29,85,000	9,00,000	16,87,500	25,87,500	3,97,500
15,000	37,12,500	13,50,000	19,68,750	33,18,750	3,93,750
20,000	41,70,000	18,00,000	22,50,000	40,50,000	1,20,000
25,000	45,00,000	22,50,000	25,31,250	47,81,250	(2,81,250)
30,000	45,00,000	27,00,000	28,12,500	55,12,500	(9,90,000)

(ii) Profitability of the company as a whole

(a) At 30,000 units level, at which Division X's net profit is maximum	*Rs.*
Profit of Division X	4,50,000
Profit of division Y	(9,00,000)
Operating profitability / (Loss) of the company	(5,40,000)
(b) At 10,000 units level, at which Division Y's net profit is maximum	*Rs.*
Profit of division X	NIL
Profit of division Y	3,97,500
Operating profitability of the company	3,97,500

(iii) Profitability of the company, if it is not organised on profit centre basis

No. of components	*Sales revenue on average basis*	*Cost of component to division X*	*Manufacturing cost in division Y*	*Total cost*	*Profit/ (Loss)*
	(Rs.)	*(Rs.)*	*(Rs.)*	*(Rs.)*	*(Rs.)*
(a)	*(b)*	*(c)*	*(d)*	*(e)={(c) + (d)}*	*(f)={(b)–(e)}*
5,000	19,68,750	5,62,500	14,06,250	19,68,750	-
10,000	29,85,000	9,00,000	16,87,500	25,87,500	3,97,500
15,000	37,12,500	12,37,500	19,68,750	32,06,250	5,06,250
20,000	4170,000	15,75,000	22,50,000	38,25,000	3,45,000
25,000	45,00,000	19,12,500	25,31,250	44,43,750	56,250
30,000	45,22,500	22,50,000	28,12,500	50,62,500	(5,40,000)

The level of output, the company will earn maximum profit, if the company is not organized on profit centre basis is 15,000 components.

Ans.32. Statement showing contribution P.U. of ranking
(Rs.)

Particulars	Product			
	A	B	C	D
Market Price P.U.	150	146	140	130
Less: Variable Production Cost P.U	130	100	90	85
Contribution P.U.	20	46	50	45
Labour hours P.U.	3	4	2	3
Contribution per labour hour (i)/(ii)	6.67	11.5	25	15
Ranking	IV	III	I	II

(i) Allocation of 20,000 labour hours

C	(2,300 units x 2 L.H.)	4,600
D	(1,600 units x 3 L.H.)	4,800
B	(2,500 units x 4 L.H.)	10,000
A (Balance)	(200 units x 3 L.H.0	600
		20,000

Product D can be transferred to Division Y, but the maximum Quantity that might be required for transfer is 2,500 units of D.
Time required for 2,500 units of D =2,500 units x 3 L.H =7,500 L.H
2,500 units of Product D for Division Y can be met by sacrificing as follows:

(Labour hours)

Product A	(200 units x 3 L.H.)	600
Product B (Balance)	(1,725 units x 4 L.H.)	6,900
		7,500

Transfer price to be charged by Division Z to Division y on supply of 2,500 units of product D.

(Rs.)

Variable cost	(2,500 units x Rs.85)	2,12,500
Add: opportunity cost of contribution foregone		
Product A	(200 units x Rs.20)	4,000
Product B	(1,725 units x Rs.46)	79,350
Transfer Price		2,95,850
Transfer Price P.U.	(Rs.2,95,850 / 2,500 units)	118.34

(ii) Allocation of 30,000 Labour Hours

C	(2,300 units x 2 L.H.)	4,600
D	(1,600 units x 3 L.H.)	4,800
B	(2,500 units x 4 L.H.)	10,000
A	(2,800 units x 3 L.H.)	8,400
Idle Labour (Balance)		2,200
Total		30,000

2,500 units of Product D for Division Y can be met by sacrificing as follows:

Idle labour hour		2,200
Product A	(1,725 units x 3 L.H.)	5,300
Total		7,500

Calculation of transfer price

(Rs.)

Variable cost	(2,500 units x Rs.85)	2,12,500
Opportunity cost of Contribution foregone of Product A (1,767 units x Rs.20)		35,340
		2,47,840
Transfer price P.U.	(Rs.2,47,840 / 2,500 units)	99.14

Ans. 33

Working Notes:

(i) *Hours required to meet maximum demand:*

External sales	*Hours reqd. unit*	*Total Hrs. per*
(i)	*(ii)*	*(iii) = (i) × (ii)*
X 800 units	3	2,400
Y 500 units	4	2,000
Z 300 units	2	600
	Total	5,000

(ii) *Contribution per unit:*

Product	X	Y	Z
	Rs.	*Rs.*	*Rs.*

Selling price	48	46	40
Less : Variable cost	33	24	28
Contribution per unit : (A)	15	22	12
Labour hours required per unit : (B)	3	4	2
Contribution per hour (Rs) : (A) / (B)	5	5.5	6
Ranking	III	II	I

(a) **If only 3,800 hours are available in Division A.**

300 units of Z (maximum), which will take*	600 hrs.
500 units of Y (maximum), which will take	2,000 hrs.
400 units of X to use remaining hrs.	1,200 hrs.
	3,800 hrs.

***Note:** Labour hours required per unit are given in the question. If 300 units of Y are to be transferred to 'B' division, then 1,200 hours will have to be used for production of Y instead of X. It means Division A will sacrifice production of 400 units of X, which are yielding Rs. 5 per hr. Given above is the optimum mix for Division A for 3,800 hrs. If 300 units of Y are to be transferred to 'B' division with time constraint of 3,800 hours, then additional 300 units of Y will have to be produced sacrificing the production of 400 units of X which is yielding contribution.

Transfer price	Rs.
(i) Variable cost of Y	24.00
Opportunity cost	
(ii) Contribution relating to 'X' forgone for producing additional units of Y (4 hrs × Rs. 5*)	20.00
	44.00

*Y takes 4 hours and in each hour production of X would have generated contribution of Rs. 5.

(b) **If 5,600 hours are available**

Maximum time required to meet external sales *(Refer to Working note 1)*	5,000 hrs.
Hours now available	5,600 hrs.

(i) It means 600 hrs can be easily used for the production of Y and transfer price will be variable cost only

i.e. (600 hrs. 4 hrs) × Rs. 24 Rs. 3,600

Note: Y takes 4 hours per unit

(ii) For producing additional 150 units, production of X will be disturbed.

Variable costs

(i) 150 units of X @ Rs. 24 Rs. 3,600

Opportunity cost

(ii) Contribution of 'X' units

forgone (600 hrs. × Rs. 5)	Rs. 3,000*	6,600
Total price for 300 units		10,200

Average transfer price should be Rs. 34 per unit

*Contribution per hr. of X forgone.

Ans.34. (1) Maximum hours required to meet the present outside market requirement

	Maximum sales units	Hours required per unit	Total hours
Vx	900	3	2,700
X1	300	2	600
Xt	600	4	2,400
Maximum total hours required to meet the outside market requirement 5,700			

(2) Contribution per unit, per hour and ranking (Rs.)

Product	V	X	X
Selling price per units	24	23	20
Less: Variable cost per unit	17	12	14
Contribution per unit	7	11	6
Labour hours required per unit	3	2	4
Contribution per hour	2.33	5.5	1.5
Ranking	II	I	III

(3) Utilisation of 4,800 available hours according to ranking

(hours)

300 units of products X1	(300 units x 2 hours)	600
900 units of products Vx	(300 units x 3 hours)	2,700
375 units of products Xt	(300 units x 4 hours)	1,500
Total hours		4,800

(a) computation of transfer price for each unit of Vx if total labour hours available in Department x are 4,800

According to the ranking 4,800 available hours are utilized to produce 300 units of X 900 units of Vx and 375 units of X. The aforesaid product mix would give rise to optimum mix for optimum profit.

In case 400 units of Vx are to be supplied to Department y in addition to existing outside sale then the production of product X is to be curtailed partially and the hours thus obtained will be utilized for the production of 400 additional units of Vx. The new product mix will be as follows:

(Hours)

300 units of products X1	(300 units x 2 hours)	600

1,300 units of products Vx	(1,300 units x 3 hours)	3,900
75 units of products Xt	(75 units x 4 hours)	300
Total hours		4,800

Computation of transfer price per unit

(Rs.)

Variable cost of one unit of Vx	17.00
Contribution foregone (opportunity cost) per unit due to the curtailment of Xt(3 hours x Rs.1.5)	4.50
Transfer price per unit	21.50

(b) Computation of transfer price for each unit of Vx, if total labour hours available in Department x are 6,200

Hours required to meet the present outside market requirement

5,700

Remaining hours available for producing 400 additional units of Vx

500

After meeting the present outside market requirement (6,200 hours -5,700 hours)

Computation of transfer price per unit:

(Rs.)

Total variable cost on the production of 166.67 units of Vx (500 hours / 3 hours) @ Rs.17 per unit by utilizing 500 remaining available hours	2,833
Total variable cost of 233.33.units of Vx @ Rs.17 per unit (400 units – 166.67 units) produced by curtailing the production of Xt product to the tune of 700 hours.	3,967
Contribution foregone (opportunity cost) on the diversion of 700 hours of Production of Xt for producing 233.33 units of Vx (700 hours x Rs.1.50)	1,050
Total cost for producing 400 additional units of Vx	7,850
Transfer price for one unit of Vx (Rs.7,850 / 400 units)	19,625

<u>Ans. 35</u> (i) Statement of contribution

(a) When component is purchased by Division B from outside

(Rs.)

Division A				Nil
Division B Sales	(2000x 400)		8,00,000	
Less: Cost of Purchase	(2000x 200)	400000		
Variable costs	(200x 150)	300000	3,80,000	1,00,000
Company's total contribution				1,00,000

(b) When component is purchased from Division A by Division B

(Rs.)

Division A			
Sales	(2000x 220)	4,40,000	
Less: Variable costs	(2000x 190)	7,00,000	60,000
Division B			
Sales	(2000x 400)	8,00,000	
Less: Variable Costs:			

Purchase cost in Division A	(2000x 220)	440000		
Variable cost in Division B	(2000x 150)	300000	7,40,000	60,000
Company's total contribution				1,20,000

Thus, it will be beneficial for the company as a whole to ask Division B to buy the component from Division A.

(ii) Statement of total contribution if Division A could be put to alternative use:

Division A:				
Contribution from alternative use of facilities				30,000
Division B:				
Sales	(2000x 400)		8,00,000	
Less: Variable costs:				
Cost of purchase	(2000x 400)	400000		
Division B	(2000x 150)	300000	7,00,000	1,00,000
Company's total contribution				1,30,000

Since, the company's contribution when component is purchased from outside, shows as increase of Rs.30,000 as compared to when there is inter departmental transfer. Hence, it will be beneficial to purchase the component from outside.

(iii) Statement of total contribution when component is available from outside at Rs.185.

Division A:				Nil
Division B:				
Sales	(2000x 400)		8,00,000	
Less: Variable costs:				
Cost of purchase	(2000x 185)	370000		
Division B	(2000x 150)	300000	6,70,000	1,30,000
Company's total contribution				1,30,000

If the component is purchased by Division B from Division A, the contribution is only Rs.1,20,000 as calculated under

(2) above. Hence it will be beneficial to buy the component from outside.

(v) Fixations of transfer price

(a) When there are no alternative uses of production facilities of Dept. A:
In such a case the variable cost i.e. Rs.190 per component will be charged.

(b) If facilities of Division A can be put to alternative uses:

(Rs.)

Variable cost	190
Opportunity cost	15
Transfer price	205

(c) If market price gets reduced to Rs.185 and there is no alternative use of facilities of Division A. the variable cost of Rs.190 per component should be charged.

Ans. 36

(a) Div A B B

	Rs. / unit	*Rs. / unit*	*Rs. / unit*
Direct Material (Other than A)	50	24	
Direct Labour	25	14	
Variable Overhead (Production)	20	2	
Variable Production Cost (excl. A)	95	40	40
From A		144	
From Outside		____	160
Variable production Cost / unit		184	200
Selling Price			
From outside	160	300	
Less: Selling Overhead	13	26	
Net Selling Price (outside)	147	274	
Net Selling Price to B	144		
Net Selling Price to S		250	
Net Selling Price (outside)	147	274	274
Variable Production Cost	– 95	– 184	–200
Contribution / unit (outside)	52	90	74
(Sale to B & S respectively)	144	250	250
Variable Production Cost	–95	–184	–200
Contribution / unit	49	66	50

Best strategy

A = Maximise Production; Sell maximum no. of units @ 52 / unit (outside) 18,000 × 52 = 9,36,000

(To B) remaining units 2,000 × 49 = 98,000

Total Contribution for A 10,34,000

Best strategy for B:

Maximise contribution / unit by selling outside and procuring from A 90 / unit

Contribution × 2,000 units

Balance units can yield contribution of either 74/ unit for outside or Rs. 50 / unit to S Ltd.

Production Capacity = 28,000.

Option I			*Option II*
Outside Sales	Sales to S		Outside Sales × contribution / unit
20,000 × 74 = 14,80,000	6,000 × 50	= 3,00,000	24,000 × 74 = 17,76,000
2,000 × 90 = 1,80,000			2,000 × 90 = 1,80,000
16,60,000		3,00,000	
Total Contribution	(16,60,000 + 3,00,000)	19,60,000	19,56,000

(B) Choose Option I i.e. get 2,000 units from A, sell 6,000 units to S and 20,000 to outside. Make 28,000 units @ full capacity. Total Contribution Rs19,60,000.

If A and B are allowed to act independent of the group synergy,

		Rs.
Total contribution	A –	10,34,000
	B –	19,60,000
Total contribution for X Ltd.		29,94,000

Cost from X Ltd.'s Perspective

	Div A	Div B
Variable Cost of production	Rs. 95	
Variable cost of production other than A	40	40
A supplied by Division	95	
A – Variable Cost		
A purchased	___	160
	135	200

Option I	Outside 26,000 units	Option II	
Outside 20,000 × (274 – 135)	27,80,000	20,000 (274 – 135)	27,80,000
2,000 × (274 – 200)	1,48,000	6,000 (274 – 200)	4,44,000
22,000			
S Ltd. 6,000 units (250 – 200)	3,00,000		_____
	32,28,000		32,24,000

Choose Option I

Contribution = Rs. 32,28,000 for X Ltd. as a whole

Transfer (2,000 units)

Make A transfer all output to B. Sell 6,000 units of B to S and 22,000 units to outside market. This will make X Ltd. better off by 32,28,000 – 29,94,000 = Rs 2,34,000

(i.e. 18,000 units of A sold to outside increases contribution to A by 3 Rs. / unit and decreases contribution to B by 16 Rs. / unit Net negative effect = 13 × 18,000 = Rs.2,34,000).

Ans. 37

Fastners Limited

(a) Present profitability of individual shops and overall profitability

Particulars	*Welding shop*			*Painting shop*	
	Qty. Unit	*Rate Rs.*	*Value Rs.*	*Qty Unit*	
Sale in open market	2,400	12.00	28,800	9,600	
Transfer to painting shop	9,600	12.00	1,15,200		
Total sales : (A)	12,000		1,44,000	9,600	
Less: Variable cost : (B) *(12,000 units × 9.50)*	1,14,000	*(9600 units × Rs.20)*		1,92,000	
Contribution : {(A) – (B)}	30,000			48,000	
Less: Fixed cost	25,000			30,000	
Profit	5,000			18,000	

Overall profit for the company (Rs. 5,000 + Rs. 18,000) = Rs. 23,000

(b) (i) When painting shop purchases all its requirement from open market at a price of Rs. 10 per unit

	Welding shop			*Painting shop*		
	Qty. Unit	Rate *Rs.*	*Value Rs.*	*Qty Unit*	*Rate Rs.*	*Value Rs.*
Sale	2,400	12.00	28,800	9,600	25.00	2,40,000
Less: Variable cost	2,400	9.50	22,800	9,600	18.00*	1,72,800
Contribution			6,000			67,200
Less: Fixed cost			25,000			30,000
Profit/(Loss)			(19,000)			37,200

Overall profit for the company Rs. 37,200 – Rs. 19,000 = Rs. 18,200

*It is given in the question that cost of painting including transfer price from welding shop is Rs. 20 per unit. The transfer price from welding shop is Rs. 12 per unit. Therefore, the variable cost of Rs. 8 (Rs. 20 – Rs. 12) is incurred by painting shop exclusively. The painting shop will be purchasing its requirement from open market at Rs. 10 per unit. Therefore, the variable cost per unit in painting shop will be Rs. 18 (Rs. 10 + Rs. 8). This point should be noted carefully.

(b) (ii) When all the requirements of painting shop is met by transfer from welding shop at a transfer price of Rs. 10 per unit

	Welding shop			*Painting shop*		
	Qty. Unit	Rate *Rs.*	*Value Rs.*	*Qty Unit*	*Rate Rs.*	*Value Rs.*
Sale in the open market	2,400	12.00	28,800	9,600	25.00	2,40,000
Transfer to painting shop	9,600	10.00	96,000			
Total sales	12,000		1,24,800			
Less: Variable cost	*(12,000 units×Rs.9.50)*		1,14,000	*(9,600 units×Rs.18)*		1,72,800
Contribution			10,800			67,200
Less: Fixed cost			25,000			30,000
Profit/(Loss)			(14,200)			37,200

Overall profit of the company = Rs. 37,200 – Rs. 14,200 = Rs. 23,000

For the purpose of comparison, the results of the three alternatives are summarised below:

	Welding shop	*Painting shop*
	Rs.	*Rs.*
Profit under (i)	5,000	18,000
Profit/(Loss) under (b)(i)	(19,000)	37,200
Profit/(Loss) under (b)(ii)	(14,200)	37,200

		Rs.
The overall profit under	(a)	23,000

b(i)	18,200
b(ii)	23,000

Alternative (b)(ii) should be accepted due to the following reasons:

(a) It gives a maximum overall profit of Rs. 23,000. The discussion is confined to either b(i) or b(ii).

(b) Each shop is treated as a separate cost centre and not a profit centre.

(c) The policy of overall goal congruence of the company is followed.

Ans. 38

Neither selling price nor total sales is given. Division A of Better Margins Ltd. expects a return of 25% on average assets employed i.e., Rs. 12,00,000.

Total sales will be:	Rs.
(a) Profit (25% of 12,00,000)	
(b) Fixed overhead	
(c) Variable cost (2,00,000 × Re. 1)	
Total sales	9,00,000
Sales per unit (Rs. 9,00,000 ÷ 2,00,000 units)	Rs. 4.50

	Transfer to Division B and sale to outside parties	*Sale to outside parties only*
Sales (units)	2,00,000	1,40,000
	Rs.	Rs.
Sales value *(1,40,000 units @ Rs. 4.50)*	6,30,000	6,30,000
(60,000 units @ Rs. 2.25)	1,35,000	Nil
	7,65,000	6,30,000
Less: Variable cost *(Re. 1 per unit)*	2,00,000	1,40,000
Contribution	5,65,000	4,90,000
Less: Fixed overhead	4,00,000	3,60,000*
Net profit	1,65,000	1,30,000
Average assets employed	12,00,000	10,00,000
Return on investment	13.75%	13.00%

If the component is transferred to Division B as well as sold to outside parties, it is more profitable as the contribution, net profit and return on investment is more than the existing proposal. Therefore selling the components to Division B at Rs. 2.25 per unit is in the overall interest of the company.

*Reduction in selling and administration expenses (fixed in nature) by Rs. 40,000.

Ans. 39

Statement showing the contribution to profit for each assuming that all estimates and budgets materialised as expected

Sales Centre (S)	Rs.	Rs.	Rs.
New Board Sold			
– Selling price			35,000
– Purchase price			29,000
Gross margin			6,000
Less: Second hand boat			
Part-exchange of old boat		16,000	
Broker's Price	15,000		
Less: Repairs	1,200	(13,800)	2,200
Contribution			3,800
Brokerage Centre (B)			
Second-hand boat sold			19,000
Less: Paid to Centre S		13,800	
Paid to Centre R		1,200	15,000
Contribution			4,000
Repair Centre (R)			
Sales to Centre B			1,200
Less: Materials		300	
Direct labour variable cost		360	660
Contribution			540

(ii) Assuming Additional Costs It is noticed that all estimates and budgets are materialised except that repairs undertaken by R took an extra 10 hours and Rs. 100 of materials due to a problem not noticed by B or R.

R is responsible for giving correct repair costs and, therefore, he has to bear the additional cost:

	Rs.	Rs.
Repair Centre (R)'s contribution		540
Less: Extra cost of materials	100	
Extra D.L. variable cost (10 hrs × Rs. 6)	60	160
Revised contribution		380

However, full details are not given in the question. 'B' is a middleman passing on R's costs to S and as such should not bear additional costs. Had the item been noticed originally then S would have paid the cost and perhaps it should be passed back. This would be particularly so if R had insufficient opportunity for a complete inspection. In that case extra cost should be:

	Rs.
Material	100
Labour (10 hrs. × Rs. 15)	150
	250

Reduced contribution of S = Rs. 3,800 – Rs. 250 = Rs. 3,550

	Rs.	Original
contribution of R	540	
Add.: Saving in variable cost		
[10 hrs × (Rs. 15 – Rs. 6)]	90	
Increased contribution of R	630	

Note: Other solutions are equally acceptable if well argued and logically justified.

Ans.: 40

(a) (i) Contribution per unit against sale to outside = Rs (200-120-20) = Rs 60
In case of transfer, good units and rejected units are in proportion of 9:1
In case of transfer, contribution per good unit = Rs (190 – 120) = Rs 70
In case of transfer, contribution per rejected unit = Rs (150 – 120-100) = Rs -70
Thus, effective contribution per unit of transfer = Rs (70 x 0.9 – 70x 0.1) = Rs 56

As contribution per unit against outside sale is higher, the best strategy should be to sell maximum number of unit to outside marker.

Contribution from outside market from sale of 900 units = Rs 54,000 {Rs.(900 x 60)}

Contribution from transfer of 300 units to B {Rs (300 x 56)}	=	Rs 16,800
Total Contribution from best strategy	=	Rs 70,800

(ii) If B's demand is 540 units, total production required (540 /0.9) = 600 units.

Taking outside market demand of 600, it is within production capacity of 1200 units.

Now contribution from 600 units of outside sale Rs (600 x 60)	=	Rs 36,000
Contribution from rejected 60 units Rs (60 x – 70)	=	Rs (4,200)
	=	Rs 31,800

To keep same level of contribution as in (i), the contribution required from transfer of 540 unit to B (Rs 70,800 – 31,800) = Rs 39,000

Thus, contribution required per unit Rs 39,000 /540	=	Rs 72.22
Hence price to be charged p. u. against transfer to B Rs (120 + 72.22)	=	Rs 192.2

Alternative Solution:
Let x be the number of units sold outside and y be the number of units sold to B, before B returns 10% as defectives.

Then, x + y = 1,200, is the limitation on production capacity of A.

	Department A	
	Outside	**to B**
	Rs.	**Rs.**
Selling Prices	200	190
Variable Cost – Production	120	120
Variable Cost – Sale	20	--
Total Variable Cost	140	120
Contribution	60	70

Contribution on x units sold outside = 60x

Out of y units to B, 10% = $\frac{1}{10}$ y. 1 = .1y is returned to A. If A scraps, amount got = 30 per unit.

If A reworks and sells, it gets 150 – 100	=	50/unit.
∴Decision to reworks all defectives. i.e. (.1) (y)		
Contribution on good units of B = 0.9y × 70	=	63y
Contribution on reworked units of B = (.1) (y) × 50	=	5y
Amount of material lost on manufacture of defectives to B		=12y(.1)(y)×120
∴Contribution on y gross units transferred to B		= 56y

63y + 5Y – 12y
Total contribution earned by A = 60x + 56y
Where x + y = 1200

To maximize contribution, maximize units sold outside.
∴900 units – sell outside.

Balance 300÷1,200 units (gross transfer to B, of which B gives back defectives)

Contribution:	Rs.60 (900) + Rs.56 (300)
	= Rs.54,000 + Rs.16,800
Contribution	= Rs.70,800
Fixed Cost	= Rs.36,000
(i) Profit	= Rs.34,800

(ii) Outside demand = 600 units

Contribution = 600 × Rs.60	= Rs.36,000
Balance to be got	= Rs.34,800
	= Rs.70,800

Out of Rs.34,800, defectives of B will give

Rs.	3,000	60 × 50
Rs.	31,800	charge to B for 540 units

Contribution to be obtained from 540 units of B	= Rs. 31,800
Add: Production cost of 600 units @ 120/-	= Rs. 72,000
Amount changed for 540 units	= Rs.1,03,800

∴Price to be charged to B = 1,03,800÷540 = 192.22

Per good unit transferred, to maintain the same level of profit as in (a).

Ans. 41

Analysis of range of negotiation for Manager of Division X

(Figures in Rs.)

(a) Division X

	Outside sales		Sales to Y (Range)	
Selling Price	110	70	–	79
(–) Commission	15	–		–
Net Selling Price	95	70	–	79
Variable Cost	70	70	–	70
Contribution per unit	25	0		9
Units	14,000	6,000		6,000
Total contribution (Units × Contribution per unit)	3,50,000	0		54,000

Analysis of Range of negotiation for Manager of Division Y

(Figures in Rs.)

Division Y

	Outside Sales			Sale to Z		
	From A	From outside		From A	From outside	
Price range	70	79	85	70	79	85
Add: Transport	6	6	–	6	6	–
	76	85	85	76	85	85
Add: Direct Labour	50	50	50	50	50	50
	126	135	135	126	135	135
Add: Delivery cost	10	10	10	8	8	8

	136	145	145		134	143	143
Add: Sales Commission	15	15	15		–	–	–
Total Cost	151	160	160	134	134	143	143
Selling Price	170	170	170	134	135	135	135
Contribution	19	10	10	0	+1	(–) 8	(–) 8

Manager of division X will sell 14,000 units outside at 110 Rs. per unit and earn contribution of Rs. 3.50 lakhs.

Excess capacity of 6,000 units can be offered to Y at a price between 70 (the variable manufacturing cost at X) and Rs. 95 (the maximum amount to equal outside contribution). But Y can get the material outside @ 85. So, y will not pay to X anything above (Rs.85 – 6) = Rs. 79 to match external available price.

X will be attracted to sell to Y only in the range of 71 – 79 Rs. per unit at a volume of 6,000 units.

At Rs. 70, X will be indifferent, but may offer to sell to Y to use idle capacity.

Z will not buy from Y at anything above 135. If X sells to Y at 70 per unit, Y can sell to Z at 134 and earn no contribution, only for surplus capacity and if units transferred by X to Y at Rs. 70 per unit.

	Y	Z
Provided X sells to Y at Rs. 70 per unit	Sell 4,000 units to Z at 134 (Indifferent)	Buy 4,000 units from y at 134 (attracted)
	Sell 4,000 units to Z at 135 (willingly for a contribution of Re. 1)	Indifferent, since market price is also 135

For buying from X at 71 – 79 price range, Y will be interested in selling to Z only at prices 136 – 143, which will not interest Z.

Thus Y will sell to Z only if X sells to Y at Rs. 70 per unit and Y will supply to Z maximum 4,000 units.