Illustration 8 :

प्रज्ञा स्टील्स लिमिटेड के 20,000 इकाइयों के उत्पादन के व्यय निम्न प्रकार हैं—

The expenses for production of 20,000 Units in Pragya Steels Limited are as fallows :

		₹ per Unit
(i)	Materials	55
(ii)	Labour	35
(iii)	Variable overheads	25
(iv)	Fixed overheads (₹ 1,60,000)	8
(v)	Variable Expenses (Direct).	7
(vi)	Selling Expenses (30% Fixed)	10
(vii)	Distribution Expenses (40% Fixed)	15
(viii)	Administrative Expenses (₹ 80,000)	4
(ix)	Total Cost per Unit	159

यह मानते हुए कि प्रशासनिक व्यय सभी उत्पादन स्तरों पर स्थिर हैं, 16,000 इकाइयों तथा 12,000 इकाइयों के लिए लोचशील बजट बनाइए।

Prepare a Flexible Budget for 16,000 units and 12,000 units assuming that administrative expenses are constant for all levels of production.

(U.O.R. B.Com. Pt. III, 2005, 2006, 2014, 2016 & U.O.R. B.Com. Hons. Pt-I, 2012)

Solution :

Flexible Budget of Pragya Steal Ltd.

Particulars	Level of Production	
	16,000 Units (₹)	12,000 Units (₹)
(A) Fixed Expenses :		
(i) Fixed Overheads	1,60,000	1,60,000
(ii) Administrative Expenses	80,000	80,000
Total (A)	2,40,000	2,40,000
(B) Semi-Variable Expenses :		
(i) Selling Expenses	1,72,000	1,44,000
(ii) Distribution Expenses	2,64,000	2,28,000
Total (B)	4,36,000	3,72,000
(C) Variable Expenses :		
(i) Materials	8,80,000	6,60,000
(ii) Labour	5,60,000	4,20,000
(iii) Direct Expenses	1,12,000	84,000
(iv) Variable Overheads	4,00,000	3,00,000

Total (C)	19,52,000	14,64,000
Total Cost (A + B + C)	26,28,000	20,76,000

Working Notes :

(A) Calculation of Selling Expenses :

	₹
Selling Expenses for 20,000 Units @ ₹ 10/- Per Unit	2,00,000
Less : 30% Fixed	60,000
Variable	1,40,000
(i) For 16,000 Units : Fixed	60,000
Variable $\left(\dfrac{1,40,000}{20,000} \times 16,000\right)$	1,12,000
	1,72,000
(ii) For 12,000 Units : Fixed	60,000
Variable $\left(\dfrac{1,40,000}{20,000} \times 12,000\right)$	84,000
	1,44,000

(B) Calculation of Distribution Expenses :

	₹
Distribution exps. for 20,000 Units @ ₹ 15/- Per Unit	3,00,000
Less : 40% Fixed	1,20,000
Variable	1,80,000

	₹
(i) For 16,000 Units : Fixed	1,20,000
Variable $\left(\dfrac{1,80,000}{20,000} \times 16,000\right)$	1,44,000
	2,64,000
(ii) For 12,000 Units : Fixed	1,20,000
Variable $\left(\dfrac{1,80,000}{20,000} \times 12,000\right)$	1,08,000
	2,28,000

विविध उदाहरण
(Miscellaneous Illustrations)

Illustration 5 :

चान्द ब्रादर्स के निम्नलिखित विक्रय समंकों से न्यूनतम वर्ग रीति का प्रयोग करते हुये सर्वोत्तम उपयुक्त रेखा का निर्धारण कीजिये तथा वर्ष 2016 की बिक्री की गणना कीजिये।

By using the method of least Square, determine the line of best fit from the following sales data of Chand Brothers and also determine the sales for the year 2016 :

Year	Sales in Thousands (₹)
2011	10
2012	13
2013	14
2014	15
2015	18

Solution :

Year	X	Y (Sales)	X^2	XY
2011	0	10	0	0
2012	1	13	1	13
2013	2	14	4	28
2014	3	15	9	45
2015	4	18	16	72
N = 5	$\Sigma X = 10$	$\Sigma Y = 70$	$\Sigma X^2 = 30$	$\Sigma XY = 158$

$$Y = a + bX$$

We will use the following two normal equations to findout the value of a and b—

$$\Sigma Y = Na + b\Sigma X \qquad \text{...........(1)}$$
$$\Sigma XY = a\Sigma X + b\Sigma X^2 \qquad \text{...........(2)}$$

By Substituting the values

$$70 = 5a + 10b \qquad \text{...........(1)}$$
$$158 = 10a + 30b \qquad \text{...........(2)}$$

Multiplying by 2 the equation no. 1

$$140 = 10a + 20b \qquad \text{...........(1)}$$
$$158 = 10a + 30b \qquad \text{...........(2)}$$

— By substracting

$$-18 = -10b$$

$$b = \frac{18}{10} = 1.8$$

By putting the value of b in equation no. 1

$70 = 5a + (10 \times 1.8)$

$70 = 5a + 18$

$-5a = 18 - 70$

$a = \dfrac{52}{5} = 10.4$

Hence, the line of best fit is —

$Y = 10.4 + 1.8X$

If X is 5 (year 2016) then, sales

will be; $Y = 10.4 + (1.8 \times 5)$

$Y = 10.4 + 9 = ₹ 19.4$ thousand

✓ **Illustration 11 :** निम्नलिखित विवरणों से विभिन्न श्रम विचरणों की गणना कीजिए—

From the following particulars calculate various Labour Variances :

	Standard		Actual	
	(Nos.)	Weekly Wages Per Worker (₹)	(Nos.)	Weekly Wages Per Worker (₹)
Men	75	60	70	70
Women	45	40	30	50
Boys	60	30	80	20

इस उपकार्य को 30 सप्ताह में पूरा किया जाना था परन्तु वास्तव में इसे 32 सप्ताह में पूरा किया गया।

The job was scheduled to be completed in 30 weeks but actually it was completed in 32 weeks. **(U.O.R., B.Com. Part III, 2012)**

Solution : आवश्यक समंक निम्न तालिका में दिए गए हैं :

Category of Workers	Standard			RSMW	Actual		
	Men Weeks	Rate (₹)	Cost (₹)		Men Weeks	Rate (₹)	Cost (₹)
Men	2,250	60	1,35,000	2,400	2,240	70	1,56,800
Women	1,350	40	54,000	1,440	960	50	48,000
Boys	1,800	30	54,000	1,920	2,560	20	51,200
Total	5,400		2,43,000	5,760	5,760		2,56,000

(i) LCV = SC – AC
     = ₹ 2,43,000 – ₹ 2,56,000 = ₹ 13,000 (A)

(ii) LRV = (SR – AR) AMW
for Men : (₹ 60 – ₹ 70) 2,240 = ₹ 22,400 (A)
for Women : (₹ 40 – ₹ 50) 960 = ₹ 9,600 (A)
for Boys : (₹ 30 – ₹ 20) 2,560 = ₹ 25,600 (F)
Total ₹ 6,400 (A)

(iii) LEV = (SMW – AMW) SR
for Men : (2,250 – 2,240) ₹ 60 = ₹ 600 (F)
for Women : (1,350 – 960) ₹ 40 = ₹ 15,600 (F)
for Boys : (1,800 – 2,560) ₹ 30 = ₹ 22,800 (A)
Total ₹ 6,600 (A)

(iv) LMV = (RSMW – AMW) SR
for Men : (2,400 – 2,240) ₹ 60 = ₹ 9,600 (F)
for Women : (1,440 – 960) ₹ 40 = ₹ 19,200 (F)
for Boys : (1,920 – 2,560) ₹ 30 = ₹ 19,200 (A)
Total ₹ 9,600 (F)

(v) LREV = (SMW – RSMW) SR

for Men : (2,250 – 2,400) ₹ 60 = ₹ 9,000 (A)
for Women : (1,350 – 1,440) ₹ 40 = ₹ 3,600 (A)
for Boys : (1,800 – 1,920) ₹ 30 = ₹ 3,600 (A)

Total ₹ 16,200 (A)

Verification : LCV = LRV + LEV
₹ 13,000 (A) = ₹ 6,400 (A) + ₹ 6,600 (A)
LEV = LMV + LREV
₹ 6,600 (A) = ₹ 9,600 (F) + ₹ 16,200 (A)

Working Notes :

(1) प्रमाप मानव-सप्ताह (Standard Men-Weeks or SMW) तथा वास्तविक मानव-सप्ताह (Actual Men-Weeks or AMW) की गणना निम्न प्रकार की गई है :

	SMW	AMW
	No. × Weeks	No. × Weeks
Men	75 × 30 = 2,250	70 × 32 = 2,240
Women	45 × 30 = 1,350	30 × 32 = 960
Boys	60 × 30 = 1,800	80 × 32 = 2,560

(2) संशोधित प्रमाप मानव-सप्ताह (Revised Standard Men-Weeks or RSMW) की गणना निम्न प्रकार की गई है—

$$RSMW = \frac{SMW}{TSMW} \times TAMW$$

for Men : $\frac{2,250}{5,400} \times 5,760 = 2,400$

for Women : $\frac{1,350}{5,400} \times 5,760 = 1,440$

for Boys : $\frac{1,800}{5,400} \times 5,760 = 1,920$

Illustration 15 : मोहन लिमिटेड के संचालकों ने अपने दो उत्पादों X तथा Y के सम्बन्ध में निम्नलिखित सूचनाएँ प्रस्तुत की हैं :

The directors of Mohan Ltd. have submitted the following information regarding its two products X and Y :

	Product X	Product Y
	₹	₹
Direct material per unit	400	360
Direct wages (@ ₹ 2 per hour) per unit	120	80
Selling price per unit	800	600
Variable overheads per hour	2	2
Total fixed overheads are ₹ 32,000 p.a.		

बताइए कि निम्नलिखित में से कौन सा उत्पाद-मिश्रण विक्रय हेतु अपनाया जाये—

You are asked to suggest which of the following product-mix be adopted for sales :

    (a) 100 units of X and 200 units of Y.
    (b) 150 units of X and 150 units of Y.
    (c) 200 units of X and 100 units of Y.

Solution :   **Statement of Marginal Cost and Contribution**

Particulars	Product X	Product Y
	₹	₹
Selling Price per unit (S)	800	600
Material cost per unit	400	360
Wages per unit	120	80
Variable Overheads per unit	120	80
Marginal cost per unit (V)	640	520
Contribution per unit (S–V)	160	80

Calculation of Contribution and Profit for Different Sales Mixes :

    (a) When 100 units of X and 200 units of Y are sold :

		₹
Contribution :	X 100 × ₹ 160	16,000
	Y 200 × ₹ 80	16,000
	Total Contribution	32,000
Less : Fixed Overheads		32,000
	Profit	Nil

(b) When 150 units of X and 150 units of Y are sold :

		₹
Contribution :	X 150 × ₹ 160	24,000
	Y 150 × ₹ 80	12,000
	Total Contribution	36,000
Less : Fixed Overheads		32,000
	Profit	4,000

(c) When 200 units of X and 100 units of Y are sold :

		₹
Contribution :	X 200 × ₹ 160	32,000
	Y 100 × ₹ 80	8,000
	Total Contribution	40,000
Less : Fixed Overheads		32,000
	Profit	8,000

टिप्पणी : उपर्युक्त विश्लेषणात्मक विवरण से स्पष्ट है कि जब उत्पाद X की 200 इकाइयाँ तथा Y की 100 इकाइयाँ बिक्री की जायेंगी तो कम्पनी को 8,000 ₹ का लाभ होगा जो तीनों स्थितियों में अधिकतम है। अतः 'C' मिश्रण सर्वश्रेष्ठ होगा अर्थात् X उत्पाद की 200 इकाइयाँ तथा Y उत्पाद की 100 इकाइयाँ उत्पादित करना सबसे अधिक लाभप्रद स्थिति है।

Illustration 18 : मशीन अ तथा ब के निम्नलिखित समंकों से औसत प्रत्याय दर की गणना कीजिए एवं बताइये कौनसी मशीन लाभप्रद है ।

Calculate Average Rate of Return from the following data of machine A and B and suggest which machine is profitable.

		Machine A ₹	Machine B ₹
(i)	Original Cost	1,00,000	1,00,000
(ii)	Additional Net Working Capital Required	10,000	15,000
(iii)	Estimated Life in Years	5	5
(iv)	Estimated Scrap Value	5,000	5,000
(v)	Income Tax Rate	50%	50%

Annual Earnings before depreciation and Tax :

Year	Machine A ₹	Machine B ₹
1	5,000	1,10,000
2	12,000	90,000
3	28,000	28,000
4	80,000	12,000
5	1,00,000	5,000
	2,25,000	2,45,000

ह्रास सीधी रेखा पद्धति के आधार पर लगाया जाता है ।

Depreciation is charged on the basis of Straight line method.

Solution :

Calculation of Average Investment :

Average Investment

$$= \frac{\text{Initial Investment} + \text{Scrap Value}}{2} + \text{Addl. Net Working Capital}$$

For Machine A $= ₹ \left(\frac{1,00,000 + 5,000}{2} \right) + ₹ 10,000$

$= ₹ 52,500 + ₹ 10,000 = ₹ 62,500$

For Machine B $= ₹ \left(\frac{1,00,000 + 5,000}{2} \right) + ₹ 15,000$

$= ₹ 52,500 + ₹ 15,000 = ₹ 67,500$

Computation of Average Rate of Return
Machine A

Year (1)	Earnings before Dep. & Tax (2)	Dep. (3)	Earnings before Tax (4) = (2)–(3)	Tax @ 50% (5)	Earnings after Dep. & Tax (6) = (4)–(5)
	₹	₹	₹	₹	₹
1	5,000	19,000	(–) 14,000	–	(–) 14,000
2	12,000	19,000	(–) 7,000	–	(–) 7,000
3	28,000	19,000	9,000	4,500	4,500
4	80,000	19,000	61,000	30,500	30,500
5	1,00,000	19,000	81,000	40,500	40,500
Total Earnings after Dep. and Tax.					54,500

Average Earnings after Dep. and Tax $= ₹ \left(\dfrac{54,500}{5}\right) = ₹\ 10,900$

Average Rate of Return $= \dfrac{\text{Average Earnings after Dep. \& Tax}}{\text{Average Investment}} \times 100$

$$= ₹ \left(\dfrac{10,900}{62,500}\right) \times 100 = 17.44\%$$

Machine B

Year (1)	Earnings before Dep. & Tax (2)	Dep. (3)	Earnings before Tax (4) = (2)–(3)	Tax @ 50% (5)	Earnings after Dep. & Tax (6) = (4)–(5)
	₹	₹	₹	₹	₹
1	1,10,000	19,000	91,000	45,500	45,500
2	90,000	19,000	71,000	35,500	35,500
3	28,000	19,000	9,000	4,500	4,500
4	12,000	19,000	(–) 7,000	–	(–) 7,000
5	5,000	19,000	(–) 14,000	–	(–) 14,000
Total Earnings after Dep. and Tax.					64,500

Average Earnings after Dep. and Tax $= ₹ \left(\dfrac{64,500}{5}\right) = 12,900$

Average Rate of Return $= \dfrac{\text{Average Earnings after Dep. \& Tax}}{\text{Average Investment}} \times 100$

$$= ₹ \left(\dfrac{12,900}{67,500}\right) \times 100 = 19.11\%$$

निर्णय : मशीन B का औसत प्रत्याय दर अधिक होने के कारण यह अधिक लाभप्रद है ।