



Management Accounting

(Solutions)

B.Com. and B.B.A.

By
Editorial Board

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MANAGEMENT ACCOUNTING

(Solutions)

1

Responsibility Accounting (including Transfer Pricing)

Ques. 1 Sunshine Ltd. is a fast expanding firm. It presently has two projects for evaluation for being taken by Division A and Division B. The following information is available for these projects as well as for these divisions.

Particulars	Division A	Division B
Current Rate of Return on Investment	22%	36%
Investment outlay of a new project	₹2,00,000	₹2,00,000
Expected Return on new Investments	22%	32%

Evaluate these projects from the point of view of these divisions on the basis of:

- (i) Residual Income Approach (target ROI being 26%), and
- (ii) ROI criterion.

Sol. (i) **Residual Income Approach:**

Determination of Residual Income

Particulars	Amount (in ₹)	
	Division A	Division B
Investment	2,00,000	2,00,000
Net Income on New Investment @ 22% (Div. A) and 32% (Div. B)	44,000	64,000
Less: Expected Return (COC 26%)	52,000	52,000
Thus, Residual Income	(12,000)	12,000

As per Residual Income Approach, **Division B may accept** the Project because its Residual Income is ₹12,000 where as **Division A should reject** the project because it will give a loss of ₹12,000.

(ii) **ROI Technique:**

ROI on New Investment = Net Return/ Net Investment × 100

Division A = ₹ 44,000/ ₹ 2,00,000 × 100 = **22%**

Division B = ₹ 64,000/ ₹ 2,00,000 × 100 = **32%**

As per ROI criterion, **Division A may accept** the project since its current ROI of 22% is equal to new ROI on new investment. **Division B should reject** the new investment as its new ROI is 32% which is less than the current ROI of 36%.

Ques. 2. The departments M and N of Singh Ltd. are offered a new investment Project.

Particulars	Deptt. M	Deptt. N
Investment Outlay	₹ 10,00,000	₹ 10,00,000
Net Return on the New Investment	₹ 1,60,000	₹ 1,10,000
Current Return on Investment	18%	11%

Should the project be accepted or rejected as per:

- (i) ROI criterion, and
(ii) Residual Income Approach (given that the target rate of return is 13% for both the departments).

Sol. (i) **ROI Technique:**

ROI on New Investment = Net Return / Net Investment × 100

Deptt. M = ₹ 1,60,000 / ₹ 10,00,000 × 100 = **16%**

Deptt. N = ₹ 1,10,000 / ₹ 10,00,000 × 100 = **11%**

Deptt. M should **reject the new investment** as its ROI is 16% which is less than the current ROI of 18%.

Deptt. N may **accept the investment** as its current ROI of 11% is equal to new ROI on new investment.

(ii) **Residual Income Approach:**

Determination of Residual Income

Particulars	Amount (in ₹)	
	Deptt. M	Deptt. N
Investment	10,00,000	10,00,000
Net Return on New Investment	1,60,000	1,10,000
Less: Expected Return (COC 13%)	1,30,000	1,30,000
Thus, Residual Income	30,000	(20,000)

As per Residual Income Approach, **Deptt. M may accept** the Project because its Residual Income is ₹ 30,000 where as **Deptt. N should reject** the project because it will give a loss of ₹ 20,000.

Ques. 3. Sony Company has 20 cars in operation. The budget for the transport department based on 40,000 km of run for a month is ₹ 1,45,000 out of which a sum of ₹ 45,000 is fixed.

During the last month, the total kilometers run by all the 20 cars were 48,000 and the costs incurred were ₹ 1,68,300. The cost of hiring a car would have been ₹ 4 per km.

Evaluate the performance of the transport department on the basis of:

- (a) Cost Centre, (b) Profit Centre.

Sol.

Calculation of Variable Cost per Km.

Particulars	Amount (in ₹)
Total Budgeted Expenditure	1,45,000
Less: Fixed Cost	(45,000)
Variable Cost	1,00,000
Thus, Variable Cost per Km. = (₹ 1,00,000 / 40,000 Km.)	2.50 per Km.

(a) Evaluation of Performance on the basis of Cost Centre:

Particulars	Amount (in ₹)
Allowed Cost: Variable (48,000 Km. × ₹ 2.50)	1,20,000
Fixed	45,000
Total Allowed Cost	1,65,000
Actual Cost	1,68,300
Thus, Budget Variance	3,300(A)

(b) Evaluation of Performance on the basis of Profit Centre:

Particulars	Amount (in ₹)
Hiring Charges (48,000 Km. × ₹ 4.00)	1,92,000
Actual Expenditure	1,68,300
Thus, Profit Variance	23,700(F)

Ques. 4. Home Comforts Ltd. deals in three products – Ace, Nice and Grace and these are sold directly through salesmen in three zones, Prime, Extension and Outreach. The responsibility for sales promotion rests with headquarter and so does the overall control of distribution and sales. The percentage of cost of sales for three products are:

Ace	:	85% of Sales
Nice	:	80% of Sales
Grace	:	75% of Sales

Details of Sales and Selling Expenses for the year are as follows:

Particulars	Amount (in ₹)	
	Sales	Selling Expenses
Prime Zone:	Ace	9,00,000
	Nice	84,465
	Grace	47,160
		22,50,000
Extension Zone:	Ace	6,75,000
	Nice	47,700
	Grace	23,940
		13,50,000
Outreach Zone:	Ace	18,900
	Nice	15,165
	Grace	66,375
		9,00,000
		1,00,440

Selling Expenses at Headquarters are as follows:

Office expenses	₹ 94,500
Advertisement expenses	₹ 1,35,000
Other expenses	₹ 1,21,500

Advertisement costs are allocated to zones and products on the basis of sales.

Office expenses and other expenses are apportioned equally to zones or the products while computing the profit or loss for the zones or the products as the case may be.

You are required to prepare a “**Comparative Profit and Loss Statements**” presenting zonal performance as well as product performance.

Sol.

I. Comparative Zonal-wise Profit and Loss Statement

Particulars	Amount (in ₹)			
	Prime	Extension	Outreach	Total
Sales	22,50,000	13,50,000	9,00,000	45,00,000
Cost of Sales:				
Ace @ 85% of Sales	7,65,000	5,73,750	1,91,250	15,30,000
Nice @ 80% of Sales	7,20,000	3,60,000	1,44,000	12,24,000
Grace @ 75% of Sales	3,37,500	1,68,750	3,71,250	8,77,500
Total Cost of Sales	18,22,500	11,02,500	7,06,500	36,31,500
Gross Profit - (A)	4,27,500	2,47,500	1,93,500	8,68,500
Selling Expenses	1,95,615	1,18,350	1,00,440	4,14,405
Advertisement	67,500	40,500	27,000	1,35,000
Office Expenses	31,500	31,500	31,500	94,500
Other Expenses	40,500	40,500	40,500	1,21,500
Total Selling Cost – (B)	3,35,115	2,30,850	1,99,440	7,65,405
Net Profit or (Loss) : (A – B)	92,385	16,650	(5,940)	1,03,095

II. Comparative Product-wise Profit and Loss Statement

Particulars	Amount (in ₹)			
	Prime	Extension	Outreach	Total
Sales:	18,00,000	15,30,000	11,70,000	45,00,000
Cost of Sales	15,30,000	12,24,000	8,77,500	36,31,500
Gross Profit - (A)	2,70,000	3,06,000	2,92,500	8,68,500
Selling Expenses	1,29,600	1,47,330	1,37,475	4,14,405
Advertisement	54,000	45,900	35,100	1,35,000
Office Expenses	31,500	31,500	31,500	94,500
Other Expenses	40,500	40,500	40,500	1,21,500
Total Selling Cost – (B)	2,55,600	2,65,230	2,44,575	7,65,405
Net Profit : (A – B)	14,400	40,770	47,925	1,03,095

Ques. 5. There are two divisions in a firm, the Valve Division and Pump Division. The Pump Division requires 40,000 units of a special type of valve which can be supplied by Valve Division.

Presently, the Valve Division is producing 2,00,000 valves of other models at full capacity (variable cost ₹20 and Selling Price ₹35 per unit). In order to produce the special valve (as required by the Pump Division), the Valve Division has to give up 50% of its regular production. If the Valve Division decides to produce the special valve for the Pump Division, what **Minimum Transfer Price** should it charge from the latter?

Sol. In order to produce 40,000 units of special valve, the Valve Division has to cut the production of regular valves by 50%, i.e., 1,00,000 units, on which the lost contribution would be:

$$\text{Lost Contribution} = 1,00,000 \text{ units} \times ₹ (35 - 20) = ₹ 15,00,000$$

This lost contribution of ₹15,00,000 should be recovered from the new special valves. The lost contribution per special valves comes to ₹37.50 (i.e., ₹15,00,000 ÷ 40,000). Now, the Minimum Transfer Price may be found out as follows:

$$\begin{aligned} \text{Minimum Transfer Price} &= \text{Variable Cost} + \text{Lost Contribution} \\ &= ₹ (20 + 37.50) = ₹ \mathbf{57.50. \text{ Ans.}} \end{aligned}$$

The Valve Division should charge a **Minimum Transfer Price** of ₹57.50 in order to be as well off as at present. Any Transfer Price higher than ₹57.50 would give higher profit to the Valve Division.

Ques. 6. Current liabilities of a company are ₹60,000. Its current ratio is 3 : 1 and quick ratio is 1.8 : 1. Calculate the value of current assets, liquid assets and stock.

Sol. Current Ratio is 3 : 1 and current liabilities are ₹60,000.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\frac{3}{1} = \frac{\text{Current Assets}}{60,000}$$

$$\text{Current Assets} = ₹ 1,80,000$$

Liquid Ratio is 1.8 : 1

$$\text{Quick Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

$$\frac{1.8}{1} = \frac{\text{Liquid Assets}}{60,000}$$

$$\text{Liquid Assets} = 1.8 \times 60,000 = ₹ 1,08,000$$

$$\begin{aligned} \text{Stock} &= \text{Current Assets} - \text{Liquid Assets} \\ &= 1,80,000 - 1,08,000 = ₹ 72,000 \end{aligned}$$

Ques. 7. Dev Ltd's stock is ₹66,000. Liquid assets are ₹64,000 and quick ratio is 1.6. Find out the current ratio.

Sol. Quick Ratio = 1.6 and Liquid Assets are ₹ 64,000.

$$\text{Current Liabilities} = \frac{64,000}{1.6} = ₹ 40,000$$

Current Assets = Liquid Assets + Stock

$$= 64,000 + 66,000 = ₹ 1,30,000$$

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{1,30,000}{40,000} = 3.25$$

Ques. 8. Calculate the current ratio and quick ratio on liquidity position of Divya Ltd.

	₹
Cash	12,000
Sundry Debtors	1,48,000
B/R	20,000
Stock	3,40,000
Prepaid Expenses	20,000
Land and Building	4,00,000
Patents	40,000
Loose Tools	20,000
Goodwill	1,00,000
B/P	40,000
Bank overdraft	80,000
Sundry creditors	60,000
10% Debentures	2,00,000

Sol.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\begin{aligned} \text{Current Assets} &= \text{Cash} + \text{Debtors} + \text{Bills Receivable} + \text{Stock} + \text{Prepaid Expenses} \\ &= 12,000 + 1,48,000 + 20,000 + 3,40,000 + 20,000 \\ &= ₹5,40,000 \end{aligned}$$

$$\begin{aligned} \text{Current Liabilities} &= \text{Bills Payable} + \text{Bank Overdraft} + \text{Creditors} \\ &= 40,000 + 80,000 + 60,000 \\ &= ₹1,80,000 \end{aligned}$$

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{5,40,000}{1,80,000} = 3 : 1$$

$$\text{Quick Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

$$\begin{aligned} \text{Quick Assets} &= \text{Cash} + \text{Debtors} + \text{Bills Receivable} \\ &= 12,000 + 1,48,000 + 20,000 \\ &= ₹1,80,000 \end{aligned}$$

$$\text{Quick Ratio} = ₹1,80,000 / ₹1,80,000 = 1 : 1$$

Ques. 9. From the following information, compute:

- (i) Liquidity Ratio (ii) Current Ratio
(iii) Fixed Assets Ratio (iv) Debt-Equity Ratio

Balance Sheet
as on 31st March 2015

Liabilities	₹	Assets	₹
Share Capital	15,00,000	Fixed Assets	18,00,000
Fixed Liabilities	7,50,000	Liquid Assets	9,00,000
Current Liabilities	7,50,000	Stock	3,00,000
	<u>30,00,000</u>		<u>30,00,000</u>

Sol.

(i) Liquidity Ratio = $\frac{\text{Liquid Assets}}{\text{Current Liabilities}} = \frac{9,00,000}{7,50,000} = 1.20$

(ii) Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{12,00,000}{7,50,000} = 1.60$

(iii) Fixed Assets Ratio = $\frac{\text{Long - Term Funds}}{\text{Fixed Assets}} = \frac{15,00,000 + 7,50,000}{18,00,000} = 1.25$

(iv) Debt-Equity Ratio = $\frac{\text{External Equity}}{\text{Internal Equity}} = \frac{7,50,000 + 7,50,000}{15,00,000} = 1 : 1$

Ques. 10. From the following information, compute capital gearing ratio:

	₹
Equity Share Capital	10,00,000
Pref. Share Capital	4,00,000
Long-term Loans	2,00,000

Sol.

$$\text{Capital Gearing Ratio} = \frac{\text{Equity Share Capital} + \text{Reserves}}{\text{Preference Share Capital} + \text{Long - term Loans}}$$

$$= \frac{10,00,000}{4,00,000 + 2,00,000} = 1.67$$

Ques. 11. From the following Balance Sheet of Vinayak Ltd., calculate:

- (i) Debt-Equity Ratio
- (ii) Proprietary Ratio
- (iii) Solvency Ratio
- (iv) Fixed Assets to Net Worth Ratio

Balance Sheet

Liabilities	₹	Assets	₹
Equity Share Capital	6,00,000	Goodwill	2,00,000
Pref. Share Capital	3,00,000	Land and Building	6,00,000
Reserve Fund	3,00,000	Plant and Machinery	7,00,000
Dividend Equalisation Fund	1,00,000	Stock	4,00,000
		Debtors	3,00,000
10% Debentures	8,00,000	Cash at Bank	70,000
Current Liabilities	2,00,000	Accrued Income	30,000
	23,00,000		23,00,000

Sol.

(i) Debt-Equity Ratio = $\frac{\text{External Equity}}{\text{Internal Equity}}$

External Equity = Debenture + Current Liabilities
 = 8,00,000 + 2,00,000 = 10,00,000

Internal Equity = Equity Share Capital + Preference Share Capital + Reserve Fund
 + Dividend Equalisation Fund
 = 6,00,000 + 3,00,000 + 3,00,000 + 1,00,000
 = ₹13,00,000

Debt-Equity Ratio = ₹10,00,000/₹13,00,000 = 0.77

- (ii) Proprietary Ratio = $\frac{\text{Shareholders' Funds}}{\text{Total Assets}} \times 100$
 $= \frac{13,00,000}{23,00,000} \times 100 = 56.52\%$
- (iii) Solvency Ratio = 100 – Proprietary Ratio
 $= 100 - 56.52 = 43.48\%$
- (iv) Fixed Assets to Net Worth Ratio = $\frac{\text{Net Fixed Assets}}{\text{Net Worth}} \times 100$
 Net worth = ₹13,00,000 (Internal Equity)
 Fixed Assets = 2,00,000 + 6,00,000 + 7,00,000
 $= ₹15,00,000$
 $\frac{\text{Net Fixed Assets}}{\text{Net Worth}} = \frac{15,00,000}{13,00,000} \times 100 = 115.38\%$

Ques. 12. Calculate the Gross Profit ratio, Net profit ratio, operating ratio and Net Operating Profit ratio from the following details:

Particulars	₹
Sales	2,05,000
Sales Return	5,000
Gross Profit	75,000
Loss by Fire	12,000
Office Expenses	7,500
Selling Expenses	13,000
Interest on Debentures	5,000
Income from investments	2,500

- Sol.**
- (i) Gross Profit Ratio = $\frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$
 $= \frac{75,000}{2,00,000} \times 100 = 37.5\%$
- (ii) Net Profit Ratio = $\frac{\text{Net Profit}}{\text{Net Sales}} \times 100$
 Net Profit = Gross Profit – Office Expenses – Selling Expenses – Interest on Debenture – Loss by Fire +
 Income from Investment
 $= 75,000 - 7,500 - 13,000 - 5,000 - 12,000 + 2,500 = ₹40,000$
 Net Profit Ratio = $(40,000/2,00,000) \times 100 = 20\%$
- (iii) Operating Profit Ratio = $\frac{\text{Operating Profit}}{\text{Net Sales}} \times 100$
 Operating Profit = Gross Profit – Office Expenses – Selling Expenses
 $= 75,000 - 7,500 - 13,000 = ₹54,500$
 Operating Profit Ratio = $\frac{54,500}{2,00,000} \times 100 = 27.25\%$
- (iv) Operating Ratio = 100 – Operating Profit Ratio
 $= 100 - 27.25 = 72.75\%$

Ques. 13. Calculate the operating ratio and operating profit ratio from the following:

	₹
Sales	8,20,000
Sales Return	20,000
Purchases	4,50,000
Opening Stock	50,000
Closing Stock	80,000
Carriage	15,000
Wage	35,000
Manufacturing Expenses	40,000
Office Expenses	60,000
Selling Expenses	20,000
Discount	5,000
Bad debts	2,000
Interest on short-term loans	3,000
Interest on long-term loans	25,000
Loss by fire	20,000

Sol.

$$\text{Operating Ratio} = \frac{\text{Cost of Goods sold} + \text{Operating Expenses}}{\text{Net Sales}} \times 100$$

$$\begin{aligned} \text{Cost of Goods Sold} &= \text{Opening Stock} + \text{Purchases} + \text{Carriage} + \text{Wages} \\ &\quad + \text{Manufacturing Expenses} - \text{Closing Stock} \\ &= 50,000 + 4,50,000 + 15,000 + 35,000 + 40,000 - 80,000 \\ &= ₹5,10,000 \end{aligned}$$

$$\begin{aligned} \text{Operating Expenses} &= \text{Office Expenses} + \text{Selling Expenses} + \text{Discount} + \text{Bad Debts} \\ &\quad + \text{Interest on Short-term Loans} \\ &= 60,000 + 20,000 + 5,000 + 2,000 + 3,000 = ₹90,000 \end{aligned}$$

$$\text{Operating Ratio} = \frac{5,10,000 + 90,000}{8,00,000} \times 100 = 75\%$$

$$\begin{aligned} \text{Operating Profit Ratio} &= 100 - \text{Operating Ratio} \\ &= 100 - 75\% = 25\% \end{aligned}$$

Ques. 14. Calculate Earning per share from the following data:

Particulars	₹
Net Profit before tax	25,00,000
Tax rate	50%
10% Profit Share Capital (₹ 10 each)	25,00,000
Equity Share Capital (₹ 10 each)	25,00,000

Sol.

$$\begin{aligned} \text{Net Profit before Tax} &= 25,00,000 \\ \text{Less: Tax} &= \underline{12,50,000} \\ \text{Profit after Tax} &= 12,50,000 \\ \text{Less: Preference Dividend} &= \underline{2,50,000} \end{aligned}$$

Profit available for Equity Shareholders = ₹10,00,000

$$\text{E.P.S.} = \frac{\text{Profit after Tax} - \text{Preference Dividend}}{\text{No. of Equity Shares}}$$

$$\text{E.P.S.} = \frac{10,00,000}{2,50,000} = ₹4$$

Ques. 15. From the following details, calculate (i) opening stock (ii) closing stock, when stock turnover ratio is 3 times; gross profit ratio is 20% on sales; sales ₹ 9,000; closing stock is ₹500 in excess of opening stock.

Sol. Cost of Goods sold = Sales – Gross Profit
 = 9,000 – 20% of 9,000
 = ₹ 7,200

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Stock}}$$

$$\text{Or Average Stock} = \frac{\text{Cost of Goods Sold}}{\text{Stock Turnover Ratio}} \\ = 7,200/3 = ₹ 2,400$$

Let the opening stock be X

Closing stock will be = X + ₹500

$$\frac{X + (X + ₹500)}{2} = ₹2,400$$

$$\frac{2X + ₹500}{2} = ₹2,400$$

$$X = (4,800 - 500)/2 = ₹2,150$$

Opening Stock = ₹2,150

Closing Stock = ₹2,150 + 500 = ₹2,650

Ques.16. From the following figure and ratios make out Trading and Profit and Loss A/c and Balance Sheet:

	₹
Share Capital	90,000
Working Capital	31,500
Bank Overdraft	5,000

There are no fictitious assets. In current assets, there are no assets other than stock, debtors and cash. Closing stock is 20% higher than the opening stock.

Ratios are:	₹
Current Ratio	2.5
Quick Ratio	1.5
Proprietary Ratio (Fixed Assets/Proprietary Funds)	0.7
Gross Profit Ratio (G.P./Sales)	20%
Stock Turnover	4
Debtors Turnover	36.5 days
Net Profit Ratio (to paid up capital)	10%

Sol.
Trading and Profit and Loss A/c

Particulars	₹	Particulars	₹
To Opening Stock	17,500	By Sales	96,250
To Purchases	80,500	By Closing Stock	21,000
To Gross Profit	19,250		
	<u>1,17,250</u>		<u>1,17,250</u>
To Expenses	10,250	By Gross Profit	19,250
To Net Profit	9,000		
	<u>19,250</u>		<u>19,250</u>

Balance Sheet

Liabilities	₹	Assets	₹
Share Capital	90,000	Fixed Assets	73,500
Reserve and Surplus:		Current Assets:	
Reserve	6,000	Debtors	9,625
Profits	9,000	Stock	21,000
Current Liabilities:		Cash	21,875
Bank Overdraft	5,000		
Other Liabilities	16,000		
	<u>1,26,000</u>		<u>1,26,000</u>

Working Notes:

- (a) Current Assets and Current Liabilities

Let Current Liabilities will be X

Then Current Assets will be 2.5 X

Current Assets – Current Liabilities = Working Capital

$2.5 X - X = ₹31,500$

or $1.5 X = ₹31,500$

$X = ₹ 21,000$

Hence, Current Liabilities = ₹ 21,000

Current Assets = ₹ 21,000 × 2.5

= ₹ 52,500

- (b) Closing Stock:

Quick Ratio = $\frac{\text{Quick Assets}}{\text{Current Liabilities}} = 1.5$

or $= \frac{\text{Quick Assets}}{21,000} = 1.5$

Quick Assets = 21,000 × 1.5

= ₹ 31,500

$$\begin{aligned} \text{Current Assets} - \text{Quick Assets} &= \text{Stock} \\ 52,500 - 31,500 &= ₹ 21,000 \end{aligned}$$

(c) Opening Stock:

$$\text{Opening Stock} = \frac{21000}{120} \times 100 = ₹ 17,500$$

Note: As Closing Stock is 20% higher than opening stock.

(d) Cost of Sales:

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of Sales}}{\text{Average Stock}} = 4$$

or

$$\frac{\text{Cost of Sales}}{\left(\frac{21,000 + 17,500}{2} \right)} = 4$$

$$\begin{aligned} \text{Cost of Sales} &= 4 \times 19,250 \\ &= ₹ 77,000 \end{aligned}$$

(e) Purchases = Cost of Sales + Closing Stock – Opening Stock

$$\begin{aligned} &= 77,000 + 21,000 - 17,500 \\ &= ₹ 80,500 \end{aligned}$$

(f) Sales = Cost of Sales + Gross Profit

Note: Gross Profit is 20% of sales, so it will be 25% of cost of sales.

$$\begin{aligned} \text{Sales} &= ₹ 77,000 + 25\% \text{ of } 77,000 \\ &= ₹ 96,250 \end{aligned}$$

(g) Indirect Expenses:

$$\text{Net Profit} = 10\% \text{ of } 90,000 = ₹ 9,000$$

$$\begin{aligned} \text{Expenses} &= \text{Gross Profit} - \text{Net Profit} \\ &= 19,250 - 9,000 \\ &= ₹ 10,250 \end{aligned}$$

(h) Debtors:

$$\text{Debtor Turnover Ratio} = \frac{\text{Total Debtors}}{\text{Net Credit Sales}} \times 365$$

$$36.5 = \frac{\text{Total Debtors}}{96,250} \times 365$$

Or

$$\begin{aligned} \text{Total Debtors} &= \frac{36.5 \times 96,250}{365} \\ &= ₹ 9,625 \end{aligned}$$

(i) Cash = Quick Assets – Debtors

$$\begin{aligned} &= 31,500 - 9,625 \\ &= ₹ 21,875 \end{aligned}$$

(j) Fixed Assets:

Let Proprietary Funds be x

Then Fixed Assets = 0.7 x

Proprietary Funds – Fixed Assets = Current Assets – Current Liabilities

$$x - 0.7x = 52,500 - 21,000$$

$$x = 31,500/0.3$$

$$x = ₹1,05,000$$

$$\text{Fixed Assets} = 0.7 \times 1,05,000$$

$$= ₹73,500$$

(k) Reserves:

$$\text{Reserves} = \text{Proprietary Funds} - \text{Share Capital} - \text{Profits}$$

$$= 1,05,000 - 90,000 - 9,000$$

$$= ₹6,000$$

Ques.17. Compute the return on capital employed (Total Asset Basis) from the following information provided by Tushar Ltd. and Aditya Ltd.:

	Tushar Ltd.	Aditya Ltd.
Net Sales (₹)	1,00,000	?
Total Assets (₹)	?	16,000
Net Return on Sales	4%	20%
Turnover of Total Assets	5 Times	?
Gross Margin	30 %	25% (₹2,000)

Sol. **Tushar Ltd.:**

$$\text{Return on Capital Employed} = \frac{\text{Net Profit}}{\text{Capital Employed}}$$

$$\text{Capital Employed} = \text{Total Assets (Given)}$$

$$\text{Net Profit} = 1,00,000 \times 4/100 = ₹4,000$$

$$\text{Total Assets} = ₹1,00,000/5 = ₹20,000$$

$$\text{Return on Capital Employed} = \frac{4,000}{20,000} \times 100 = 20\%$$

Aditya Ltd.:

$$\text{Sales} = 2,000 \times \frac{100}{25} = ₹8,000$$

$$\text{Net Profit} = 8,000 \times 20/100 = ₹1,600$$

$$\text{Return on Capital Employed} = \frac{1600}{16,000} \times 100 = 10\%$$

Ques.18. Complete the following balance sheet with the following information:

Total debt is 2/3 of net worth; Turnover of total assets is 1.8; 30 days sales are in the form of debtors; Turnover of stock is 5; cost of goods sold in a year is ₹54,00,000; Acid test is 1:1.

Balance Sheet

Liabilities	₹	Assets	₹
Equity Capital	18,00,000	Fixed Assets	?
Retained Earnings	18,00,000	Inventories	?
Creditors	?	Debtors	?
		Cash	?
	_____?		_____?
	=====		=====

Sol.**Balance Sheet**

Liabilities	₹	Assets	₹
Equity Capital	18,00,000	Fixed Assets	25,20,000
Retained Earnings	18,00,000	Inventories	10,80,000
Creditors	24,00,000	Debtors	9,00,000
		Cash	15,00,000
	_____60,00,000		_____60,00,000
	=====		=====

Working Note:

$$\begin{aligned} \text{Net Worth} &= \text{Equity Capital} + \text{Retained Earnings} \\ &= 18,00,000 + 18,00,000 = ₹36,00,000 \end{aligned}$$

$$\begin{aligned} \text{Total Debt} &= 2/3 \text{ of Net Worth} \\ &= 2/3 \text{ of } 36,00,000 = ₹ 24,00,000 \end{aligned}$$

$$(a) \text{ Creditors} = \text{Total Debt} = ₹ 24,00,000$$

Note: As the creditors are given only in balance as debt

$$(b) \text{ Turnover of Total Assets} = 1.8$$

$$\begin{aligned} \text{Turnover} &= \text{Total Assets} \times 1.8 \\ &= 60,00,000 \times 1.8 \\ &= ₹1,08,00,000 \end{aligned}$$

Note: Total Assets = Total Liabilities

$$\begin{aligned} \text{Total Liabilities} &= 18,00,000 + 18,00,000 + ₹24,00,000 \\ &= ₹60,00,000 \end{aligned}$$

$$\text{So, Total Assets} = ₹60,00,000$$

$$(c) \text{ Debtors Collection Period} = 30 \text{ days}$$

$$30 = \frac{\text{Total Debtors}}{\text{Sales Per Day}}$$

$$\begin{aligned} \text{Total Debtors} &= 30 \times \frac{108,00,000}{360} \\ &= ₹9,00,000 \end{aligned}$$

$$(d) \text{ Stock Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Stock}}$$

$$5 = \frac{54,00,000}{\text{Stock}}$$

$$\text{Stock} = \frac{54,00,000}{5} = ₹ 10,80,000$$

$$(e) \text{ Acid Test Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}} = 1$$

Thus, Quick Assets = Current Liabilities × 1

$$= 24,00,000 \times 1 = ₹ 24,00,000$$

Quick Assets = Cash + Debtors (as per items given in Balance Sheet)

$$24,00,000 = \text{Cash} + 9,00,000$$

$$\text{Cash} = 24,00,000 - 9,00,000 = ₹ 15,00,000$$

$$(f) \text{ Fixed Assets} = \text{Total Assets} - \text{Stock} - \text{Debtors} - \text{Cash}$$

$$= 60,00,000 - 10,80,000 - 9,00,000 - 15,00,000$$

$$= ₹ 25,20,000$$

Ques.19. Given below is summarised profit and loss account of Divya Ltd. for the year ending 31st March, 2015 and its balance sheet is on that date. You are required to calculate the following ratios:

- (a) Return on shareholders' Fund
- (b) Return on capital Employed
- (c) Return on Equity capital
- (d) Return on Total Assets
- (e) Earning per share
- (f) Pay-out Ratio
- (g) P/E Ratio

Balance Sheet
as on 31st March, 2015

Liabilities	₹	Assets	₹
Issued Capital:		Land and Buildings	24,00,000
16,000 Equity Shares of ₹100 each	16,00,000	Plant and Machinery	8,00,000
8,000 10% Pref. Shares of ₹100 each	8,00,000	Stock	2,40,000
Reserves and Surplus	1,60,000	Debtors	4,00,000
Borrowings	8,00,000	Cash at Bank	1,60,000
Current Liabilities	6,40,000		
	40,00,000		40,00,000

Profit and Loss A/c of Divya Ltd.
for the year ending 31st March, 2015

Dr.		Cr.	
Particulars	₹	Particulars	₹
To Opening Stock	80,000	By Sales	21,60,000
To Purchases	15,20,000	By closing stock	2,40,000
To Carriage	1,60,000		
To Gross Profit	6,40,000		
	24,00,000		24,00,000
To Factory Expenses	40,000	By Gross Profit	6,40,000
To Administrative Expenses	56,000		
To Interest	24,000		
To Provision for Taxation	2,00,000		
To Net Profit	3,20,000		
	6,40,000		6,40,000

Proposed Dividends: Equity = ₹ 1,60,000; Preference = ₹ 80,000; Gen. Reserves = ₹ 80,000; Market Price of a share ₹ 165.

Sol.

Balance Sheet

Liabilities	Amount (₹)	Assets	Amount (₹)
Issued Capital:		Land and Building	24,00,000
16,000 Equity Shares of ₹ 100 each	16,00,000	Plant and Machinery	8,00,000
8,000, 10% Preference Shares of ₹ 100 each	8,00,000	Stock	2,40,000
Reserves and Surplus	1,60,000	Debtors	4,00,000
Borrowings	8,00,000	Cash at Bank	1,60,000
Current Liabilities	6,40,000		
	40,00,000		40,00,000

Profit and Loss Account of Divya Ltd.
for the year ending 31st March, 2015

Dr.		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening Stock	80,000	By Sales	21,60,000
To Purchases	15,20,000	By Closing Stock	2,40,000
To Carriage	1,60,000		
To Gross Profit	6,40,000		
	<u>24,00,000</u>		<u>24,00,000</u>
To Factory Expenses	40,000	By Gross Profit	6,40,000
To Admn. Expenses	56,000		
To Interest	24,000		
To Provision for Tax	2,00,000		
To Net Profit	3,20,000		
	<u>6,40,000</u>		<u>6,40,000</u>

Proposed Dividends: Equity = ₹ 1,60,000; Preference = ₹ 80,000; General Reserve = ₹ 80,000

- (a) Return on Shareholders' Fund:

$$\begin{aligned}
 &= \frac{\text{Earning after Tax}}{\text{Shareholders' Funds}} \times 100 \\
 &= \frac{3,20,000}{25,60,000} \times 100 = 12.5\%
 \end{aligned}$$

- (b) Return on Capital Employed = $\frac{\text{Net Operating Profit}}{\text{Capital Employed}} \times 100$

$$\begin{aligned}
 &= \frac{3,20,000 + 2,00,000 + 24,000}{16,00,000 + 8,00,000 + 1,60,000 + 8,00,000} \times 100 \\
 &= \frac{5,44,000}{33,60,000} \times 100 = 16.19\%
 \end{aligned}$$

- (c) Return on Equity Capital = $\frac{\text{Net Profit after Interest and Tax} - \text{Preference Dividend}}{\text{Paid up Equity Share Capital}} \times 100$

$$\begin{aligned}
 &= \frac{3,20,000 - 80,000}{16,00,000} \times 100 \\
 &= \frac{2,40,000}{16,00,000} \times 100 = 15\%
 \end{aligned}$$

- (d) Return on Total Assets = $\frac{\text{Profit before Interest and Tax}}{\text{Total Assets}} \times 100$

$$= \frac{5,44,000}{40,00,000} \times 100 = 13.6\%$$

$$(e) \text{ E.P.S.} = \frac{\text{Profit after Interest and Tax} - \text{Preference Dividend}}{\text{No. of Equity Shares}} \times 100$$
$$= \frac{2,40,000}{16,000} = ₹ 15$$

$$(f) \text{ Dividend Pay-Out Ratio} = \frac{\text{DPS}}{\text{EPS}} \times 100$$
$$= \frac{10}{15} \times 100 = 66.67\%$$

$$\text{D.P.S.} = \frac{\text{Proposed Equity Dividend}}{\text{No. of Equity Shares}}$$
$$= \frac{160,000}{16,000} = ₹ 10$$

$$(g) \text{ P/E Ratio} = \frac{\text{Market Price per Share}}{\text{EPS}}$$
$$= \frac{₹165}{₹15} = ₹ 11$$



ELEMENTS OF COST AND CLASSIFICATION

Ques. 1. The following expenses are related to the production of 2,000 units, during the month of August 2018:

Particulars	₹
Direct Materials	24,000
Direct Wages	20,000
Factory Rent and Rates	2,000
Depreciation on Machinery	1,000
Supervisor's Salary	3,000
Indirect Material	400
Indirect Labour	600
Office Expenses	3,000
Other Factory Expenses	1,000
Office Salaries	3,600
Printing & Stationery	400
Administrative Expenses	5,000

Prepare a cost sheet showing (a) Prime Cost; (b) Works Cost; (c) Total Cost of Production.

Sol.

Cost Sheet		Output : 2000 Units	
Particulars		Total (₹)	Per unit (₹)
Direct Material		24,000	12.00
Wages		20,000	10.00
	Prime Cost	44,000	22.00
Factory Rent & Rates		2,000	1.00
Depreciation on Machinery		1,000	0.50
Indirect Material		400	0.20
Indirect Labour		600	0.30
Supervisor's Salary		3,000	1.50
Other Factory Expenses		1,000	0.50
	Factory Cost	52,000	26.00
Office Salaries		3,600	1.80
Administration Expenses		5,000	2.50
Printing & Stationary		400	0.20
Office Expenses		3,000	1.50
	Total Cost of Production	64,000	32.00

Ques. 2. From the following details, prepare the cost sheet for the month ending on 31st March, 2019:

Particulars	₹
Direct Material	1,12,500
Direct Labour	1,80,000
Direct Expenses	30,000
Factory Overheads	75,000
Office overheads	45,000
Selling and Distribution Overheads	90,000
Sales	6,00,000

Total output – 3,000 units

Sol.

Cost Sheet

Output : 3,000 Units

Particulars	Total (₹)	Per Unit (₹)
Direct Material	1,12,500	37.50
Direct Labour	1,80,000	60.00
Direct Expenses	30,000	10.00
	Prime Cost	3,22,500
Factory Overheads	75,000	25.00
	Factory Cost	3,97,500
Office Overheads	45,000	15.00
	Cost of Production	4,42,500
Selling and Distribution Overheads	90,000	30.00
	Total Cost	5,32,500
Profit	67,500	22.50
	Sales	6,00,000

Ques. 3. Atul Foundry Works has the following exp. during the month of June 2019:

Particulars	₹
Direct Material	1,25,000
Direct Wages	2,00,000
Factory Fuel	25,000
Electric Power	7,500
Repairs to Machinery	5,000
Haulage	3,750
Factory lighting and water	6,250
Factory Rent	15,000
Factory Insurance	5,000
Depreciation on Machinery	7,500
Administration Overheads	24,500
Selling Overheads	20,000
Factory Salaries	21,250
No. of units of products — 2,000 units	
Sales	5,20,000

Sol.

Cost Sheet

Output : 2000 Units

Particulars	Total (₹)	Per Unit (₹)
Direct Material	1,25,000	62.50
Direct Wages	2,00,000	100.00
Prime Cost	3,25,000	162.50
Factory Overheads		
Factory Fuel	25,000	12.50
Electric Power	7,500	3.75
Repairs to Machinery	5,000	2.50
Haulage	3,750	1.875
Factory Lighting and Water	6,250	3.215
Factory Rent	15,000	7.50
Factory Insurance	5,000	2.50
Depreciation of Machinery	7,500	3.75
Factory Salaries	21,250	10.625
Factory Cost	4,21,250	210.625
Administration Overheads	24,500	12.25
Cost of Production	4,45,750	222.875
Selling & Distribution Overheads	20,000	10.00
Total Cost	4,65,750	232.875
Profit	54,250	27.125
Sales	5,20,000	260.00

Ques. 4. From the following particulars, prepare a cost sheet showing the comparative cost per tonne for each of two periods:

Three Months ended

Particulars	31-3-2019 (₹)	30-6-2019 (₹)
Productive Wages	36,000	49,000
Administration expenses	6,000	6,000
Raw Materials	18,000	24,500
Rent, Rates & Taxes	375	375
Light and Water	500	500
Direct expenses	4,500	6,250
Depreciation	1,000	1,000
Factory Rent	750	750
Unproductive Labour	15,000	20,500
Factory Repairs	1,500	2,250
Total	83,625	1,11,125
Output	3,000 tonne	4,000 tonne

Sol.

Cost Sheet

Output : 3000 tonne		Particulars	Output : 4000 tonne	
Total (₹)	Per Unit (₹)		Total (₹)	Per Unit (₹)
18,000	6.00	Raw Materials	24,500	6.125
36,000	12.00	Productive Wages	49,000	12.250
4,500	1.50	Direct Expenses	6,250	1.563

58,500	19,50		Prime Cost	79,750	19,938
375	0,125	Taxes & Insurance (Fact.)		375	0,094
500	0,167	Light & Water		500	0,125
1,000	0,333	Depreciation		1,000	0,250
750	0,250	Factory Rent		750	0,188
15,000	5,000	Unproductive Labour		20,500	5,125
1,500	0,500	Factory Repairs		2,250	0,563
77,625	25,875		Factory Cost	1,05,125	26,283
6,000	2,000	Administration Expenses		6,000	1,500
83,625	27,875		Total Cost	1,11,125	27,783

- Ques. 5.** Ramesh Kumar is a producer of Article 'A' and 'B'. The cost records reveal that there is no opening and closing stock of any article at the beginning and at the end of the period. Prepare a cost sheet showing cost and profit per unit from the following particulars:

Particulars	Article 'A'	Article 'B'
Materials	₹ 24,800	₹ 26,464
Labour	₹ 45,000	50,716
No. of units sold	1,040	1,560
Selling Price	₹ 150	₹ 110

Works overheads come to 100% on labour and office overheads to 20% on works cost.

Sol.

Cost Sheet

Per Unit (₹)	Total (₹)	Particulars	Total (₹)	Per Unit (₹)
23.85	24,800	Materials	26,464	16.96
43.27	45,000	Labour	50,716	32.51
67.12	69,800	Prime Cost	77,180	49.47
43.27	45,000	Works Overheads (100% on Labour)	50,716	32.51
110.39	1,14,800	Works Cost	1,27,896	81.98
22.08	22,960	Office Overheads (20% on Works Cost)	25,579	16.40
132.47	1,37,760	Total Cost	1,53,475	98.38
17.53	18,240	Profit	18,125	11.62
150.00	1,56,000	Selling Price	1,71,600	110.00

- Ques. 6.** The cost records of a manufacturer reveal the following facts:

Particulars	₹
Closing stock of Raw Materials	23,000
Closing stock of Finished Materials	31,500
Purchase of Raw Materials	38,000
Work-in-progress (opening)	3,000
Work-in-progress (closing)	5,000
Opening Stock of Raw Materials	10,000
Opening Stock of Finished Goods	15,000
Sales of Finished Goods	1,20,000
Administration Overheads	15,000
Selling and Distribution Overheads	7,000
Direct Labour	36,000
Works Overheads	11,000

Prepare a statement of cost for the above and show:

- (i) Cost of materials consumed
- (ii) Cost of manufacture
- (iii) Cost of goods sold
- (iv) Profit made on goods sold
- (v) Net Profit

Valuation of work-in-progress is to be made at works cost.

Sol. **Statement of Cost**

	₹	₹
Opening Stock of Raw Materials	10,000	
Add : Purchases	38,000	
	48,000	
Less : Closing Stock & Raw Materials	23,000	
(i) Cost of Materials Consumed		25,000
Direct Labour		36,000
Prime Cost		61,000
Work-in-progress (Opening)	3,000	
Add : Works overheads	11,000	
	14,000	
Less : Work-in-progress (Closing)	5,000	9,000
Works Cost		70,000
Office or Admn. Overheads		15,000
(ii) Cost of Manufacture		85,000
Add : Opening Stock of Finished Goods		15,000
		1,00,000
Less : Closing Stock of Finished Goods		31,500
(iii) Cost of Goods Sold		68,500
Sales		1,20,000
(iv) Profit on Goods Sold (1,20,000 – 68,500)		51,500
Less : Selling and Distribution Overheads		7,000
(v) Net Profit		44,500

Ques. 7. You are required to ascertain from the following figures what percentage (a) the manufacturing cost; (b) the selling overhead; (c) the management overhead bear to the total cost of goods sold. You are further required to ascertain by what percentage the average selling price should be raised in order to double the profit:

Particulars	₹
Opening stock of direct material	61,700
Work-in-progress at Commencement	1,21,700
Purchase of direct material	2,86,500
Direct wages	3,57,000
Factory overheads	1,99,500
Selling overheads	70,000
Management overheads	1,10,000
Sales	12,50,000
Closing stock of direct material	75,400
Closing work-in-progress	1,35,600
Sale of scrap	1,350
Carriage on direct materials	5,950

There is no opening and closing stock of finished goods.

Sol.

Statement of Cost

Particulars	₹	₹
Opening Stock of Direct Materials	61,700	
Add : Purchases	2,86,500	
Add : Carriage on Direct Material	5,950	
	3,54,150	
Less : Closing Stock	75,400	
	Cost of Material Consumed	2,78,750
Add : Wages		3,57,000
	Prime Cost	6,35,750
Add : Factory Overheads		1,99,500
		8,35,250
Add : Opening work-in-progress		1,21,700
		9,56,950
Less : Closing work-in-progress		1,35,600
	Works Cost	8,21,350
Add : Office Overheads & Management Overheads		1,10,000
		9,31,350
Less : Sale of Scrap		1,350
		9,30,000
Add : Selling Overheads		70,000
	Total Cost	10,00,000
Profit		2,50,000
	Selling Price	12,50,000

$$(a) \text{ Percentage of Manufacturing Cost of Total Cost of goods Sold} = \frac{821350}{10,00,000} \times 100 = 82\%$$

$$(b) \text{ Percentage of Selling Overhead to Total Cost} = \frac{70,000}{10,00,000} \times 100 = 7\%$$

$$(c) \text{ Percentage of Management Overhead to Total Cost} = \frac{1,10,000}{10,00,000} \times 100 = 11\%$$

$$\text{Profit} = 2,50,000 + 2,50,000 = ₹ 5,00,000$$

Cost	=	10,00,000
Profit	=	5,00,000
Selling Price	=	15,00,000

$$\text{Increase in selling price} = ₹ 2,50,000$$

To double the net profit, the average selling price should be raised by 20%.

$$= \frac{2,50,000}{12,50,000} \times 100 = 20\%$$

$$\text{Profit} = \left(\frac{12,50,000}{100} \times 20 \right) = ₹ 5,00,000$$

Ques. 8. The following extract of costing information relates to a commodity for the six months ended 30th June, 2019.

Particulars	₹
Purchases of Raw Materials	15,000
Direct Wages	12,500
Rent, Rates and Insurance of works	5,000
Carriage Inwards	180
Stock on 1-1-2019:	

Raw Materials	2,500
Finished Product (500 tonne)	2,000
Stock on 30-6-2019:	
Raw Materials	2,780
Finished Product (1,000 tonne)	4,000
Work-in-progress on 1-1-2019	600
Work-in-progress on 30-6-2019	2,000
Cost of Factory Supervision	1,000
Sales of Finished Product	37,500

Advertising, discounts allowed and selling expenses amount to 25 paise per tonne sold.

8,000 tonnes of the commodity were produced during the year. Prepare a statement showing:

- the value of raw material used;
- the cost of the output for the period;
- the cost of turnover for the period;
- the net profit for the period;
- the net profit per tonne of the commodity.

Sol.

Cost Statement

(for six months ended 30-6-2019)

Particulars	₹	₹
Stock of Raw Materials on 1-1-2019	2,500	
Purchase of Raw Materials	15,000	
Carriage Inward	180	
	17,680	
Less : Stock of Raw Materials on 30-6-2019	2780	
(a) Raw materials consumed		14,900
Add : Work-in-progress on 1-1-2019		600
		15,500
Less : Work-in-progress on 30-6-2019		2,000
		13,500
Direct Wages	12,500	
Rent, Rates and Insurance	5,000	
Factory Supervision	1,000	18,500
(b) Cost of output		32,000
Add : Stock of Finished Product on 30-6-2019 (500 tonne)		2,000
Less : Stock of Finished Product on 30-6-2019 (1000 tonne)		34,000
		4,000
		30,000
Add : Advertising, discounts, etc.		1,875
(c) Cost of turnover		31,875
Sales for the period (7500 tonne)		37,500
(d) Net profit for the period		5,625
(e) Net profit per tonne = $\frac{5625}{7500 \text{ tons}}$ = 75 paise		

Working Notes

Number of units sold = 7500 units

Rate of expenses on advertising, discounts = 25 paise per tonne

Allowed selling expenses

∴ Expenses on advertising, discounts = ₹ (7500 × 0.25) = ₹ 1875

Ques. 9. Prepare a cost sheet showing cost and profit per unit from the following particulars:

Particulars	Product A (₹)	Product B (₹)
Materials (per unit)	40	80
Labour (per unit)	160	240
Selling Price (per unit)	600	960
No. of units produced and sold	4000	8,000

Works overheads may be taken 100% on labour and office overheads to 25% on works cost.

Sol.

Cost Sheet

(Output : 4000 units)

Product 'A' and Product 'B'

(Output : 8000 units)

Cost per unit (₹)	Total Cost (₹)	Particulars	Cost per unit (₹)	Total Cost (₹)
40.00	1,60,000	Materials	80.00	6,40,000
160.00	6,40,000	Labour	240.00	19,20,000
200.00	8,00,000	Prime Cost	320.00	25,60,000
160.00	6,40,000	Works overheads (100% on Labour)	240.00	19,20,000
360.00	14,40,000	Works Cost	560.00	44,80,000
90.00	3,60,000	Office overheads (25% on works Cost)	140.00	11,20,000
450.00	18,00,000	Total Cost	700.00	56,00,000
150.00	6,00,000	Profit	260.00	20,80,000
600.00	24,00,000	Sales	960.00	76,80,000

Ques. 10. ABC Ltd. produced 60,000 units of a product during the month of July 2019, out of these 54,000 units were sold at ₹ 7 per unit.

The cost of raw material consumed was ₹ 2,40,000 and the direct wages were ₹ 60,000. The factory overheads were charged on the basis of machine hour rate, which, for this month was ₹ 10 per hour and 2,000 machine hours were worked during the month.

The office expenses are charged @ 10% on works cost and the selling and distribution expenses were charged @ Re 1 per unit.

You are required to prepare a cost sheet and a profit statement.

Sol.

Cost Sheet for July 2019

(Output : 60,000 units)

Particulars	Total Cost (₹)	Cost per unit (₹)
Raw Materials	2,40,000	4.000
Direct Wages	60,000	1.000
Prime Cost	3,00,000	5.000
Works Overheads (2,000 hours @ ₹ 10 per hour)	20,000	0.333
Works Cost	3,20,000	5.333
Office Overheads (10% on works cost)	32,000	0.533
Cost of Production	3,52,000	5.866

Statement of Profit

(Sales : 54,000 Units)

Particulars	Total Cost (₹)	Cost per unit (₹)
Cost of Production of 54,000 units @ ₹ 5.866	3,16,800	5.866
Selling & Distribution overheads @ ₹ 1 per unit	54,000	1.000
Cost of Sales	3,70,800	6.866
Profit	7,200	0.134
Sales @ ₹ 7 per unit	3,78,000	7.000

Ques. 11. Prepare a statement of cost from the Trading and Profit and Loss Account given below for the year ending 31st March, 2019. During this period 1,000 television-sets were manufactured.

Trading and Profit and Loss Account
(for the year ended 31st March, 2019)

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening Stock:		By Sales	2,50,000
Raw Materials	20,000	By Closing Stock:	
Finished T.V. Sets (50)	10,000	Raw Materials	10,000
To Purchase of Materials	60,000	Finished TV Sets (100)	20,000
To Wages	40,000		
To Carriage Inward	5,000		
To Indirect Wages	4,000		
To Coal and Power	2,500		
To Factory Rent	5,000		
To Repairs to Plant	1,000		
To Depreciation on Plant	3,250		
To Gross Profit c/d	1,29,250		
	2,80,000		2,80,000
To Printing & Stationery	2,500	By Gross Profit b/d	1,29,250
To Office Salaries	7,500		
To General Expenses	3,000		
To Travelling Expenses	5,000		
To Distribution Expenses	10,000		
To Advertisement	12,500		
To Net Profit	88,750		
	1,29,250		1,29,250

It has been disclosed, later on, that the work-in-progress as on 1st April, 2018 amounting to ₹ 2,500 and the work-in-progress as on 31st March, 2019, amounting to ₹ 5,000 have been wrongly included in the stocks of finished goods. The work-in-progress is valued at factory cost.

You are required to prepare a cost statement along with profit statement, showing production cost per T.V. and profit earned per T.V.

Sol.

Statement of Cost

(Output : 1,000 T.V.)

Particulars		Total Amount ₹
Opening Stock of Raw Materials	20,000	
Add : Purchases	60,000	
Carriage Inward on Purchases	5,000	
	85,000	
Less : Closing Stock of Raw Materials	10,000	
Material Consumed		75,000
Direct Wages		40,000
		Prime Cost
Works Overheads:		1,15,000
Indirect wages	4,000	

Coal and Power	2,500	
Rent	5,000	
Repairs to Plant	1,000	
Depreciation on Plant	3,250	15,750
		1,30,750
Add : Work-in-progress (1-4-2018)		2,500
		1,33,250
Less : Work-in-progress (31-3-2019)		5,000
	Works Cost	1,28,250
Administration Overheads :		
Printing and Stationery	2,500	
Office Salaries	7,500	
General Expenses	3,000	13,000
	Cost of Production	1,41,250

Statement of Profit

Particulars	No. of T.V.	Amount of per T.V. (₹)	Total Amount (₹)
Cost of Production	1,000	141.25	1,41,250
Add : Opening Stock of TVs	50		7,500
	1,050		1,48,750
Less : Closing Stock of TVs	100		15,000
	950		1,33,750
	Cost of Goods Sold		
Selling and distribution overheads :			
Travelling Expenses			5,000
Advertisement			12,500
Distribution			10,000
	Total Cost	169.74	1,61,250
Profit		93.42	88,750
	Sales	263.16	2,50,000

Working Notes:

$$\text{Total cost per unit} = \frac{1,61,250}{950} = ₹ 169.74$$

Ques. 12. A company manufactures three types of fans - table fans, ceiling fans and room cooler. Their costs are as under:

Particulars	Table Fan ₹	Ceiling Fan ₹	Room Cooler ₹
Materials	20	25	125
Labour	40	60	120

Factory Overheads : ₹ 30,000

Office Overheads : ₹ 10,000

Selling & Distribution Overheads : ₹ 15,000

Find out the total cost if overheads are allocated on the basis of one ceiling fan is equal to two table fans and one room cooler is equal to five table fans. Production was:

Table fans 250; Ceiling fans 125; Room Cooler 25.

Sol.

Cost Sheet

Particulars	Table Fan (250)		Ceiling Fan (125)		Room Cooler (25)	
	Total (₹)	Per Unit (₹)	Total (₹)	Per Unit (₹)	Total (₹)	Per Unit (₹)
Materials	5,000	20	3,125	25	3,125	125
Labour	10,000	40	7,500	60	3,000	120
Prime Cost	15,000	60	10,625	85	6,125	245
Factory Overheads (2 : 2 : 1)	12,000	48	12,000	96	6,000	240
Factory cost	27,000	108	22,625	181	12,125	485
Office Overheads (2 : 2 : 1)	4,000	16	4,000	32	2,000	80
Cost of production	31,000	124	26,625	213	14,125	565
Selling & Distribution Overheads (2 : 2 : 1)	6,000	24	6,000	48	3,000	120
Total Cost	37,000	148	32,625	261	17,125	685

Working Note : Overheads will be divided in the ratio of 2 : 2 : 1

Output : Table Fan = 250, ceiling Fan = 125, Room Cooler = 25

Given that 1 ceiling Fan = 2 Table Fans and

1 Room Cooler = 5 Table Fans

We convert all products on the basis of Table Fans

Therefore, 250 Table Fans = 250 Table Fans

125 Ceiling Fans = 250 Table Fans

25 Room Cooler = 125 Table Fans

Ratio (in terms of Table Fans) = 2 : 2 : 1

Ques. 13. Govind Ltd. manufactures two types of cars 'Alto' and 'Santro'. The total expenses during a period are shown by the books of assembly of 1,200 of Alto and 1,800 of Santro as under:

Materials ₹ 5,76,000; Wages ₹ 16,000;

Stores overhead ₹ 57,600; Running expenditure of machine ₹ 17,600.

Depreciation ₹ 2,200; Labour Welfare expenses ₹ 2,080;

Works expenses ₹ 40,000; Administrative expenses ₹ 71,150.

Additional Information:

	Alto	Santro
Material Cost ratio per unit	1	: 2
Labour Cost ratio per unit	3	: 2
Machine utilisation	1	: 2

Prepare Cost Sheet for each car.

Sol.

Cost Sheet

Particulars	Alto (1,200)		Santro (1,800)	
	Total	Per car	Total	Per car
Materials	1,44,000	120.00	4,32,000	240.00
Wages	8,000	6.67	8,000	4.44
Prime Cost	1,52,000	126.67	4,40,000	244.44
Works Overhead				
Stores Overhead (10% of Materials)	14,400	12.00	43,200	24.00
Machine Expenses (1 : 3)	4,400	3.67	13,200	7.33
Depreciation (1 : 3)	550	0.45	1,650	0.92
Labour Welfare Expenses (13% of Wages)	1,040	0.87	1,040	0.58
Works Expenses (250% of Wages)	20,000	16.67	20,000	11.11

Works Cost	1,92,390	160.33	5,19,090	288.38
Administrative Expenses (10% of works cost)	19,239	16.03	51,909	28.84
Total Cost	2,11,630	176.36	5,71,000	317.22

Working Note

- $$\left. \begin{array}{l} \text{Alto} = 1,200 \times 1 = 1,200 \\ \text{Santro} = 1,800 \times 2 = 3,600 \end{array} \right\} \text{ on } 1:3$$
- Labour :**

$$\left. \begin{array}{l} \text{Alto} = 1,200 \times 3 = 3,600 \\ \text{Santro} = 1,800 \times 2 = 3,600 \end{array} \right\} \text{ on } 1:1$$
- Stores overhead : 10% of Materials**

$$\left(\frac{57,600}{5,76,000} \times 100 = 10\% \right)$$
- Depreciation :**

$$\left. \begin{array}{l} \text{Alto} = 1,200 \times 1 = 1,200 \\ \text{Santro} = 1,800 \times 2 = 3,600 \end{array} \right\} \text{ on } 1:3$$
- Labour Welfare Expenses :**

$$= \frac{2,080}{16,000} \times 100 = 13\% \text{ of wages}$$
- Works Expenses :**

$$= \frac{40,000}{16,000} \times 100 = 250\% \text{ of wages}$$
- Administrative Expenses :**

$$= \frac{71,150}{(1,92,390 + 5,19,090)} \times 100$$

$$= 10\% \text{ of works cost}$$

Ques. 14. The cost structure of an article, the selling price of which is ₹ 1,000 is as follows:

Direct Materials — 50% of the total cost

Direct Labour — 30% of the total cost

Overheads — Balance

Due to anticipated increase in existing material price by 20% and in the existing labour by 10%. The existing profit would come down by 30% if the selling price remains the same.

Prepare a comparative statement showing the cost, profit and sales price under the present conditions and with the increase expected for the future, assuming the same percentage of profit on cost as under present conditions has to be earned.

Sol. Selling Price = ₹ 1000

Let us assume total cost to be x

Particulars	Present Condition	Anticipated Condition
Direct Material	0.5 x	0.60 x
Direct Labour	0.3 x	0.33 x
Overheads (Balance)	0.2 x	0.20 x
Total cost	x	1.13 x

$$x + y = 1,000 \quad \dots(i)$$

$$\text{or } 1.13x + 0.70y = 1,000 \quad \dots(ii)$$

By solving equation (i) and (ii),

We get

$$x = 700$$

$$y = 300$$

Comparative Statement of Cost, Profit and Sales Price

Particulars	Present Condition (₹)	Future Anticipation	
		Sales Price Unchanged (₹)	Sales Price increased (₹)
Direct Material	350	420	420
Direct Labour	210	230	230
Overheads	140	140	140
Total Cost	700	790	790
Profit	300	210	338
Sales Price	1,000	1,000	1,128

Working note : $\frac{300}{700} = 3/7$; Profit = $791 \times 3/7 = 338$

Ques. 15. The following figures relate to the costing of manufacture of table fans of uniform size and quality for a period of three months:

Particulars	₹
Completed Stock on 1.3.2019	Nil
Completed Stock on 31.5.2019	20,250
Stock of Raw Materials on 1.3.2019	5,000
Stock of Raw Materials on 31.5.2019	3,500
Wages	75,000
Indirect Charges	12,500
Materials Purchased	32,500
Sales	1,12,500

The number of fans manufactured during 3 months was 3,000.

Prepare a statement showing the cost per fan and the price to be realised for 750 fans to realise the same percentage of profit as was realised during the three months, referred to above assuming identical cost.

Sol.

Cost Sheet

(Output : 300 units)

Particulars	Per Fan (₹)	Total (₹)
Stock of Raw Materials on 1st March, 2019		5,000
<i>Add:</i> Purchases of Raw Materials		32,500
		37,500
<i>Less:</i> Stock of Raw Materials on 31-5-2019		3,500
Materials consumed	11.33	34,000
<i>Add:</i> Wages	25.00	75,000
Prime Cost	36.33	1,09,000
<i>Add:</i> Indirect Expenses	4.17	12,500
Cost of Production	40.50	1,21,500

Statement of Profit

Particulars	₹
Completed Stock on 1st March, 2019	Nil
Add: Cost of Production	1,21,500
	1,21,500
Less: Completed Stock on 31-5-2019	20,250
	1,01,250
	Cost of goods sold
	1,01,250
Profit 10% on sales	11,250
	Sales
	1,12,500

Tender Price

(for 750 fans)

Particulars	Per Fan (₹)	Total (₹)
Materials $\left(\frac{34,000 \times 750}{3000}\right)$	11.33	8,500
Add: Wages	25.00	18,750
	Prime Cost	27,250
Add: Indirect Expenses $\left(\frac{12,500 \times 750}{3000}\right)$	4.17	3,125
	Cost of Production	30,375
Add: Profit 10% on Sales $\left(30,375 \times \frac{10}{90}\right)$	4.50	3,375
	Tender Price	33,750

Ques. 16. A factory can produce 60,000 units per annum at its optimum capacity (100 %). The estimated costs of production are as under:

Direct Materials	₹ 3 per unit.
Direct Labour	₹ 2 per unit
Fixed	₹ 1,50,000 p.a.
Variable	₹ 5 per unit
Semi-Variable	₹ 50,000 per annum upto 50% capacity and an extra expense of ₹ 10,000 per annum for every 25% increase in capacity or part thereof.

The factory produces only against orders and not for own stock. If production programme of the factory is as indicated below and the management desires to ensure a profit of ₹ 1,00,000 for the year, work out the average selling price at which each unit should be quoted:

First 3 months of the year 50% of capacity.

Remaining 9 months of the year 80% of capacity.

Sol.

Statement of Cost

(60,000 units p.a. at 100% capacity)

Particulars	50% capacity for first 3 months 7,500 unit (₹)	80% of capacity for next 9 months 36,000 unit (₹)	Total Cost of 43,500 unit (₹)
Direct Material @ ₹ 3 per unit	22,500	1,08,000	1,30,500
Direct Labour @ ₹ 2 per unit	15,000	72,000	87,000
Prime Cost	37,500	1,80,000	2,17,500
Overheads :			
Fixed ₹ 1,50,000 p.a.	37,500	1,12,500	1,50,000
Variable @ ₹ 5 per unit	37,500	1,80,000	2,17,500
Semi-variable (₹ 50,000 upto 50% capacity and extra ₹ 10,000 p.a. for every 25% increase in capacity or part thereof)	12,500	52,500	65,000
Cost of production	1,25,000	5,25,000	6,50,000
Profit	4,300	95,700	1,00,000
Selling price	1,29,300	6,20,700	7,50,000

$$1. \text{ Average Selling Price} = \frac{\text{₹ } 7,50,000}{43,500} = \text{₹ } 17.24 \text{ per unit}$$

∴ Selling price of 7500 units produced in 3 months = ₹ (17.24 × 7500) = ₹ 1,29,300
And, selling price of 36000 units produced = ₹ (7,50,000 – 1,29,300)

$$2. \text{ Semi-variable cost at 80\% capacity:} \quad \text{₹}$$

₹ 50,000 p.a. for 9 months for 50% capacity	= 37,500
₹ 10,000 p.a. for 9 months for 25% extra	= 7,500
₹ 10,000 p.a. for 9 months for 5% extra	= 7,500
	52,500

Working Note:

$$\text{No. of units produced in a month when factory operates at optimum capacity} = \frac{60,000}{12} = 5,000 \text{ units per month}$$

$$\therefore \text{No. of units produced in 3 month when factory operates at 50\% capacity} = (3 \times 5,000) \times \frac{50}{100} = 7,500 \text{ units}$$

$$\text{And, number of units produced in 9 months when factory operates at 80\% of capacity} = (9 \times 5,000) \times \frac{80}{100} = 36,000 \text{ units}$$

Ques. 17. The following data are given about a factory for 2019:

Production (1,00,000 units)	₹
Materials consumed	1,50,000
Direct Wages	1,00,000
Variable Production Expenses	2,00,000
Variable Selling Expenses	4,00,000
Fixed Expenses	1,50,000
Selling Price per unit	12

It is expected that in 2020:

- (i) The factory will produce 2,00,000 units
- (ii) Prices of materials will go up by 33.3%.
- (iii) There will be an increase of 25% of variable selling expenses rate due to increase in the rate of commission to salesman and extensive advertisement.
- (iv) Fixed expenses will increase by ₹ 50,000.

Calculate:

- (i) What would be the cost per unit in 2020 based on a production of 2,00,000 units.
- (ii) If it is desired to maintain the same rate of profit on sales as in 2019.
What would be the selling in 2020?

Sol.

Statement of Cost

(Output : 1,00,000 units)

Particulars	Amount (₹)
Materials Consumed	1,50,000
Direct Wages	1,00,000
Prime Cost	2,50,000
Variable Production Expenses	2,00,000
Variable Fixed Expenses	1,50,000
Variable Selling Expenses	4,00,000
Total Cost	10,00,000
Profit (20% on total cost)	2,00,000
Sales (1,00,000 × 12)	12,00,000

Statement of Cost

(Output : 2,00,000 units)

Particulars	Amount (₹)
Materials Consumed	₹ 3,00,000
Add: 33.33% increase in prices	₹ 1,00,000
Direct Wages	2,00,000
Prime Cost	6,00,000
Variable Production Expenses	4,00,000
Variable Fixed Expenses (1,50,000 + 50,000)	2,00,000
Variable Selling Expenses (8,00,000 + 25% of increase)	10,00,000
Total Cost	22,00,000
Profit (20% on total cost)	4,40,000
Selling Price	26,40,000

Ques. 18. A certain factory produces a uniform type of article and has a capacity of producing 35,000 units per week in 48 hours. The following informations show the different elements of costs for three consecutive weeks of 48 hours each when the output has changed week to week:

Units produced in 48 hours	Direct Materials	Direct Labour	Factory overheads (partly fixed and partly variables)
10,000	20,000	40,000	95,000
12,500	25,000	50,000	1,00,000
20,000	40,000	80,000	1,15,000

You are required to find the selling price per unit when the weekly output will be 25,000 units and a profit of

$16\frac{2}{3}\%$ on sale price will have to be made.

- Sol.** (i) Direct Materials per unit is ₹ 2, as follows:
 (20,000 / 10,000) ; (25,000 / 12,500) and (40,000 / 20,000)
- (ii) Direct Labour per unit is ₹ 4 as follows:
 (40,000 / 10,000) ; (50,000 / 12,500) and (80,000 / 20,000)
- (iii) Fixed and Variable factory overheads are ascertained as follows:
 Increase in units = 12,500 – 10,000 = 2,500 units
 Increase in amount = ₹ 1,00,000 – ₹ 95,000 = ₹ 5,000
 Variable factory overheads per unit = $\frac{5,000}{2,500} = ₹ 2$
- Remaining overheads are considered as fixed overheads, i.e.
 ₹ 95,000 – (10,000 × 2) = ₹ 75,000
 or ₹ 1,00,000 – (12,500 × 2) = ₹ 75,000
 or ₹ 1,15,000 – (20,000 × 2) = ₹ 75,000
 Hence, fixed overheads = ₹ 75,000

Statement of cost

(Output : 25,000 Units)

Particulars	₹
Direct Materials @ ₹ 2 per unit	50,000
Direct Labour @ ₹ 4 per unit	1,00,000
Prime Cost	1,50,000
Factory overheads :	
Fixed	₹ 75,000
Variable @ ₹ 2 per unit	₹ 50,000
Total Cost	1,25,000
Profit @ $16\frac{2}{3}\%$ on sales price or 20% on total cost	55,000
	3,30,000

$$\text{Selling price per unit} = \frac{₹ 3,30,000}{25,000}$$

$$= ₹ 13.20$$

Ques. 19. The following is the summarised Trading and Profit and Loss Account of Vishnu waterproof manufacturing Ltd. for the year ending 31st March 2019 in which 8,000 waterproofs were sold by the company.

Trading and Profit and Loss Account
 (as on 31st March 2019)

Particulars	₹	Particulars	₹
To Cost of Materials	3,20,000	By Sales	16,00,000
To Direct Wages	4,80,000		
To Manufacturing Charges	2,00,000		
To Gross Profit c/d	6,00,000		
	16,00,000	By Gross Profit b/d	6,00,000
To Office Salaries	2,40,000		
To Rent & Taxes	40,000		
To Selling Expenses	80,000		
To General Expenses	1,20,000		
To Net Profit	1,20,000		
	6,00,000		6,00,000

Following estimates were made by the costing department of the company for the year ending 31st March, 2019:

- The output and the sales will be of 10,000 waterproofs.
- The price of materials will rise by 25% on the previous year's level.
- Wages during the year will rise 12.5%.
- Manufacturing cost will rise in proportion to the combined cost of materials and wages.
- Selling cost per unit will remain unchanged.
- Other expenses will remain unaffected by the rise in output.

From the above information prepare a cost statement showing the price at which the waterproofs would be marketed to as to show a profit of 10% on the selling price.

Sol.

Statement of Cost

(Output : 8,000 Waterproofs)

Particulars	Per unit (₹)	Total Cost (₹)
Cost of Materials	40	3,20,000
Direct Wages	60	4,80,000
	Prime Cost	8,00,000
<i>Add:</i> Manufacturing charges	25	2,00,000
	Factory Cost	10,00,000
<i>Add:</i> Office Salaries	30	2,40,000
Rent & Taxes	5	40,000
General Expenses	15	1,20,000
	Office Cost	14,00,000
<i>Add:</i> Selling Expenses	10	80,000
	Total Cost	14,80,000
	Profit	1,20,000
	Sales	16,00,000

Statement of Cost

(Output : 10,000 Units)

Particulars	Per Unit (₹)	Total Cost (₹)
Materials (25% increase)	50.000	5,00,000
Direct Wages (12.5% increase)	67.500	6,75,000
	Prime Cost	11,75,000
<i>Add:</i> Manufacturing Charges (25% on Prime Cost)	29.375	2,93,750
	Factory Cost	14,68,750
<i>Add:</i> Office Salaries	24.000	2,40,000
Rent & Taxes	4.000	40,000
General Expenses	12.000	1,20,000
	Office Cost	18,68,750
<i>Add:</i> Selling Expenses	10.000	1,00,000
	Total Cost	19,68,750
	Profit	2,18,750
	Sales	21,87,500



Budgeting and Budgetary Control

Ques. 1. A manufacturing company sells two products which are manufactured in one plant. During the year 2014 it plans to sell the following quantities of each product.

Sales Budget					(in units)
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Product 1	90,000	2,30,000	3,00,000	80,000	7,00,000
Product 2	85,000	75,000	55,000	85,000	3,00,000

Each of these two products is sold on a seasonal basis. Product I tends to sell better in summer months, while Product 2 sells better during the winter. Company plans to sell product 1 throughout the year at a price of ₹ 10 per unit and product 2 at a price of ₹ 20 per unit.

A study of the past experience reveals that the company has lost about 3% of its billed revenue each year because of returns constituting 2% of loss of revenue; 1% of loss allowances and bad debts. Prepare a budget incorporating the given information.

Sol.

Sales Budget

Period : Year 2014

Particulars	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Product 1 (Sales Price ₹ 10)	9,00,000	23,00,000	30,00,000	8,00,000	70,00,000
Product 2 (Sales Price ₹ 20)	17,00,000	15,00,000	11,00,000	17,00,000	60,00,000
Total Sales (I)	26,00,000	38,00,000	41,00,000	25,00,000	1,30,00,000
Loss for Returns @ 2% of total sales	52,000	76,000	82,000	50,000	2,60,000
Loss for Bad Debts and allowances @ 1% of total sales	26,000	38,000	41,000	25,000	1,30,000
Total Deductions (II)	78,000	1,14,000	1,23,000	75,000	3,90,000
Net Sales (I) – (II)	25,22,000	36,86,000	39,77,000	24,25,000	1,26,10,000

Ques. 2. A manufacturing company sales three products A, B and C which are manufactured in one plant. During the year 2017, it plans to sell the following quantities of each product:

Product	North	West	South
A	15,220	12,500	17,560
B	18,000	7,500	8,000
C	16,500	20,500	6,000

Sales prices are ₹ 12, ₹ 8, and ₹ 10 for product A, B and C respectively in all the areas.

Actual sales for the current year were:

Product	North	West	South
A	16,200	13,800	18,000
B	12,500	7,000	6,000
C	14,000	16,500	7,500

A market research was conducted by the management and it was found that product A has a favour among the customers and if its price is increased by ₹ 1, its sale will not be affected. The product B is overpriced and it is proposed to reduce it by ₹ 1. Product C is properly priced, but extensive advertisement is required to push its sales.

On the basis of the above estimates, it is expected that the percentage increase in sales will be:

Product	North	West	South
A	10%	5%	5%
B	10%	5%	10%
C	5%	10%	15%

It is also expected that there will be a further push up in sales if extensive advertisement is resorted to. The increase will be:

Product	North	West	South
A	1,500	240	55
B	600	1,000	1,050
C	600	Nil	700

Prepare the sales budget for the year 2017.

Sol.

Sales Budget

Product	Division	Budget for Current Year			Actual Sales for Current Year			Budget for Future Period		
		Qn.	Rate	Amount	Qn.	Rate	Amount	Qn.	Rate	Amount
A	North	15,220	12	1,82,640	16,200	12	1,94,400	18,242	13	2,37,146
	West	12,500	12	1,50,000	13,800	12	1,65,600	13,365	13	1,73,745
	South	17,560	12	2,10,720	18,000	12	2,16,000	18,493	13	2,40,409
	Total	45,280		5,43,360	48,000		5,76,000	50,100		6,51,300
B	North	18,000	8	1,44,000	12,500	8	1,00,000	20,400	7	1,42,800
	West	7,500	8	60,000	7,000	8	56,000	8,875	7	62,125
	South	8,000	8	64,000	6,000	8	48,000	9,850	7	68,950
	Total	33,500		2,68,000	25,500		2,04,000	39,125		2,73,875
C	North	16,500	10	1,65,000	14,000	10	1,40,000	17,925	10	1,79,250
	West	20,500	10	2,05,000	16,500	10	1,65,000	22,550	10	2,25,500
	South	6,000	10	60,000	7,500	10	75,000	7,600	10	76,000
	Total	43,000		4,30,000	38,000		3,80,000	48,075		4,80,750

Working Notes

Budget for Future Period

Product A

$$\text{North} = 15,220 + 10\% (15,200) + 1,500 = 18,242$$

$$\text{West} = 12,500 + 5\% (12,500) + 240 = 13,365$$

$$\text{South} = 17,560 + 5\% (17,560) + 55 = 18,493$$

Product B

$$\text{North} = 18,000 + 10\% (18,000) + 600 = 20,400$$

$$\text{West} = 7,500 + 5\% (7,500) + 1,000 = 8,875$$

$$\text{South} = 8,000 + 10\% (8,000) + 1,050 = 9,850$$

Product C

$$\text{North} = 16,500 + 5\% (16,500) + 600 = 17,925$$

$$\text{West} = 20,500 + 10\% (20,500) + \text{Nil} = 22,550$$

$$\text{South} = 6,000 + 15\% (6,000) + 700 = 7,600$$

- Ques. 3.** According to sales department of your company, the sales of the company's product is slacking and the budgeted sales of 1,50,000 units per year can only be met if the trade discount is raised from 25 per cent to 30 per cent. If the discount is raised to 35 per cent, the sales will increase by 20 per cent over the budget for which the production capacity exists. Indicate which of the two alternative is more profitable. The retail price of the product is ₹10 each. The cost of production is ₹ 6 of which ₹4 is variable.

Sol.

Particulars	(A)	(B)	
	at 30% discount	at 35% discount	
Units Sold	1,50,000	1,80,000	20% increase
	₹	₹	
Gross sales @ ₹10 per unit	15,00,000	18,00,000	
Discount	4,50,000	6,30,000	
Net Sales (1)	10,50,000	11,70,000	
Variable cost @ ₹4 per unit	6,00,000	7,20,000	
Fixed cost	3,00,000	3,00,000	
Total cost (2)	9,00,000	10,20,000	
Profit (1) – (2)	1,50,000	1,50,000	

In both situations, the profit is the same, i.e., ₹ 1,50,000. In the event of competition in the market, the (B) alternative should be adopted as the product will reach the customers at less price. However, the cost of sales of increased production, i.e., increase of sales units from 1,50,000 to 1,80,000 should be kept in view before deciding the matter finally. Secondly, once the prices are reduced by allowing note discount, it becomes difficult to revert to the old practice of allowing comparatively less discount.

- Ques. 4.** ABC Co. wishes to arrange overdraft facilities with its bankers during the period April to June of a particular year, when it will be manufacturing mostly for stock. Prepare a Cash Budget for the above period from the following data, indicating the extent of the bank facilities the company will require at the end of each month:

(a)

Month	Sales (₹)	Purchases (₹)	Wages (₹)
February	1,80,000	1,24,800	12,000
March	1,92,000	1,44,000	14,000
April	1,08,000	2,43,000	11,000
May	1,74,000	2,46,000	10,000
June	1,26,000	2,68,000	15,000

(b) 50% of the credit sales are realised in the month following the sales and the remaining sales in the second month following. Creditors are paid in the following month of purchase.

(c) Cash at bank on 1st April (estimated) ₹ 25,000.

Sol.

Cash Budget

Particulars	April (₹)	May (₹)	June (₹)
1. Receipts on sales			
1st Month	90,000	96,000	54,000
2nd Month	96,000	54,000	87,000
	1,86,000	1,50,000	1,41,000
2. Payment			
Creditors	1,44,000	2,43,000	2,46,000
Workers	11,000	10,000	15,000
	1,55,000	2,53,000	2,61,000
3. Balance (1 – 2)	31,000	(–) 1,03,000	(–) 1,20,000
Opening Balance 1st April	25,000	—	—
Balance in hand	56,000	56,000	– 47,000
Overdraft required	—	(–) 47,000	(–) 1,20,000
Cumulative overdraft	—	—	(–) 1,67,000

Ques. 5. Summarised Income and expenditure forecasts for the months of March to August 2017 are given below:

Month	Sales (Credit) (₹)	Purchases (Credit) (₹)	Wages (₹)	Manufacturing Exps. (₹)	Office Exps. (₹)	Selling Exps. (₹)
March	60,000	36,000	9,000	4,000	2,000	4,000
April	62,000	38,000	8,000	3,000	1,500	5,000
May	64,000	33,000	10,000	4,500	2,500	4,500
June	58,000	35,000	8,500	3,500	2,000	3,500
July	56,000	39,000	9,500	4,000	1,000	4,500
August	60,000	34,000	8,000	3,000	1,500	4,500

You are given the following further information:

- (a) Plant costing ₹ 16,000 is due for delivery in July payable 10% on delivery and the balance after three months.
- (b) Advance tax of ₹ 8,000 is payable in March and June each.
- (c) Period of credit allowed (i) by suppliers 2 months, and (ii) to customers 1 month.
- (d) Lag in payment of manufacturing expenses is half a month.
- (e) Lag in payment of all other expenses is 1 month.

You are required to prepare a Cash Budget for the month of May, June and July 2017 when there was a cash balance of ₹ 8,000.

Sol.

Cash Budget
(for the months from May to July 2017)

Particulars	May (₹)	June (₹)	July (₹)
Receipts			
Opening Balance	8,000	15,750	12,750
Cash received from Debtors	62,000	64,000	58,000
Total	70,000	79,750	70,750
Payments			
Payment to creditors	36,000	38,000	33,000
Payment of plant	—	—	1,600
Advance tax payable	—	8,000	—
Manufacturing expenses	3,750	4,000	3,750
Wages	8,000	10,000	8,500
Office expenses	1,500	2,500	2,000
Selling expenses	5,000	4,500	3,500
Total	54,250	67,000	52,350
Closing Balance	15,750	12,750	18,400

Ques. 6. From the following information prepare a cash budget from 1st January, 2017 to 30th June, 2017. The cash balance on 1st January, 2017 is ₹ 1,45,000.

Month	Sales (₹)	Materials (₹)	Wages (₹)	Distribution Overhead (₹)	Production overhead (₹)	Admn. Overhead (₹)
January	1,44,000	50,000	20,000	8,000	12,000	3,000
February	1,94,000	62,000	24,200	10,000	12,600	3,400
March	1,72,000	51,000	21,200	11,000	12,000	4,000
April	1,77,200	61,200	50,000	13,400	13,000	4,400
May	2,05,000	74,000	44,000	17,000	16,000	5,000
June	2,17,400	77,600	46,000	18,000	16,400	5,000

Half of the sales are cash sales. Assets are to be required in the months of February and April. Arrangement is to be made for the payment of ₹ 16,000 and ₹ 50,000 respectively for the same. An application has been given to the banker 'Bank of Commerce' for the grant of a loan of ₹ 60,000 and it is expected that it will be received in the month of May. A dividend of ₹ 70,000 is to be paid in the month of June. Debtors are allowed one month's credit. Sales commission @ 3% on sales is to be paid. Creditors and overheads are to be paid one month later.

Sol.

Cash Budget

Particulars	Jan. (₹)	Feb. (₹)	March (₹)	April (₹)	May (₹)	June (₹)
Receipts						
Opening Balance	1,45,000	1,92,680	2,42,660	3,11,300	3,02,584	4,11,534
Cash sales	72,000	97,000	86,000	88,600	1,02,500	1,08,700
Debtors	—	72,000	97,000	86,000	88,600	1,02,500
Bank Loan	—	—	—	—	60,000	—
Total	2,17,000	3,61,680	4,25,660	4,85,900	5,53,684	6,22,734

Payments						
Materials	—	50,000	62,000	51,000	61,200	74,000
Wages	20,000	24,200	21,200	50,000	44,000	46,000
Selling and Dist. OH.	—	8,000	10,000	11,000	13,400	17,000
Prod. OH.	—	12,000	12,600	12,000	13,000	16,000
Admn. OH	—	3,000	3,400	4,000	4,400	5,000
Sales comm.	4,320	5,820	5,160	5,316	6,150	6,522
Assets requirements	—	16,000	—	50,000	—	—
Dividend	—	—	—	—	—	70,000
Total	24,320	1,19,020	1,14,360	1,83,316	1,42,150	2,34,522
Closing Balance	1,92,680	2,42,660	3,11,300	3,02,584	4,11,534	3,88,212

Ques. 7. Estimate the cash requirements of ABC company for June 2017, from the following data:

- (A) Sales (2017) ₹
- February 25,000
- March 20,000
- April to June 30,000 per month

Half of the sales are for cash. 90% of credit sales are collected in the month following the sale and the balance one month later.

- (B) Goods are always bought for cash to avail the cash discount of 5%. The purchase budget for the second quarter (April to June) was 15,000 units per month at ₹1 per unit.
- (C) Salaries and wages for second quarter were budgeted at ₹ 5,000 per month.
- (D) Manufacturing and other expenses budgeted for the quarter are: cash expenses ₹ 4,500; depreciation ₹ 7,500; selling expenses ₹ 3,000; administrative expenses (in April and May only) ₹ 2000.

Sol.

Cash Budget

Particulars	April	May	June
	₹	₹	₹
Receipts			
Opening Balance	—	2,500	9,250
Cash sales (1/2 of sales)	15,000	15,000	15,000
Cash from Debtors	10,250	14,500	15,000
Total	25,250	32,000	39,250
Payments			
Cash Purchases	14,250	14,250	14,250
(Less : Cash discount)			
Salaries and Wages	5,000	5,000	5,000
Cash Expenses	1,500	1,500	1,500
Selling Expenses	1,000	1,000	1,000
Admin. Expenses	1,000	1,000	—
	22,750	22,750	21,750
Closing Balance	2,500	9,250	17,500

Cash required for the payment for June 2017 will be ₹ 21,750

Note : 1. Administration expenses are only for May and June.

2. Depreciation, being non-cash item, is not recorded in the cash budget.

3. Cash Discount = $\left(15,000 \times \frac{5}{100}\right) = ₹ 750$

4. Cash collected from the debtors is as follows :

Particulars	Feb (₹)	March (₹)	April (₹)	May (₹)	June (₹)
Credit Sales (1/2 of total sales)	12,500	10,000	15,000	15,000	15,000
Amount collected from Debtors					
90% of previous months credit sales	—	11,250	9,000	13,500	13,500
10% of two months earlier	—	—	1,250	1,000	1,500
			10,250	14,500	15,000

Ques. 8. ABC Ltd. wishes to arrange overdraft facilities with its bankers during the period April to June of 2018, when it will be manufacturing mostly for stock. Prepare a Cash Budget for the above period from the following data, including the extent of the banking facilities the company will require at the end of each month:

(a) Months	Sales (₹)	Purchases (₹)	Wages (₹)
February	5,40,000	3,74,400	36,000
March	5,76,000	4,32,000	42,000
April	3,24,000	7,29,000	33,000
May	5,22,000	7,38,000	30,000
June	3,78,000	8,04,000	45,000

(b) 50% of the credit sales are realised in the month following the sales and the remaining sales in the second month following. Creditors are paid in the following month of purchase.

(c) Cash at bank on 1st April (estimated) was ₹ 75,000.

Sol.

Cash Budget

Particulars	April ₹	May ₹	June ₹
A. Receipts on Sales			
1st Month	2,70,000	2,88,000	1,62,000
2nd Month	2,88,000	1,62,000	2,61,000
	5,58,000	4,50,000	4,23,000
B. Payment			
Creditors	4,32,000	7,29,000	7,38,000
Workers	33,000	30,000	45,000
	4,65,000	7,59,000	7,83,000
C. Balance (A – B)	93,000	(-) 3,09,000	(-) 3,60,000
Opening Balance 1st April	75,000		
Balance in hand	1,68,000	1,68,000	—
Overdraft required	—	(-) 1,41,000	(-) 1,41,000
Cumulative overdraft	—	—	5,01,000

Ques. 9. Make a cash budget for April-June 2018 from the following information:

(1) Actual and budgeted sales:

Actual (₹)		Budgeted (₹)	
January	1,60,000	April	1,80,000
February	1,60,000	May	1,70,000
March	1,50,000	June	1,60,000

(2) Actual and budgeted purchases:

Actual (₹)		Budgeted (₹)	
January	90,000	April	1,00,000
February	80,000	May	90,000
March	84,000	June	70,000

(3) Actual and budgeted wages and expenses:

	Actual (₹)			Budgeted (₹)	
	Wages (₹)	Expenses (₹)		Wages (₹)	Expenses (₹)
January	40,000	10,000	April	48,000	14,000
February	36,000	12,000	May	40,000	12,000
March	44,000	12,000	June	36,000	10,000

(4) Special: Advance income tax in May of ₹ 8,000, Plant in April ₹ 20,000

(5) Rent ₹ 600 payable each month, not included in expenses.

(6) 10% of purchases and sales are on cash term.

(7) Credit purchases are paid after 1 month and credit sales are collected after 2 months. Time lag in wages and expenses: 1/2 month.

(8) Cash and Bank balance on April 1 was ₹ 26,000.

Sol.

Cash Budget

(for the quarter ending 30th June, 2018)

Particulars	Months		
	April (₹)	May (₹)	June (₹)
Receipts			
Cash sales	18,000	17,000	16,000
Collection from Debtors	1,44,000	1,35,000	1,62,000
Total Receipts	1,62,000	1,52,000	1,78,000
Payments			
Cash Purchases	10,000	9,000	7,000
Payment to Creditors	75,600	90,000	81,000
Payment of Wages	46,000	44,000	38,000
Payment of Rent	600	600	600
Payment of Expenses	13,000	13,000	11,000
Payment of Plant	20,000	—	—
Advance Income tax	—	8,000	—
Total Payments	1,65,200	1,64,600	1,37,600
Opening Balance	26,000	22,800	10,200
Add : Total Receipts	1,62,000	1,52,000	1,78,000
	1,88,000	1,74,800	1,88,200
Less : Total Payments	1,65,200	1,64,600	1,37,600
Closing Balance	22,800	10,200	50,600

Ques. 10. From the following information prepare a Cash Budget of Avon Limited for the half year ending on 30th June, 2018.

Months	Sales (Credit) (₹)	Purchases (Credit) (₹)	Wages (₹)	Mfg. Expenses (₹)	Admn. Expenses (₹)	Selling Expenses (₹)
Nov. 2017	2,50,000	1,00,000	25,000	11,000	10,000	6,000
Dec. 2017	3,00,000	1,50,000	28,000	12,000	9,750	6,500
Jan. 2018	2,00,000	1,00,000	20,000	12,500	10,600	5,500
Feb. 2018	2,50,000	1,50,000	22,000	11,500	10,400	6,500
Mar. 2018	3,00,000	1,75,000	24,000	13,000	11,050	7,500
April 2018	3,00,000	2,00,000	26,000	13,500	11,200	8,000
May 2018	4,00,000	2,25,000	28,000	14,500	11,800	8,250
June 2018	4,50,000	2,50,000	30,000	15,000	11,850	8,750

- (i) A sales commission of 5% on sales due two months after the sales, is payable.
- (ii) Plant purchased on 1st January, 2018 for ₹ 1,00,000, is payable immediately.
- (iii) Building purchased in January for ₹ 8,00,000 payable in two half yearly instalments, the first instalment is due in February, 2018.
- (iv) A dividend of ₹ 50,000 is payable in April.
- (v) Period of credit allowed by creditors and to customers is 2 months.
- (vi) Lag in payment of wages is 1/8 month.
- (vii) Lag in payment of other expenses is one month.
- (viii) Cash balance on January 1, 2018 is expected to be ₹ 3,75,000

Sol.

Cash Budget

(for the half year ending on 30th June, 2018)

Particulars	Jan. (₹)	Feb. (₹)	March (₹)	April (₹)	May (₹)	June (₹)
1. Receipt						
Opening Balance	3,75,000	3,63,250	47,900	85,750	65,950	1,15,500
Debtors	2,50,000	3,00,000	2,00,000	2,50,000	3,00,000	3,00,000
Total	6,25,000	6,63,250	2,47,900	3,35,750	3,65,950	4,15,500
2. Payment						
Paid to Creditors	1,00,000	1,50,000	1,00,000	1,50,000	1,75,000	2,00,000
Wages	21,000	21,750	23,750	25,750	27,750	29,750
Mfg. Exps.	12,000	12,500	11,500	13,000	13,500	14,500
Admn. Exps.	9,750	10,600	10,400	11,050	11,200	11,800
Selling Exps.	6,500	5,500	6,500	7,500	8,000	8,250
Comm. on sales	12,500	15,000	10,000	12,500	15,000	15,000
Payment for Plant	1,00,000	—	—	—	—	—
Payment for Building	—	4,00,000	—	—	—	—
Dividend	—	—	—	50,000	—	—
Total	2,61,750	6,15,350	1,62,150	2,69,800	2,50,450	2,79,300
Closing Balance of Cash (1 – 2)	3,63,250	47,900	85,750	65,950	1,15,500	1,36,200

Working Notes

Amount of wages is calculated as follows :

Gap in time of payment is 1/8 month, it means 7/8 of the expenditure will be paid in the same month and 1/8 in the next month. Therefore, the payment of wages in different months comes like :

Month	Amount (₹)
January (7/8 of Jan. + 1/8 of Dec.)	= (17,500 + 3,500) = 21,000
February (7/8 of Feb. + 1/8 of Jan.)	= (19,250 + 2,500) = 21,750
March (7/8 of Mar. + 1/8 of Feb.)	= (21,000 + 2,750) = 23,750
April (7/8 of April + 1/8 of Mar.)	= (22,750 + 3,000) = 25,750
May (7/8 of May + 1/8 of April)	= (24,500 + 3,250) = 27,750

Ques. 11. From the following information, prepare a Cash Budget by the Adjusted Profit and Loss method for BPL Limited.

Balance Sheet

(as on 31st December, 2017)

Equity and Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	2,50,000	Cash	36,800
Debentures	1,47,000	Debtors	98,000
Creditors	1,34,600	Stock	1,23,800
Accumulated Dep.	1,00,000	Investments	2,00,000
Profit and Loss A/c	2,67,000	Plant	4,40,000
	8,98,600		8,98,600

Forecasted Profit and Loss Account

(as on 31st December, 2017)

Particulars	Amount (₹)	Particulars	Amount (₹)
To Acc. Dep. A/c	44,000	By Gross Profit b/d	4,00,000
To Admn. & Selling Exps.	20,000	By Profit on Sale of Investment	4,000
To Income Tax	10,000	By Interest	20,000
To Interest	6,000		
To Loss on Sale of Plant	16,000		
To Net Profit c/d	3,28,000		
	4,24,000		4,24,000
To Dividend	20,000		
To Balance c/d	3,08,000	By Net Profit b/d	3,28,000
	3,28,000		3,28,000

Additional Information: (i) Investment costing ₹ 20,000 were sold for ₹ 24,000. (ii) New plant costing ₹ 1,60,000 was purchased during the year. (iii) An old plant costing ₹, 1,20,000 and acc. dep. of ₹ 84,000 was sold for ₹ 20,000. Balance on 31st Dec. 2018: (i) Stock ₹ 1,85,000; (ii) Debtors ₹ 16,64,000; (iii) Creditors ₹ 2,00,000; (iv) Debtors ₹ 1,00,000; (v) Equity shares issued during the year ₹ 1,00,000.

Sol.

Cash Budget
(Adjusted Profit and Loss Method)

Particulars	₹	₹
Opening Cash Balance		36,800
Add : Budgeted Net Profit	3,28,000	
Depreciation Written off	44,000	
Increase in creditors	65,400	
Loss on sale of plant	16,000	
Sale of Investment	24,000	
Issue of shares	1,00,000	
Sale of old plant	20,000	5,97,400
		6,34,200
Less : Redemption of Debentures	47,000	
Purchase of Plant	1,60,000	
Payment of Dividend	20,000	
Profit on sale of Investment	4,000	
Increase in Stock	61,200	
Increase in Debtors	68,400	3,60,600
Closing Balance of Cash		2,73,600

Ques. 12. Using the data of Question 11 prepare a Cash Budget showing cash at bank on 31st December, 2018 under 'Projected Balance Sheet Method'.

Sol.

Projected Balance Sheet
(on 31st December)

Equity and Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	3,50,000	Plant	4,80,000
Profit and Loss A/c	5,75,000	Investments	1,80,000
Debentures	1,00,000	Stock	1,85,000
Accumulated Dep.	60,000	Debtors	1,66,400
Creditors	2,00,000	Cash at Bank (Bal. Figure)	2,73,600
	12,85,000		12,85,000

Ques. 13. With the following data for a 60 per cent activity, prepare a budget for production at 80 per cent and 100 per cent activity. Production at 60 per cent activity is 600 units.

Materials	₹ 100 per unit
Labour	₹ 40 per unit
Expenses	₹ 10 per unit
Factory Expenses	₹ 40,000 (40 per cent fixed)
Administration Expenses	₹ 30,000 (60 per cent fixed)

Flexible Budget

Particulars	60%	80%	100%
	Capacity	Capacity	Capacity
	600 Units	800 Units	1,000 Units
	(₹)	(₹)	(₹)
Material @ ₹ 100 per unit	60,000	80,000	1,00,000
Labour @ ₹ 40 per unit	24,000	32,000	40,000
Direct Expenses @ ₹ 10 per unit	6,000	8,000	10,000
Prime Cost	90,000	1,20,000	1,50,000
Factory overheads			
Fixed	16,000	16,000	16,000
Variable @ ₹ 40 per unit	24,000	32,000	40,000
Factory Cost	1,30,000	1,68,000	2,06,000
Administration overheads			
Fixed	18,000	18,000	18,000
Variable @ ₹ 20 per unit	12,000	16,000	20,000
Total	1,60,000	2,02,000	2,44,000

Ques. 14. Prepare a flexible budget for the production at 80% and 100% activity of the following information:

Production at 50% capacity	5,000 units
Raw Materials	₹ 400 per unit
Direct labour	₹ 250 per unit
Direct Expenses	₹ 75 per unit
Factory Expenses	₹ 2,50,000 (50% fixed)
Administration Expenses	₹ 3,00,000 (60% (variable))

Sol.

Flexible Budget

Particulars	50% capacity 5,000 units		80% capacity 8,000 units		100% capacity 10,000 units	
	(₹)		(₹)		(₹)	
	Per unit	Total	Per unit	Total	Per unit	Total
Raw Material	400	20,00,000	400	32,00,000	400	40,00,000
Direct Labour	250	12,50,000	250	20,00,000	250	25,00,000
Direct Expenses	75	3,75,000	75	6,00,000	75	7,50,000
Prime cost	725	36,25,000	725	58,00,000	725	72,50,000
Factory Expenses (Fixed 50%)	25	1,25,000	15.625	1,25,000	12.50	1,25,000
(Variable 50%)	25	1,25,000	25	2,00,000	25	2,50,000
Works Cost	775	38,75,000	765.625	61,25,000	762.50	76,25,000
Admn. Expenses						
(Fixed 40%)	24	1,20,000	15.00	1,20,000	12.00	1,20,000
(Variable 60%)	36	1,80,000	36.00	2,88,000	36.00	3,60,000
Total cost	835	41,75,000	816.625	65,33,000	810.50	81,05,000

Ques. 15. The cost of an article at a capacity of 5,000 units is given under A below. For a variation of 25% in capacity above or below this level the individual expenses vary as indicated under B below:

Particulars	A (₹)	B (₹)
Material	25,000	100% Varying
Labour	15,000	100% Varying
Power	1,250	80% Varying
Repair & Maintenance	2,000	75% Varying
Stores	1,000	100% Varying
Inspection	500	20% Varying
Depreciation	10,000	100% Varying
Admn. Overheads	5,000	25% Varying
Selling Overheads	3,000	25% Varying
Total	62,750	

Cost per unit is ₹ 12.55.

Find the unit cost of the product at production levels of 4,000 units and 6,000 units.

Sol.

Flexible Budget

Particulars	4,000 units		5,000 units		6,000 units	
	Per Unit	Total Amt.	Per Unit	Total Amt.	Per Unit	Total Amt.
	₹	₹	₹	₹	₹	₹
Material cost	5.00	20,000	5.00	25,000	5.00	30,000
Labour cost	3.00	12,000	3.00	15,000	3.00	18,000
Prime cost	8.00	32,000	8.00	40,000	8.00	48,000
Factory Overheads						
Variable (80%)	0.20	800	0.20	1,000	0.20	1,200
Fixed (1250 × 20%)	0.06	250	0.05	250	0.04	250
Repairs and Maintenance						
Fixed (2000 × 25%)	0.13	500	0.10	500	0.08	500
Variable (2000 × 75%)	0.30	1,200	0.30	1,500	0.30	1,800
Stores	0.20	800	0.20	1,000	0.20	1,200
Inspection						
Variable (500 × 20%)	0.02	80	0.02	100	0.02	120
Fixed (500 × 80%)	0.10	400	0.08	400	0.07	400
Depreciation	2.00	8,000	2.00	10,000	2.00	12,000
Works cost	11.01	44,030	10.95	54,750	10.91	65,470
Admn. Overheads						
Fixed (5000 × 75%)	0.94	3,750	0.75	3,750	0.63	3,750
Variable (5000 × 25%)	0.25	1,000	0.25	1,250	0.25	1,500
Selling Overheads						
Fixed (3000 × 75%)	0.56	2,250	0.45	2,250	0.38	2,250
Variable (3000 × 25%)	0.15	600	0.15	750	0.15	900
Total cost	12.91	51,630	12.55	62,750	12.32	73,870

Ques. 16. XYZ Ltd, has prepared the budget for the production of lakh units of the only commodity manufactured by them for a costing period as under:

	(₹ in lakh)
Raw Material	2.52
Direct Labour	0.75
Direct Expenses	0.10
Works Overheads (60% Fixed)	2.25
Administrative Overheads (80% Fixed)	0.40
Selling Overheads (50% fixed)	0.20

The actual production during the period was only 60,000 units. Calculate the revised budgeted cost per unit.
(I.C.W.A. Inter)

Sol.

Flexible Budget

Particulars	Original Budget (1,00,000 Units)		Revised Budget (60,000 Units)	
	Per Unit	Total	Per Unit	Total
Raw Material	2.52	2,52,000	2.52	1,51,200
Direct Labour	0.75	75,000	0.75	45,000
Direct Expenses	0.10	10,000	0.10	6,000
Prime Cost	3.37	3,37,000	3.37	2,02,200
Works overheads				
Fixed (2,25,000 × 60%)	1.35	1,35,000	2.25	1,35,000
Variable (2,25,000 × 40%)	0.90	90,000	0.90	54,000
Works Cost	5.62	5,62,000	6.52	3,91,200
Administrative overheads				
Fixed (40,000 × 80%)	0.32	32,000	0.53	32,000
Variable (40,000 × 20%)	0.08	8,000	0.08	4,800
Cost of Production	6.02	6,02,000	7.13	4,28,000
Selling overheads				
Fixed (20,000 × 50%)	0.10	10,000	0.17	10,000
Variable (20,000 × 50%)	0.10	10,000	0.10	6,000
Cost of Sales	6.22	6,22,000	7.40	4,44,000

Ques. 17. From the information given below prepare flexible budget for 60% and 80% capacities and fix the total overhead rates as a percentage of direct wages at these capacities:

Particulars	At 60% Capacity (₹)	At 75% Capacity (₹)	At 80% Capacity (₹)
Variable Overheads			
Indirect material		7,500	
Indirect Labour		22,500	
Semi-Variable Overheads			
Electricity (40% Fixed)		37,500	
Repairs and maintenance (80% fixed)		3,750	
Fixed Overheads			
Salaries		2,00,000	
Insurance		5,000	
Depreciation		25,000	

Estimated direct wages are ₹ 40,250 at 75% capacity.

(I.C.W.A. Inter)

Sol.

Flexible Budget

Particulars	At 60% Capacity	At 75% Capacity	At 80% Capacity
	₹	₹	₹
Variable Overheads			
Indirect Materials	6,000 (7,500 × 75 / 60)	7,500	8,000 (7,500 × 75 / 80)
Indirect Labour	18,000	22,500	24,000
Semi-Variable Overheads			
Electricity	15,000	15,000	15,000
Fixed (37,500 × 40 / 100)			
Variable (37,500 × 60 / 100)	18,000	22,500	24,000
Repairs and Maintenance			
Fixed (3,750 × 80 / 100)	3,000	3,000	3,000
Variable (3,750 × 20 / 100)	600	750	800
Fixed Overheads			
Salaries	2,00,000	2,00,000	2,00,000
Insurance	5,000	5,000	5,000
Depreciation	25,000	25,000	25,000
Total overheads	2,90,600	3,01,250	3,04,800
Direct wages	32,200 (40,250 / 75) × 60	40,250	42,933 (40,250 / 75) × 80
Overhead rates [(Total overheads / wages) × 100]	$\frac{2,90,600}{32,200} \times 100$ = 903%	$\frac{3,01,250}{40,250} \times 100$ = 748%	$\frac{3,04,800}{42,933} \times 100$ = 710%

Ques. 18. East and West Enterprises is currently working at 50% capacity and produces 10,000 units. Estimate the profits of the company when it works at 60% and 70% capacity.

At 60% capacity, the raw material cost increases by 2% and the selling price falls by 3%. At 70% capacity, the raw material cost increases by 4% and the selling price falls by 5%.

Operating at 50% capacity, the product costs ₹ 180 per unit and is sold at ₹ 200 per unit.

The unit cost of ₹ 180 is made up as follows:

Material	₹ 100
Wages	₹ 30
Factory Overheads	₹ 20 (40% Fixed)
Administrative Overheads	₹ 30 (50% fixed)

Sol.

Flexible Budget

Particulars	60% Capacity Output = 12,000 units		70% of Capacity Output = 14,000	
	Per Unit (₹)	Total (₹)	Per Unit (₹)	Total (₹)
Materials	102 (100 + 2%)	12,24,000	104 (100 + 4%)	14,56,000
Wages	30	3,60,000	30	4,20,000
Factory overheads				
Fixed (40%)	6.67	80,000	5.71	80,000

Admn. overheads	Variable (60%)	12.00	1,44,000	12.00	1,68,000
	Fixed	12.50	1,50,000	10.72	1,50,000
	Variable	15.00	1,80,000	15.00	2,10,000
	Total cost	178.17	21,38,000	177.43	24,84,000
Profit		15.83	1,90,000	12.57	1,76,000
	Sales	194.00 (200 – 3% of 200)	23,28,000	190.00 (200 – 5% of 200)	26,60,000

Ques. 19. A company produces a standard product. The estimated costs per unit are given below:

Materials	₹ 10
Direct Wages	₹ 8
Direct expenses	₹ 2
Variable overheads	₹ 3
Total	<u>₹ 23</u>

Semi-variable overheads at 100% activity level (10,000 units) are estimated to be ₹40,000 and these overheads vary in steps of ₹ 2,000 for each change in output of 1,000 units. Fixed overheads are estimated at ₹50,000. The selling price per unit is also estimated at ₹40.

Prepare a flexible Budget at 50%, 70% and 90% levels of activity.

Sol.

Flexible Budget

Particulars	Capacities		
	50% (5,000 Units)	70% (7,000 Units)	90% (9,000 Units)
	₹	₹	₹
Sales @ ₹ 40 per unit	2,00,000	2,80,000	3,60,000
(A) Variable Expenses			
Materials	50,000	70,000	90,000
Direct wages	40,000	56,000	72,000
Direct expenses	10,000	14,000	18,000
Variable overheads	15,000	21,000	27,000
Total of (A)	1,15,000	1,61,000	2,07,000
(B) Semi-variable Expenses	30,000	34,000	38,000
Total of (A + B)	1,45,000	1,95,000	2,45,000
(C) Fixed Expenses	50,000	50,000	50,000
Total of (A + B + C)	1,95,000	2,45,000	2,95,000
Profit/Loss	(+ 5,000)	(+ 35,000)	(+ 65,000)

Ques. 20. The following data are available in a manufacturing company for a yearly period.

Fixed Expenses:	₹ (in lakhs)
Wages and Salaries	19.0
Rent, Rates and Taxes	13.2
Depreciation	14.8
Sundry Adm. Expenses	13.0
Semi-variable expenses (at 50% of capacity)	
Maintenance and Repairs	7.0
Indirect Labour	15.8
Sales Department Salaries	7.6
Sundry Admn. Exps.	5.6

Variable Expenses (at 50% of Capacity)

Material	43.4
Labour	40.8
Other Expenses	15.8

Assume that the fixed expenses remain constant for all levels of production, semi-variable expenses remain constant between 45% and 65% of capacity, increasing by 10% between 65% and 80% capacity and by 20% between 80% and 100% capacity. Sales at various levels are:

	₹ (in lakhs)
50% Capacity	200
60% capacity	240
75% capacity	300
90% capacity	360
100% capacity	400

Prepare a flexible budget for the year and forecast the profit at 60%, 75%, 90% and 100% capacity.

Sol.

Flexible Budget

	50%	60%	75%	90%	100%
Particulars	₹ (lakhs)	₹ (lakhs)	₹ (lakhs)	₹ (lakhs)	₹ (lakhs)
Variable Expenses:					
Material	43.40	52.08	65.10	78.12	86.80
Labour	40.80	48.96	61.20	73.44	81.60
Other Expenses	15.80	18.96	23.70	28.44	31.60
Semi-variable Expenses:					
Maintenance and Repairs	7.00	7.00	7.70	8.40	8.40
Indirect Labour	15.80	15.80	17.38	18.96	18.96
Sales Department Salaries	7.60	7.60	8.36	9.12	9.12
Sundry Admn. Expenses	5.60	5.60	6.16	6.72	6.72
Fixed Expenses:					
Wages and Salaries	19.00	19.00	19.00	19.00	19.00
Rent, Rates and Taxes	13.20	13.20	13.20	13.20	13.20
Depreciation	14.80	14.80	14.80	14.80	14.80
Sundry Admn. Exps.	13.00	13.00	13.00	13.00	13.00
Total Cost	196.00	216.00	249.60	283.20	303.20
Estimated Profit	4.00	24.00	50.40	76.80	96.80
Sales	200.00	240.00	300.00	360.00	400.00

Ques. 21. The cost of an article at a capacity level of 15,000 units is given under 'A' below. For a variation of 25% in capacity above or below this level, the individual expenses vary as indicated under below 'B'

	A (₹)	B (₹)
Material	75,000	100% Varying
Labour	45,000	100% Varying
Power	3,750	80% Varying
Repair and Maintenance	6,000	75% Varying
Stores	3,000	100% Varying

Inspection	1,500	20% Varying
Depreciation	30,000	100% Fixed
Admn. Overheads	15,000	25% Varying
Selling overheads	9,000	50% Varying
Cost per unit	12.55	

Find the unit cost of the product at production level of 12,000 units, 15,000 units and 18,000 units.

Sol.

Flexible Budget

Particulars	12,000 units		15,000 units		18,000 units	
	Cost per unit (₹)	Amount (₹)	Cost per unit (₹)	Amount (₹)	Cost per unit (₹)	Amount (₹)
Material	5.00	60,000	5.00	75,000	5.00	90,000
Labour	3.00	36,000	3.00	45,000	3.00	54,000
Prime Cost	8.00	96,000	8.00	1,20,000	8.00	1,44,000
Power	0.26	3,150	0.25	3,750	0.24	4,350
Repairs and Maintenance	0.43	5,100	0.40	6,000	0.38	6,900
Stores	0.20	2,400	0.20	3,000	0.20	3,600
Inspection	0.12	1,440	0.10	1,500	0.09	1,560
Depreciation	2.50	30,000	2.00	30,000	1.67	30,000
Cost of Production	11.51	1,38,090	10.95	1,64,250	10.58	1,90,410
Admn. overheads	1.19	14,250	1.00	15,000	0.87	15,750
Selling overheads	0.67	8,100	0.60	9,000	0.55	9,900
Total Cost	13.37	1,60,440	12.55	1,88,250	12.00	2,16,060

Ques. 22. Cello Paints Ltd. company, manufacturing a single product, is facing severe competition in selling it at ₹ 100 per unit. The company is operating at 60% level of capacity at which level the sales are ₹ 24,00,000 and variable costs are ₹ 60 per unit. Semi-variable costs may be considered as fixed at ₹ 1,80,000 when output is nil and the variable element is ₹ 500 for each additional 1% level of activity. Fixed costs are ₹ 3,00,000 at the present level of activity but at 80% level of activity or above, these costs are expected to increase by ₹ 1,00,000.

To cope with the competition, the management of the company is considering a proposal to reduce the selling price by 5%. You are required to prepare a statement showing the operating profit at levels of activity of 60%, 70%, 80%, 90% assuming that:

(a) The selling price remains at ₹ 100.

(b) The selling price is reduced by 5%.

Sol.

Flexible Budget

Particulars	60%	70%	80%	90%
	(24,000 units)	(28,000 units)	(32,000 units)	(36,000 units)
	₹	₹	₹	₹
Variable cost	14,40,000	16,80,000	19,20,000	21,60,000
Semi-variable				
Fixed	1,80,000	1,80,000	1,80,000	1,80,000
Variable	30,000	35,000	40,000	45,000
Fixed cost	3,00,000	3,00,000	4,00,000	4,00,000
	19,50,000	21,95,000	25,40,000	27,85,000
(a) Sales (selling price remaining at ₹ 100)	24,00,000	28,00,000	32,00,000	36,00,000

Profit	4,50,000	6,05,000	6,60,000	8,15,000
(b) Sales (selling price is reduced to ₹95 at 5% reduction)	22,80,000	26,60,000	30,40,000	34,20,000
Profit	3,30,000	4,65,000	5,00,000	6,35,000

Ques. 23. The following information has been made available from the records of Hindustan Tools Ltd. for the last six months of 2017 (and of only the sales of January 2018) in respect of product 'X':

(i) Units to be sold in different months are:

July 2017 = 1,100;	November 2017 = 2,500
August = 1,100;	December 2017 = 2,300
September = 1,700;	January 2018 = 2,000
October = 1,900;	

(ii) There will be no work in progress at the end of any month.

(iii) Finished units equal to half of sales for the next month will be in stock at the end of every month (including June 2017).

(iv) Budgeted production and production cost for the year ending 31st December, 2017 are as follows:

Production (units)	₹ 22,000
Direct materials per unit	₹ 10.00
Direct wages per unit	₹ 4.00
Total factory overhead apportioned to product	₹ 88,000

It is required to prepare:

- (a) a production budget for each of the last six months of 2017, and
- (b) a summarised production cost budget for the same period.

(B.Com. (Hons.) Delhi)

Sol.

(A) Production Budget

Particulars	July	Aug.	Sept.	Oct.	Nov.	Dec.
Sales (in units)	1,100	1,100	1,700	1,900	2,500	2,300
Add : Closing Stock (Half of sales for the next month)	550	850	950	1,250	1,150	1,000
	1,650	1,950	2,650	3,150	3,650	3,300
Less : Opening Stock (Closing stock of last month becomes opening stock of current month)	550	550	850	950	1,250	1,150
Production (in units)	1,100	1,400	1,800	2,200	2,400	2,150

(B) Production Cost Budget

Particulars	Units
Production for six months (July to Dec. 2017)	
in units (1100 + 1400 + 1800 + 2200 + 2400 + 2150)	= 11,050
Direct Material @ ₹ 10 per unit (11050 × 10)	= ₹ 1,10,500
Direct wages @ ₹ 4 per unit (11050 × 4)	= ₹ 44,200
Prime Cost	₹ 1,54,700
Factory overhead $\left(\frac{88,000}{22,000} \times 11050\right)$	₹ 44,200
Total Production cost for 6 months	₹ 1,98,900

Ques. 24. Sangrila Food Product Ltd. has prepared the following sales budget for the first five months of 2018.

Sales Budget (in units)	
January	10,800
February	15,600
March	12,200
April	10,400
May	9,800

The inventory of finished product at the end of every month is to be equal to 25 per cent of sales estimate for the next month. On 1st January, 2018, there were 2,700 units of product on hand. There is no work-in-progress at the end of any month.

Every unit of product requires two types of materials in the following quantities:

Material A 4 units

Material B 5 units

Material equal to one-half of the next month's production are to be on hand at the end of every month. This requirement was met on 1st January 2018.

Prepare a material Budget for the first quarter of 2018 in a logical form showing the quantities of each type of material to be purchased. *(B.Com. (Hons.) Delhi.)*

Sol. For preparing a material budget for a first quarter of 2018, estimated production for first 3 months of 2018 should be known which is not given in the problem. It is calculated as given below:

	= Estimated Sales + Desired closing Stock of Finished Goods – Estimated Opening Stock of Finished Goods			
	January	February	March	Total
	(units)	(units)	(units)	(units)
Sales	10,800	15,600	12,200	38,600
Add : Closing Stock (25% sales of next month)	3,900	3,050	2,600	9,550
	14,700	18,650	14,800	48,150
Less : Opening Stock of Finished Goods	2,700	3,900	3,050	9,650
Estimated Production	12,000	14,750	11,750	38,500

Note : Closing Stock:

$$\text{January} = \frac{25}{100} \times 15,600 = 3,900$$

$$\text{February} = \frac{25}{100} \times 12,200 = 3,050$$

$$\text{March} = \frac{25}{100} \times 10,400 = 2,600$$

Material Budget

Particulars	Material A (units)	Material B (units)
Material required to meet the production target :		
Material A @ 4 units for 38,500 units of finished product	1,54,000	
Material B @ 5 units for 38,500 units of finished product		1,92,500
Add :		
Desired closing balance of materials at the end of March 2018 equal to 1/2 of requirement of material for April's production	20,500	25,625
	1,74,500	2,18,125

Less : Estimated opening balance of materials at beginning of January 2018 equal to 1/2 of requirement of materials for January's production	24,000	30,000
	1,50,500	1,88,125

Working Notes

(a) Desired closing balance of materials at the end of March is calculated as follows:

	Units
Sales in April	10,400
Add : Closing Stock and finished goods equal to 25% sales of May (25% of 9,800)	2,450
	<u>12,850</u>
Less : Opening stock of finished good equal to 25% of sales of April (25% of 10400)	2,600
	<u>10,250</u>
Estimated production for April =	10,250

Closing balance of materials at the end of March is equal to 1/2 of the requirement of materials for April's production, which is as follows :

$$\text{Material A} = 1/2 \times 10250 \times 4 = 20,500 \text{ units}$$

$$\text{Material B} = 1/2 \times 10250 \times 5 = 25625 \text{ units}$$

(b) Opening balance of materials at the beginning of January equal to 1/2 of the requirement of material for January's production

$$\text{Material A} = 1/2 \times 12000 \times 4 = 24,000 \text{ units}$$

$$\text{Material B} = 1/2 \times 12000 \times 5 = 30,000 \text{ units}$$

Ques. 25. The selling expenses of a business for a particular budget period are:

	(₹)
Sales office salaries	4,000
Fixed expenses of sales office	3,000
Amount allocated for advertisement	4,000
Traveller's remuneration:	
Fixed Salaries and car allowance	12,000
Commission	1% on sales effected
Agent's commission	7 ½ % on sales

Prepare a selling overheads budget for the following levels of sales for the period:

(i) ₹ 2,80,000 including agent's sales ₹ 30,000

(ii) ₹ 3,20,000 including agent's sales ₹ 35,000

(iii) ₹ 3,60,000 including agent's sales ₹ 35,000.

Sol.

Selling Overheads Budget

Particulars	Sales	Sales	Sales
	for ₹ 2,80,000	for ₹ 3,20,000	for ₹ 3,60,000
	₹	₹	₹
Fixed selling overheads			
Sales office salaries	4,000	4,000	4,000
Fixed expenses of sales office	3,000	3,000	3,000
Advertisement	4,000	4,000	4,000
Traveller's remuneration	12,000	12,000	12,000
Total Fixed selling overheads	<u>23,000</u>	<u>23,000</u>	<u>23,000</u>

Variable selling overheads			
Traveller's commission @ 1% of sales	2,500 (1% on 2,50,000)	2,850 (1% on 2,85,000)	3,250 (1% on 3,25,000)
Agent's commission @ $7\frac{1}{2}$ % on Agent's sales	2,250 ($7\frac{1}{2}$ % on 30,000)	2,625 ($7\frac{1}{2}$ % on 35,000)	2,625 ($7\frac{1}{2}$ % on 35,000)
Total selling overheads	27,750	28,475	28,875

Ques. 26. Prepare a Cash Budget for the three months ending 30th September from the following information:

(a)

Month	Amount (in ₹)			
	Sales	Materials	Wages	Overheads
May	28,000	19,200	6,000	3,400
June	30,000	18,000	6,000	3,800
July	32,000	18,400	6,400	4,000
August	34,000	20,000	7,200	4,400
September	36,000	20,400	8,000	4,600

(b) Credit terms are:

Sales/Debtors — 10% sales are on cash, 50% of the credit sales are collected next month and balance in the following month.

(c) Creditors: Materials – 2 months; Wages $\frac{1}{4}$ month; and Overheads – $\frac{1}{2}$ month.

(d) Cash and Bank balance on 1st July is expected to be ₹60,000.

(e) Other relevant informations are:

(i) Plant and Machinery will be installed in May at a cost of ₹1,92,000. The monthly instalments of ₹4,000 are payable from July onwards.

(ii) Dividends 5% on Preference Share Capital of ₹4,00,000 will be paid on 1st September.

(iii) Advance to be received for sale of vehicles ₹18,000 in September.

(iv) Dividends from investments amounting to ₹5,000 are expected to be received in September.

(v) Advance income tax to be paid in September is ₹4,000.

[B.Com. HPU, April 2018]

Sol. Working Note

1. Calculation of Amount Collected from Debtors:

Particulars	Amt. (in ₹)		
	July	August	September
May – $(28,000 - \frac{10}{100} \times 28,000) \times \frac{50}{100}$	12,600	—	—
June – $(30,000 - \frac{10}{100} \times 30,000) \times \frac{50}{100}$	13,500	13,500	—
July – $(32,000 - \frac{10}{100} \times 32,000) \times \frac{50}{100}$	—	14,400	14,400
August – $(34,000 - \frac{10}{100} \times 34,000) \times \frac{50}{100}$	—	—	15,300
∴ Total Collection from Debtors	26,100	27,900	29,700

Cash Budget

For three months ending on 30th September

Particulars	Amt. (in ₹)		
	July	August	September
(A) Receipts:			
Opening Balance of Cash in Hand	60,000	55,900	54,000

Cash Sales — (10% of Sales)	3,200	3,400	3,600
Collection from Debtors (W.Note-01)	26,100	27,900	29,700
Advance Against Vehicles	—	—	18,000
Dividends from Investments	—	—	5,000
∴ Total Receipts (A)	89,300	87,200	1,10,300
(B) Payments:			
Creditors for Materials — (2 months)	19,200	18,000	18,400
Wages — (25% of Previous Month + 75% of Current Month)	6,300	7,000	7,800
Overheads — (50% Previous Month + 50% of Current Month)	3,900	4,200	4,500
Plant and Machinery — (Capital Expenditure)	4,000	4,000	4,000
Dividends of Preference Shares	—	—	20,000
Advance Payment of Income Tax	—	—	4,000
∴ Total Payments (B)	33,400	33,200	58,700
Thus, Closing Balance of Cash (A – B)	55,900	54,000	51,600

Ques. 27. The budget manager of Jupiter Electricals Limited is preparing a flexible budget for the accounting year starting from 1 July, 2015.

The company produces one product—DETX II. Direct material costs ₹7 per unit. Direct labour averages ₹2.50 per hour and requires 1.6 hours to produce one unit of DETX II. Salesmen are paid a commission of ₹1 per unit sold. Fixed selling and administrative expenses amount to ₹85,000 per year.

Manufacturing overhead is estimated in the following amounts under specified conditions of volume:

Particulars	Volume of production (in units)	
	1,20,000 (₹)	1,50,000 (₹)
Expenses:		
Indirect material	2,64,000	3,30,000
Indirect labour	1,50,000	1,87,500
Inspection	90,000	1,12,000
Maintenance	84,000	1,02,000
Supervision	1,98,000	2,34,000
Depreciation—Plant and equipment	90,000	90,000
Engineering services	94,000	94,000
Total manufacturing overhead	<u>9,70,000</u>	<u>11,50,000</u>

Normal capacity is 1,25,000 units.

Prepare a budget of total cost at 1,40,000 units of production.

Sol. **Working Notes**

1. Calculation of Indirect Material per unit:

$$\text{Indirect Material per unit} = \frac{\text{₹ } 2,64,000}{1,20,000 \text{ units}} \text{ or } \frac{\text{₹ } 3,30,000}{1,50,000 \text{ units}} = \text{₹ } 2.20$$

2. Calculation of Indirect Labour per unit:

$$\text{Indirect Labour per unit} = \frac{\text{₹ } 1,50,000}{1,20,000 \text{ units}} \text{ or } \frac{\text{₹ } 1,87,500}{1,50,000 \text{ units}} = \text{₹ } 1.25$$

3. Calculation of Inspection per unit:

$$\text{Inspection per unit} = \frac{\text{₹ } 90,000}{1,20,000 \text{ units}} \text{ or } \frac{\text{₹ } 1,12,500}{1,50,000 \text{ units}} = \text{₹ } 0.75$$

4. Maintenance: Semi-variable Overhead

$$\begin{aligned} \text{Variable Maintenance Cost per unit} &= \frac{\text{Change in Maintenance Cost}}{\text{Change in Output}} \\ &= \frac{\text{₹ } (1,02,000 - 84,000)}{(1,50,000 - 1,20,000)\text{units}} \\ &= \frac{\text{₹ } 18,000}{30,000\text{units}} = \text{₹ } 0.60 \end{aligned}$$

$$\begin{aligned} \text{Fixed Maintenance Cost} &= \text{Semi-variable Cost} - \text{Variable Cost} \\ &= \text{₹ } 1,02,000 - (1,50,000 \text{ units} \times \text{₹ } 0.60) \\ &= \text{₹ } (1,02,000 - 90,000) = \text{₹ } 12,000 \end{aligned}$$

or

$$\begin{aligned} &= \text{₹ } 84,000 - (1,20,000 \text{ units} \times \text{₹ } 0.60) \\ &= \text{₹ } (84,000 - 72,000) = \text{₹ } 12,000 \end{aligned}$$

Thus, for 1,40,000 units:

$$\text{Variable Cost} = 1,40,000 \text{ units} \times \text{₹ } 0.60 = \text{₹ } 84,000$$

$$\text{Fixed Cost} = \text{₹ } 12,000$$

$$\therefore \text{Total Maintenance Cost} = \text{₹ } 96,000$$

5. Supervision: Semi-variable Overhead

$$\text{Variable Supervision Cost} = \frac{\text{₹ } (2,34,000 - 1,98,000)}{(1,50,000 - 1,20,000)\text{units}} = \frac{\text{₹ } 36,000}{30,000\text{units}} = \text{₹ } 1.20$$

Fixed Supervision Cost = Semi-variable – Variable

$$= \text{₹ } 2,34,000 - (1,50,000 \times \text{₹ } 1.20) = \text{₹ } (2,34,000 - 1,80,000) = \text{₹ } 54,000$$

Or

$$= \text{₹ } 1,98,000 - (1,20,000 \times \text{₹ } 1.20) = \text{₹ } (1,98,000 - 1,44,000) = \text{₹ } 54,000$$

Thus, for 1,40,000 units:

$$\text{Variable Cost} = 1,40,000 \times \text{₹ } 1.20 = \text{₹ } 1,68,000$$

$$\text{Fixed Cost} = \text{₹ } 54,000$$

$$\text{Hence, Total Supervision Cost} = \text{₹ } 2,22,000$$

Jupiter Electricals Ltd.
Flexible Budget

Period: 1st July, 2015	Normal: 1,25,000 units Capacity: Budgeted: 1,40,000 units
Particulars	Amt. (in ₹)
Direct Material Cost @ ₹7.00 per unit	9,80,000
Direct Labour Cost — (1,40,000 units × 1.60 Hrs. × ₹2.50)	5,60,000
Direct Expenses	Nil
∴ Prime Cost	15,40,000
Manufacturing Overheads:	
Indirect Materials @ ₹ 2.20 per unit	3,08,000
Indirect Labour @ ₹ 1.25 per unit	1,75,000
Inspection @ ₹0.75 per unit	1,05,000
Maintenance — Semi-variable – (W.N.–04)	96,000
Supervision — Semi-variable – (W.N.–05)	2,22,000
Depreciation — Fixed	90,000
Engineering Services – Fixed	94,000
∴ Works Cost	26,30,000

Selling and Administration Expenses:	
Salesmen Commission @ ₹ 1.00 per unit	1,40,000
Fixed Selling and Administration Expenses	85,000
Hence, Total Cost	28,55,000

Ques. 28. The following data are available in a manufacturing company for a half-yearly period:

Particulars	(₹ in lakhs)	(₹ in lakhs)
Fixed Expenses:		
Wages and salaries	8.4	
Rent, rates and taxes	5.6	
Depreciation	7.0	
Sundry administration expenses	<u>8.9</u>	29.9
Semi-variable Expenses:		
(At 50% of capacity)		
Maintenance and repairs	2.5	
Indirect labour	9.9	
Sales department salaries, etc.	2.9	
Sundry administration expenses	<u>2.6</u>	17.9
Variable Expenses:		
(at 50% of capacity)		
Materials	24.0	
Labour	25.6	
Other expenses	<u>3.8</u>	53.4

Assume that the fixed expenses remain constant for all levels of production, semi-variable expenses remain constant between 45% and 65% of capacity, increasing by 10% between 65% and 80% capacity, and by 20% between 80% and 100% capacity.

Sales at the various levels are: (₹ in lakhs)

60% Capacity	100.00
75% Capacity	120.00
90% Capacity	150.00
100% Capacity	170.00

Prepare a flexible budget for the half year and forecast the profits at 60%, 75%, 90% and 100% of capacity.

Sol.

Working Notes:

1. Calculation of Variable Expenses per unit:

(i) **Material:**

$$\text{At 60\% Capacity: } \frac{\text{₹}24,00,000}{50} \times 60 = \text{₹}28,80,000$$

$$\text{At 75\% Capacity: } \frac{\text{₹}24,00,000}{50} \times 75 = \text{₹}36,00,000$$

$$\text{At 90\% Capacity: } \frac{\text{₹}24,00,000}{50} \times 90 = \text{₹}43,20,000$$

$$\text{At 100\% Capacity: } \frac{\text{₹}24,00,000}{50} \times 100 = \text{₹}48,00,000$$

(ii) Labour:

$$\text{At 60\% Capacity: } \frac{\text{₹}25,60,000}{50} \times 60 = \text{₹}30,72,000$$

$$\text{At 75\% Capacity: } \frac{\text{₹}25,60,000}{50} \times 75 = \text{₹}38,40,000$$

$$\text{At 90\% Capacity: } \frac{\text{₹}25,60,000}{50} \times 90 = \text{₹}46,00,000$$

$$\text{At 100\% Capacity: } \frac{\text{₹}25,60,000}{50} \times 100 = \text{₹}51,20,000$$

(iii) Other Expenses:

$$\text{At 60\% Capacity: } \frac{\text{₹}3,80,000}{50} \times 60 = \text{₹}4,56,000$$

$$\text{At 75\% Capacity: } \frac{\text{₹}3,80,000}{50} \times 75 = \text{₹}5,70,000$$

$$\text{At 90\% Capacity: } \frac{\text{₹}3,80,000}{50} \times 90 = \text{₹}6,84,000$$

$$\text{At 100\% Capacity: } \frac{\text{₹}3,80,000}{50} \times 100 = \text{₹}7,60,000$$

Flexible Budget

Particulars	Amount (in ₹)			
	60% Capacity	75% Capacity	90% Capacity	100% Capacity
Fixed Expenses				
Wages and Salaries	8,40,000	8,40,000	8,40,000	8,40,000
Rent, Rates and Taxes	5,60,000	5,60,000	5,60,000	5,60,000
Depreciation	7,00,000	7,00,000	7,00,000	7,00,000
Sundry Administration Expenses	8,90,000	8,90,000	8,90,000	8,90,000
∴ Total Fixed Cost (A)	29,90,000	29,90,000	29,90,000	29,90,000
Semi-variable Expenses				
Maintenance and Repairs	2,50,000	2,75,000	3,00,000	3,00,000
Indirect Labour	9,90,000	10,89,000	11,88,000	11,88,000
Sales Deptt. Salaries, etc.	2,90,000	3,19,000	3,48,000	3,48,000
	2,60,000	2,86,000	3,12,000	3,12,000
∴ Total Semi-variable Cost (B)	17,90,000	19,69,000	21,48,000	21,48,000
Variable Expenses				
Material	28,80,000	36,00,000	43,20,000	48,00,000
Labour	30,72,000	38,40,000	46,08,000	51,20,000
Other Expenses	4,56,000	5,70,000	6,84,000	7,60,000
∴ Total Fixed Cost (C)	64,08,000	80,10,000	96,12,000	10,68,000
Thus, Total Cost — [A + B + C]	1,11,88,000	1,29,69,000	1,47,50,000	1,58,18,000
Sales	1,00,00,000	1,20,00,000	1,50,00,000	1,70,00,000
Less: Total Cost	(1,11,88,000)	(1,29,69,000)	(1,47,50,000)	(1,58,18,000)
Hence, Profit (Loss)	(11,88,000)	(9,69,000)	(2,50,000)	11,82,000

Ques. 29. The following information relates to a Flexible Budget at 60% capacity. Find out the overhead costs at 50% and 70% capacity and also determine the overhead rates:

Particulars	Expenses at 60% capacity Amount (in ₹)
Variable Overheads:	
Indirect labour	10,500
Indirect Materials	8,400
Semi-Variable Overheads:	
Repairs and Maintenance (70% fixed, 30% variable)	7,000
Electricity (50% fixed, 50% variable)	25,200
Fixed Overheads:	
Office expenses including salaries	70,000
Insurance	4,000
Depreciation	20,000
Total	1,45,100

Estimated direct labour hours = ₹1,20,000

(B. Com-III, HPU, 2009)

Sol. Working Notes:

1. **Repairs and Maintenance:** 70% fixed and 30% variable

At 60% Capacity:

$$\text{Fixed} = \frac{70}{100} \times 7000 = \text{₹}4,900$$

$$\text{Variable} = \frac{30}{100} \times 7000 = \text{₹}2,100$$

At 50% Capacity: Fixed = ₹ 4,900

$$\text{Variable} = \frac{\text{₹}2100}{60} \times 50 = \text{₹}1,750$$

Thus,

Total Repairs and Maintenance at 50% = ₹ (4,900 + 1,750) = ₹6,650

At 70% Capacity: Fixed = ₹4,900

$$\text{Variable} = \frac{\text{₹}2,100}{60} \times 70 = \text{₹}2,450$$

Thus, **Total Repairs and Maintenance at 70% = ₹ (4,900 + 2,450) = ₹7,350**

2. **Electricity: 50% fixed and 50% Variable.**

At 60% capacity: Fixed = $\frac{50}{100} \times \text{₹}25,200 = \text{₹}12,600$

$$\text{Variable} = \frac{50}{100} \times \text{₹}25,200 = \text{₹}12,600$$

At 50% capacity: Fixed = ₹ 12,600

$$\text{Variable} = \frac{\text{₹}12,600}{60} \times 50 = \text{₹}10,500$$

Hence, **Total Electricity Cost at 50% = ₹ (12,600 + 10,500) = ₹ 23,100**

At 70% Capacity: Fixed = ₹12,600

$$\text{Variable} = \frac{\text{₹}12,600}{60} \times 70 = \text{₹}14,700$$

Hence, **Total Electricity Cost at 70% = ₹ (12,600 + 14,700) = ₹27,300**

Flexible Budget

Particulars	Amount (in ₹)		
	50% Capacity	60% Capacity	70% Capacity
Variable Overheads:			
Indirect Labour	8,750	10,500	12,250
Indirect Materials	7,000	8,400	9,800
Semi-variable Overheads:			
Repairs and Maintenance – (W.N.–1)	6,650	7,000	7,350
Electricity – (W.N.–2)	23,100	25,200	27,300
Fixed Overheads:			
Office Expenses including Salaries	70,000	70,000	70,000
Insurance	4,000	4,000	4,000
Depreciation	20,000	20,000	20,000
Total Overheads	1,39,500	1,45,100	1,50,700
Estimated Direct Labour Hours	1,00,000	1,20,000	1,40,000
∴ Overhead Rate	1.395	1.21	1.077

Ques. 30. Moksha Ltd. is currently operating at 75% capacity. In the past two years, its level of operation were 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during 2009-10. The cost details are as follows:

Particulars	Level of Capacity (Amount in ₹)		
	55%	65%	75%
Direct Materials	11,00,000	13,00,00	15,00,00
Direct Labour	5,50,000	6,50,000	7,50,000
Factory Overheads	3,10,000	3,30,000	4,00,000
Selling Overheads	3,20,000	3,60,000	4,00,000
Administrative Overheads	1,60,000	1,60,000	1,60,000

Profits are estimated @20% on sales. Incorporate the following increases in cost during the year:

Particulars	Increase in Percentage
Direct Materials	8
Direct Labour	5
Variable Factory Overheads	5
Variable Selling Overheads	8
Fixed Factory Overheads	10
Fixed Selling Overheads	15
Administrative Overheads	10

Prepare '**Flexible Budget**' for the period 2009-10 at 85% level of capacity and also ascertain profit.

(B.Com-III, HPU, 2010)

Sol. Working Notes:

1. Calculation of Fixed and Variable Costs:

- Direct Material Cost per unit = $\frac{₹ 11,00,000}{55,000 \text{ units}} = ₹20.00$

$$\bullet \text{ Direct Labour Cost per unit} = \frac{\text{₹}5,50,000}{55,000 \text{ units}} = \text{₹}10.00$$

2. Factory Overheads:

$$\begin{aligned} \text{Variable} &= \frac{\text{Change in Factory Overheads}}{\text{Change in Output}} \\ &= \frac{\text{₹}(3,30,000 - 3,10,000)}{(65,000 - 55,000) \text{ units}} \\ &= \frac{\text{₹}20,000}{10,000 \text{ units}} \\ &= \text{₹}2.00 \end{aligned}$$

$$\begin{aligned} \text{Fixed} &= (\text{Total Factory Overheads} - \text{Variable Factory Overheads}) \\ &= \text{₹}3,30,000 - (65,000 \text{ units} \times \text{₹}2) \\ &= \text{₹}(3,30,000 - 1,30,000) \\ &= \text{₹}2,00,000 \end{aligned}$$

3. Selling Overheads:

$$\text{Variable} = \frac{\text{₹}(3,60,000 - 3,20,000)}{(65,000 - 55,000) \text{ units}} = \frac{\text{₹}40,000}{10,000 \text{ units}} = \text{₹}4.00$$

$$\begin{aligned} \text{Fixed} &= (\text{Total Selling Overheads} - \text{Variable Selling Overheads}) \\ &= \text{₹}3,60,000 - (65,000 \text{ units} \times \text{₹}4) \\ &= \text{₹}(3,60,000 - 2,60,000) \\ &= \text{₹}1,00,000 \end{aligned}$$

Moksha Ltd.
Flexible Budget

Period: 2009-10

Capacity: 85% (85,000 units)

Particulars	85,000 Units
	Amt. (in ₹)
Variable Overheads	
Direct Materials — (85,000 units × ₹20 + 8% of ₹17,00,000)	18,36,000
Direct Labour — (85,000 units × ₹10 + 5% of ₹8,50,000)	8,92,800
Variable Factory Overheads — (85,000 units × ₹2 + 5% of ₹1,70,000)	1,78,500
Variable Selling Overheads — (85,000 units × ₹4 + 8% of ₹3,40,000)	3,67,200
∴ Total Variable Overheads — (A)	32,74,200
Fixed Overheads:	
Fixed Factory Overheads — (2,00,000 + 10% of 2,00,000)	2,20,000
Fixed Selling Overheads — (1,00,000 + 15% of 1,00,000)	1,15,000
Fixed Administrative Overheads — (1,60,000 + 10% of 1,60,000)	1,76,000
∴ Total Fixed Overheads — (B)	5,11,000
∴ Total Overheads — (A + B)	37,85,200
Add: Profit @ 20% on Sales, (i.e., 25% on Cost) — $(37,85,200 \times \frac{25}{100})$	9,46,300
Thus, Budgeted Sales	47,31,500

Ques. 31. Singh and Company produces 4,000 units per month of a certain product at 100% capacity. The following information is obtained:

Particulars	Months (Amount in ₹)	
	August	September
Units Produced	2,800 units	3,600 units
Repairs and Maintenance	500	560

Power	1,800	2,000
Shop Labour	700	900
Consumable Stores	1,400	1,800
Salaries	1,000	1,000
Inspection	200	240
Depreciation	1,400	1,400

Rate of production per hour is 10 units. Direct Material cost per unit is ₹1.00 and Direct wages per hour is ₹4.00.

Required: (i) Compute the cost of production at 100%, 80% and 60% capacity, showing the variable, Fixed and semi-variable items under the 'Flexible Budget'.

(ii) Find out the Overhead Absorption Rate per unit at 80% capacity.

Sol.

Working Notes:

1. Calculation of Variable Cost per unit:

$$\text{Shop Labour} = \frac{\text{₹}700}{2,800 \text{ units}} \text{ or } \frac{\text{₹}900}{3,600 \text{ units}} = \text{₹}0.25 \text{ per unit}$$

$$\text{Consumable Stores} = \frac{\text{₹}1,400}{2,800 \text{ units}} \text{ or } \frac{\text{₹}1,800}{3,600 \text{ units}} = \text{₹}0.50 \text{ per unit}$$

2. Calculation of Semi-variable Overheads:

Repairs and Maintenance:

$$\text{Variable} = \frac{\text{Change in Repairs and Maintenance Cost}}{\text{Change in Output}}$$

$$= \frac{\text{₹}(560 - 500)}{(3,600 - 2,800) \text{ units}} = \frac{\text{₹}60}{800 \text{ units}} = \text{₹}0.075 \text{ per unit}$$

$$\text{Fixed} = \text{Total Repairs and Maintenance} - \text{Variable Part of R/M.}$$

$$= \text{₹} [500 - (2,800 \text{ units} \times \text{₹}0.075)] = \text{₹} (500 - 210) = \text{₹}290$$

$$\text{Or} = \text{₹} [560 - (3,600 \text{ units} \times \text{₹}0.075)] = \text{₹} (560 - 270) = \text{₹}290$$

Power:

$$\text{Variable} = \frac{\text{Change in Power Cost}}{\text{Change in Output}}$$

$$= \frac{\text{₹}(2,000 - 1,800)}{(3,600 \text{ units} - 2,800 \text{ units})} = \frac{\text{₹}200}{800 \text{ units}} = \text{₹}0.25 \text{ per unit}$$

$$\text{Fixed} = \text{Total Power Cost} - \text{Variable Part of Power Cost}$$

$$= \text{₹} [1,800 - (2,800 \text{ units} \times \text{₹}0.25)] = \text{₹} (1,800 - 700) = \text{₹}1,100$$

$$\text{Or} = \text{₹} [2,000 - (3,600 \text{ units} \times \text{₹}0.25)] = \text{₹} (2,000 - 900) = \text{₹}1,100$$

Inspection:

$$\text{Variable} = \frac{\text{Change in Inspection Cost}}{\text{Change in Output}}$$

$$= \frac{\text{₹}(240 - 200)}{(3,600 - 2,800) \text{ units}} = \frac{\text{₹}40}{800 \text{ units}} = \text{₹}0.05 \text{ per unit}$$

$$\text{Fixed} = \text{Total Inspection Cost} - \text{Variable part of Inspection Cost}$$

$$= \text{₹} [200 - (2,800 \text{ units} \times \text{₹}0.05)] = \text{₹} (200 - 140) = \text{₹}60$$

$$\text{Or} = \text{₹} [240 - (3,600 \text{ units} \times \text{₹}0.05)] = \text{₹} (240 - 180) = \text{₹}60$$

(i)

Singh and Company
Flexible Budget

Capacity	100%	80%	60%
Output (in units)	4,000	3,200	2,400
Variable Overheads:	(₹)	(₹)	(₹)
Direct Material @ ₹ 1.00 per unit	4,000	3,200	2,400
Direct Wages @ ₹ 4 per hour, (i.e., $\frac{₹4}{10}$) = ₹ 0.40 per unit	1,600	1,280	960
Shop Labour @ ₹ 0.25 per unit	1,000	800	600
Consumable Stores @ ₹ 0.50 per unit	2,000	1,600	1,200
∴ Total Variable Overheads (A)	8,600	6,880	5,160
Fixed Overheads:			
Salaries	1,000	1,000	1,000
Depreciation	1,400	1,400	1,400
∴ Total Fixed Overhead (B)	2,400	2,400	2,400
Semi-Variable Overheads:			
Repairs and Maintenance @ ₹ 0.075 per unit (+) ₹ 290 fixed	590	530	470
Power @ ₹ 0.25 per unit (+) ₹ 1,100 fixed	2,100	1,900	1,700
Inspection @ ₹ 0.05 per unit (+) ₹ 60 fixed	260	220	180
∴ Total Semi-Variable Overheads (C)	2,950	2,650	2,350
Hence, Total Cost of Production — [A + B + C]	13,950	11,930	9,910

(ii) **Overhead Absorption Rate per unit at 80% Capacity:**

$$\begin{aligned}
 &= \frac{\text{Total Overheads}}{\text{Budgeted Output}} \\
 &= \frac{(\text{Total Cost of Production} - \text{D/M} - \text{D/W})}{\text{Budgeted Output}} \\
 &= \frac{₹ (11,930 - 3,200 - 1,280)}{3,200 \text{ units}} \\
 &= \frac{₹ 7,450}{3,200 \text{ units}} \\
 &= ₹ 2.33
 \end{aligned}$$



Standard Costing and Variance Analysis

Ques. 1. From the following data calculate:

(i) Material Cost Variance, (ii) Material Price Variance (iii) Material Usage Variance.

Products	SQ (Units)	SP (₹)	AQ (Units)	Actual Price (AP) (₹)
A	525	2.00	550	2.25
B	750	3.25	700	3.50
C	1,050	3.50	1,000	3.75

Sol.

(i) Material Cost Variance (MCV) = (SQ × SP) – (AQ × AP)

$$\begin{aligned}
 A &= (525 \times 2) - (550 \times 2.25) \\
 &= 1050 - 1237.50 &= & ₹ 187.5 \text{ (Adv.)} \\
 B &= (750 \times 3.25) - (700 \times 3.50) \\
 &= 2437.50 - 2450 &= & ₹ 12.5 \text{ (Adv.)} \\
 C &= (1050 \times 3.50) - (1000 \times 3.75) \\
 &= 3,675 - 3,750 &= & ₹ 75.0 \text{ (Adv.)} \\
 \text{MCV} & &= & ₹ 275.0 \text{ (Adv.)}
 \end{aligned}$$

(ii) Material Price Variance (MPV) = AQ (SP – AP)

$$\begin{aligned}
 A &= 550 (2.00 - 2.25) &= & ₹ 137.5 \text{ (Adv.)} \\
 B &= 700 (3.25 - 3.50) &= & ₹ 175.0 \text{ (Adv.)} \\
 C &= 1,000 (3.50 - 3.75) &= & ₹ 250.0 \text{ (Adv.)} \\
 \text{MPV} & &= & ₹ 562.5 \text{ (Adv.)}
 \end{aligned}$$

(iii) Material Usage Variance (MUV) = SP (SQ – AQ)

$$\begin{aligned}
 A &= 2.00 (525 - 550) &= & ₹ 50.0 \text{ (Adv.)} \\
 B &= 3.25 (750 - 700) &= & ₹ 162.5 \text{ (Fav.)} \\
 C &= 3.50 (1050 - 1000) &= & ₹ 175.0 \text{ (Fav.)} \\
 \text{MUV} & &= & ₹ 287.5 \text{ (Fav.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 \text{MCV} &= \text{MPV} + \text{MUV} \\
 ₹ 275.0 \text{ (Adv.)} &= ₹ 562.5 \text{ (Adv.)} + ₹ 287.5 \text{ (Fav.)} \\
 ₹ 275.0 \text{ (Adv.)} &= ₹ 275.0 \text{ (Adv.)}
 \end{aligned}$$

Ques. 2. Calculate Material Mix Variance:

Materials	Std. Qty. (kg)	Std. Price (₹)	Actual Qty. (₹)	Actual Price (₹)
A	20	5	25	6
B	30	3	25	5

Sol. As in this question the total weight of standard mix is equal to the total weight of actual mix, Material Mix Variance will be calculated as follows :

$$\begin{aligned}
 \text{MMV} &= \text{SP (SQ - AQ)} \\
 \text{A} &= 5 (20 - 25) && = ₹ 25 \text{ (Adv.)} \\
 \text{B} &= 3 (30 - 25) && = ₹ 15 \text{ (Fav.)} \\
 &&& \underline{\text{MMV}} \\
 &&& = ₹ 10 \text{ Adv.}
 \end{aligned}$$

Ques. 3. Find out the material variances.

Material	Std. Qty. (units)	Std. Price (₹)	Actual Qty. (₹)	Actual Price (₹)
A	50	2	60	3
B	25	5	30	4
	75		90	

Sol. (i) Material Cost Variance (MCV) = (SQ × SP) – (AQ × AP)

$$\begin{aligned}
 \text{A} &= (50 \times 2) - (60 \times 3) \\
 &= 100 - 180 && = ₹ 80 \text{ (Adv.)} \\
 \text{B} &= (25 \times 5) - (30 \times 4) \\
 &= 125 - 120 && = ₹ 5 \text{ (Fav.)}
 \end{aligned}$$

$$\text{MCV} = \underline{₹ 75 \text{ (Adv.)}}$$

(ii) Material Price Variance (MPV)

$$\begin{aligned}
 \text{A} &= 60 (2 - 3) && = ₹ 60 \text{ (Adv.)} \\
 \text{B} &= 30 (5 - 4) && = ₹ 30 \text{ (Fav.)} \\
 &&& = ₹ 30 \text{ (Adv.)}
 \end{aligned}$$

(iii) Material Usage Variance (MUV)

$$\begin{aligned}
 \text{A} &= 2 (50 - 60) && = ₹ 20 \text{ (Adv.)} \\
 \text{B} &= 5 (25 - 30) && = ₹ 25 \text{ (Adv.)} \\
 \text{MUV} &&& = ₹ 45 \text{ (Adv.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 \text{MCV} &= \text{MPV} + \text{MUV} \\
 ₹ 75 \text{ (Adv.)} &= ₹ 30 \text{ (Adv.)} + ₹ 45 \text{ (Adv.)} \\
 ₹ 75 \text{ (Adv.)} &= ₹ 75 \text{ (Adv.)}
 \end{aligned}$$

(iv) Material Mix Variance (MMV)

$$\text{RSQ} = \frac{\text{Total Weight of Actual Mix}}{\text{Total Weight of Standard Mix}} \times \text{Standard Quantity}$$

$$\text{RSQ of A} = \frac{90}{75} \times 50 = 60$$

$$\text{RSQ of B} = \frac{90}{75} \times 25 = 30$$

MMV

$$\begin{aligned}
 \text{A} &= 2 (60 - 60) && = \text{Nil} \\
 \text{B} &= 5 (30 - 30) && = \text{Nil} \\
 &&& \underline{\text{Nil}}
 \end{aligned}$$

(v) Material Sub-usage Variance (MSUV) = SP (SQ – RSQ)

$$\begin{aligned}
 \text{A} &= 2 (50 - 60) && = ₹ 20 \text{ (Adv.)} \\
 \text{B} &= 5 (25 - 30) && = ₹ 25 \text{ (Adv.)} \\
 &&& \underline{₹ 45 \text{ (Adv.)}}
 \end{aligned}$$

Verification

$$\begin{aligned}
 \text{MUV} &= \text{MMV} + \text{MSUV} \\
 45 \text{ (Adv.)} &= \text{Nil} + 45 \text{ (Adv.)}
 \end{aligned}$$

Ques. 4. Find out material variances.

Material	Std. Qty. (units)	Std. Price (₹)	Actual Qty. (₹)	Actual Price (₹)
A	20	5	20	6
B	16	8	18	9
C	8	10	10	9
	44		48	

- Sol.**
- Material Cost Variance (MCV) = $(SQ \times SP) - (QQ \times A)$

$$A = (20 \times 5) - (18 \times 9) = 100 - 120 = ₹ 20 \text{ (Adv.)}$$

$$B = (16 \times 8) - (18 \times 9) = 128 - 162 = ₹ 34 \text{ (Adv.)}$$

$$C = (8 \times 10) - (10 \times 9) = 80 - 90 = ₹ 10 \text{ (Adv.)}$$

$$\underline{₹ 64 \text{ (Adv.)}}$$
 - Material Price Variance (MPV) = $AQ (SP - AP)$

$$A = 20 (5 - 6) = ₹ 20 \text{ (Adv.)}$$

$$B = 18 (8 - 9) = ₹ 18 \text{ (Adv.)}$$

$$C = 10 (10 - 9) = ₹ 10 \text{ (Fav.)}$$

$$\underline{₹ 28 \text{ (Adv.)}}$$
 - Material Usage Variance (MUV) = $SP (SQ - AQ)$

$$A = 5 (20 - 20) = \text{Nil}$$

$$B = 8 (16 - 18) = ₹ 16 \text{ (Adv.)}$$

$$C = 10 (8 - 10) = ₹ 20 \text{ (Adv.)}$$

$$\underline{₹ 36 \text{ (Adv.)}}$$

Verification:

$$\begin{aligned} \text{MCV} &= \text{MUV} + \text{MPV} \\ 64 \text{ (Adv.)} &= 36 \text{ (Adv.)} + 28 \text{ (Adv.)} \\ ₹ 64 \text{ (Adv.)} &= ₹ 64 \text{ (Adv.)} \end{aligned}$$

- Material Mix Variance (MMV) = $SP (RSQ - AQ)$

$$\text{RSQ of A} = \frac{48}{44} \times 20 = 21.8$$

$$\text{RSQ of B} = \frac{48}{44} \times 16 = 17.45$$

$$\text{RSQ of C} = \frac{48}{44} \times 8 = 8.72$$

MMV

$$\begin{aligned} A &= 5 (21.8 - 20) = ₹ 9.0 \text{ (Fav.)} \\ B &= 8 (17.45 - 18) = ₹ 4.4 \text{ (Adv.)} \\ C &= 10 (8.72 - 10) = ₹ 12.8 \text{ (Adv.)} \\ \text{MMV} &= ₹ 8.2 \text{ (Adv.)} \end{aligned}$$

- Material Sub-Usage Variance (MSUV) = $SP (SQ - RSQ)$

$$A = 5 (20 - 21.8) = ₹ 9.0 \text{ (Adv.)}$$

$$B = 8 (16 - 17.45) = ₹ 11.60 \text{ (Adv.)}$$

$$C = 10 (8 - 8.72) = ₹ 7.20 \text{ (Adv.)}$$

$$\underline{₹ 27.80 \text{ (Adv.)}}$$

Verification:

$$\begin{aligned} \text{MUV} &= \text{MMV} + \text{MSUV} \\ 36 \text{ (Adv.)} &= 8.2 \text{ (Adv.)} + 27.8 \text{ (Adv.)} \\ ₹ 36 \text{ (Adv.)} &= ₹ 36 \text{ (Adv.)} \end{aligned}$$

Ques. 5. Calculate material variances from the following data:

Material	Standard			Actual		
	Std. Qty. (kg)	Rate (₹)	Amount (₹)	Qty.	Rate (₹)	Amount (₹)
A	10	2	20	5	3	15
B	20	3	60	10	6	60
C	20	6	120	15	5	75
	50		200	30		150

(B.Com. M.D.U.)

- Sol.**
- $MCV = (SQ \times SP) - (AQ \times AP)$
 A = $(10 \times 2) - (5 \times 3)$
 = $20 - 15$ = ₹ 5 (Fav.)
 B = $(20 \times 3) - (10 \times 6)$
 = $60 - 60$ = Nil
 C = $(20 \times 6) - (15 \times 5)$
 = $120 - 75$ = ₹ 45 (Fav.)
₹ 50 (Fav.)
 - $MPV = AQ (SP - AP)$
 A = $5 (2 - 3)$ = ₹ 5 (Adv.)
 B = $10 (3 - 6)$ = ₹ 30 (Adv.)
 C = $15 (6 - 5)$ = ₹ 15 (Fav.)
₹ 20 (Adv.)
 - $MUV = SP (SQ - AQ)$
 A = $2 (10 - 5)$ = ₹ 10 (Fav.)
 B = $3 (20 - 10)$ = ₹ 30 (Fav.)
 C = $6 (20 - 15)$ = ₹ 30 (Fav.)
₹ 70 (Fav.)
 - $MMV = SP (RSQ - AQ)$
 A = $2 (6 - 5)$ = ₹ 2 (Fav.)
 B = $3 (12 - 10)$ = ₹ 6 (Fav.)
 C = $6 (12 - 15)$ = ₹ 18 (Adv.)
₹ 10 (Adv.)
- RSQ
- $MSUV = SP (SQ - RSQ)$
 A = $2 (10 - 6)$ = ₹ 8 (Fav.)
 B = $3 (20 - 12)$ = ₹ 24 (Fav.)
 C = $6 (20 - 12)$ = ₹ 48 (Fav.)
₹ 80 (Fav.)

Verification:

- $MCV = MPV + MUV$
 ₹ 50 (Fav.) = ₹ 20 (Adv.) + ₹ 70 (Fav.)
 ₹ 50 (Fav.) = ₹ 50 (Fav.)

$$(2) \quad \text{MUV} = \text{MMV} + \text{MSUV}$$

$$\text{₹ } 70 \text{ (Fav.)} = \text{₹ } 10 \text{ (Adv.)} + \text{₹ } 80 \text{ (Fav.)}$$

$$\text{₹ } 70 \text{ (Fav.)} = \text{₹ } 70 \text{ (Fav.)}$$

Ques. 6. The standard mix of product is as under:

Material A	= 60 units @ 15 paise per unit.
Material B	= 80 units @ 20 paise per unit
Material C	= 100 units @ 25 paise per unit.

10 units of finished product should be obtained from the above mix.

During the month January 2001, 10 such mixes were completed and consumption was as follows:

Material A	= 640 units @ 20 paise per unit
Material B	= 960 units @ 15 paise per unit
Material C	= 840 units @ 30 paise per unit

Actual output was 90 units.

Calculate the various material variances.

(B.Com. K.U.K. Sept. 1999)

Sol. Standard mix is given for 10 units and 10 such mixes were completed, therefore standard quantity will be 10 times of the given standard mix.

Material	Standard			Actual		
	Qty.	Price	Amount	Qty.	Price	Amount
			(₹)			(₹)
A	600	0.15	90	640	0.20	128
B	800	0.20	160	960	0.15	144
C	1,000	0.25	250	840	0.30	252
	2,400		500	2,440		524

Standard Output = 100 Units

Actual Output = 90 Units

As the standard output and actual output are not same, therefore standard quantity for actual output will be calculated as follows:

$$A = \frac{90}{100} \times 600 = 540 \text{ units}$$

$$B = \frac{90}{100} \times 800 = 720 \text{ units}$$

$$C = \frac{90}{100} \times 1000 = 900 \text{ units}$$

- $$\text{MCV} = (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP})$$

A	= (540 × 0.15) – (640 × 0.20)	= ₹ 47 (Adv)
B	= (720 × 0.20) – (960 × 0.15)	= Nil
C	= (900 × 0.25) – (840 × 0.30)	= ₹ 27 (Adv.)
		<u>₹ 74 (Adv.)</u>
- $$\text{MPV} = \text{AQ}(\text{SP} - \text{AP})$$

A	= 640(0.15 - 0.20)	= ₹ 32 (Adv.)
B	= 960(0.20 - 0.15)	= ₹ 48 (Fav)
C	= 840(0.25 - 0.30)	= ₹ 42 (Adv.)
		<u>₹ 26 (Adv.)</u>
- $$\text{MUV} = \text{SP}(\text{SQ} - \text{AQ})$$

A	= 0.15(540 - 640)	= ₹ 15 (Adv.)
B	= 0.20(720 - 960)	= ₹ 48 (Adv.)
C	= 0.25(900 - 840)	= ₹ 15 (Fav.)
		<u>₹ 48 (Adv.)</u>

$$\begin{aligned}
 4. \quad \text{MMV} &= \text{SP}(\text{RSQ} - \text{AQ}) \\
 \text{A} &= 0.15 (610 - 640) &= ₹ 4.50 \text{ (Adv.)} \\
 \text{B} &= 0.20 (813.33 - 960) &= ₹ 29.33 \text{ (Adv.)} \\
 \text{C} &= 0.25 (1016.67 - 840) &= ₹ 44.17 \text{ (Fav.)} \\
 & &= ₹ 10.34 \text{ (Fav.)}
 \end{aligned}$$

RSQ

$$\begin{aligned}
 \text{A} &= \frac{2440}{2160} \times 540 &= 610 \text{ tons} \\
 \text{B} &= \frac{2440}{2160} \times 720 &= 813.33 \text{ tons} \\
 \text{C} &= \frac{2440}{2160} \times 900 &= 1016.67 \text{ tons.}
 \end{aligned}$$

$$\begin{aligned}
 5. \quad \text{MYV} &= \text{SC} (\text{AY} - \text{RSY}) \\
 \text{SC} &= \frac{\text{Total Cost of Standard Mix}}{\text{Net Standard Yield}} \\
 &= \frac{500}{100} = ₹ 5 \\
 \text{RSY} &= \frac{100}{2400} \times 2440 = 101.67 \text{ Units.} \\
 \text{MYV} &= 5 (90 - 101.67) = ₹ 58.35 \text{ (Adv.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 (1) \quad \text{MCV} &= \text{MPV} + \text{MUV} \\
 74 \text{ (Adv.)} &= 26 \text{ (Adv.)} + 48 \text{ (Adv.)} \\
 74 \text{ (Adv.)} &= 74 \text{ (Adv.)} \\
 (2) \quad \text{MUV} &= \text{MMV} + \text{MYV} \\
 48 \text{ (Adv.)} &= 10.33 \text{ (Fav.)} + 58.33 \text{ (Adv.)} \\
 48 \text{ (Adv.)} &= 48 \text{ (Adv.)}
 \end{aligned}$$

Ques. 7. The standard mix to produce one unit of product is as follows.

Material A	= 60 units @ ₹ 15 per unit	= ₹ 900
Material B	= 80 units @ ₹ 20 per unit	= ₹ 1,600
Material C	= 100 units @ ₹ 25 per unit	= ₹ 2,500
	240 units	= ₹ 5,000

During the month of February, 10 units were produced and the actual consumption was as follows:

Material A	= 640 units @ ₹ 17.50 per unit	= ₹ 11,200
Material B	= 950 units @ ₹ 18 per unit	= ₹ 17,100
Material C	= 870 units @ ₹ 27.50 per unit	= ₹ 23,925
	<u>2460 units</u>	<u>₹ 52,225</u>

Calculate:

- (i) Material Cost Variance (ii) Material Price Variance
- (iii) Material Usage Variance (iv) Material Mix Variance
- (v) Material Yield Variance.

Sol.

Material	Standard			Actual		
	Qty (Units)	Price (₹)	Amt. (₹)	Qty (Units)	Price	Amount
A	600	15	9,000	640	17.50	11,200
B	800	20	16,000	950	18	17,100
C	1,000	25	25,000	870	27.50	23,925
	<u>2,400</u>		<u>50,000</u>	<u>2,460</u>		<u>52,225</u>

		Standard Output = 10 Units	
		Actual Output = 10 Units	
(i)	MCV	= Standard Cost – Actual Cost	
		= ₹ 50,000 – 52,225	= ₹ 2225 (Adv.)
(ii)	MPV	= AQ (SP – AP)	
	A	= 640 (15 – 17.50)	= ₹ 1,600 (Adv.)
	B	= 950 (20 – 18)	= ₹ 1,900 (Fav.)
	C	= 870 (25 – 27.50)	= ₹ 2,175 (Adv.)
			= ₹ 1,875 (Adv.)
(iii)	MUV	= SP (SQ – AQ)	
	A	= 15 (600 – 640)	= ₹ 600 (Adv.)
	B	= 20 (800 – 950)	= ₹ 3,000 (Adv.)
	C	= 25 (1000 – 870)	= ₹ 3,250 (Fav.)
			= ₹ 350 (Adv.)
(iv)	MMV	= SP (RSQ – AQ)	
	RSQ : A	= $\frac{2460}{2400} \times 600$	= 615 Units
	B	= $\frac{2460}{2400} \times 800$	= 820 Units
	C	= $\frac{2460}{2400} \times 1000$	= 1025 Units
	MMV:		
	A	= 15 (615 – 640)	= ₹ 375 (Adv.)
	B	= 20 (820 – 950)	= ₹ 2600 (Adv.)
	C	= 25 (1025 – 870)	= ₹ 3875 (Fav.)
			= ₹ 900 (Fav.)
(v)	MYU	= SC (AY – RSY)	
		= 5000 (10 – 10.25)	= ₹ 1250 (Adv.)
	SC	= ₹ 50,000/10	= ₹ 5,000 Units
	RSY	= 10/2400 × 2460	= 10.25 Units

Verification:

- (1) MCV = MPV + MUV
 ₹ 2225 (Adv.) = ₹ 1875 (Adv.) + ₹ 350 (Adv.)
 ₹ 2225 (Adv.) = 2225 (Adv.)
- (2) MUV = MMV + MYV
 ₹ 350 (Adv.) = ₹ 900 (Fav.) + ₹ 1250 (Adv.)
 ₹ 350 (Adv.) = ₹ 350 (Adv.)

Ques. 8. The standard cost of a chemical mixture is as under :

4 ton of material X at ₹ 20 per ton.

6 ton of material Y at ₹ 30 per ton.

The actual cost for a period is as under:

4.5 tons of material X at ₹ 15 per ton

5.5 tons of material Y at ₹ 34 per ton.

The standard yield is 90% of input, whereas the actual yield is 9.1 tons.

Calculate: (a) Material Cost Variance

- (b) Material Price Variance
 (c) Material Usage Variance
 (d) Material Mix Variance
 (e) Material Yield Variance.

Sol. As the Standard Output and Actual Output are not same, therefore Standard Quantity for Actual Output will be computed as follows :

$$\text{RSQ of Material X} = \frac{4}{9} \times 9.1 = 4.0444 \text{ tons}$$

$$\text{RSQ of Material Y} = \frac{6}{9} \times 9.1 = 6.0666 \text{ tons}$$

1. MCV = (RSQ × SP) – (SQ × AP)

$$\begin{aligned} X &= (4.044 \times 20) - (4.5 \times 15) \\ &= 80.88 - 67.5 &&= ₹ 13.38 \text{ (Fav.)} \end{aligned}$$

$$\begin{aligned} Y &= (6.066 \times 30) - (5.5 \times 34) \\ &= 181.98 - 187 &&= ₹ 5.01 \text{ (Adv.)} \\ &&& \underline{₹ 8.37 \text{ (Fav.)}} \end{aligned}$$

2. MPV = AQ (SP – AP)

$$X = 4.5 (20 - 15) = ₹ 22.50 \text{ (Fav.)}$$

$$Y = 5.5 (30 - 34) = ₹ 22.00 \text{ (Adv.)}$$

$$\underline{₹ 0.50 \text{ (Fav.)}}$$

3. MUV = SP (RSQ – AQ)

$$X = 20 (4.044 - 4.5) = ₹ 9.11 \text{ (Adv.)}$$

$$Y = 30 (6.066 - 5.5) = ₹ 16.99 \text{ (Fav.)}$$

$$\underline{₹ 7.88 \text{ (Fav.)}}$$

4. MMV = SP (SQ – AQ)

$$X = 20 (4 - 4.5) = ₹ 10 \text{ (Adv.)}$$

$$Y = 30 (6 - 5.5) = ₹ 15 \text{ (Fav.)}$$

$$\underline{₹ 5 \text{ (Fav.)}}$$

5. MYV = SC (AY – SY)

$$= 260/9 (9.1 - 9) = 2.88 \text{ (Fav.)}$$

Verification:

$$\begin{array}{rclcl} (1) & \text{MCV} & = & \text{MPV} & + & \text{MUV} \\ & 8.38 \text{ (Fav.)} & = & 0.50 \text{ (Fav.)} & + & 7.88 \text{ (Fav.)} \\ & 8.38 \text{ (Fav.)} & = & 8.38 \text{ (Fav.)} & & \end{array}$$

$$\begin{array}{rclcl} (2) & \text{MUV} & = & \text{MMV} & + & \text{MYV} \\ & 7.88 \text{ (Fav.)} & = & 5 \text{ (Fav.)} & + & 2.88 \text{ (Fav.)} \\ & 7.88 \text{ (Fav.)} & = & 7.88 \text{ (Fav.)} & & \end{array}$$

Ques. 9. A company manufactures a single product. The standard mix is as under:

Material A - 60% at ₹ 20 per kg

Material B - 40% at ₹ 10 per kg

Normal loss in production is 20% of input. Due to shortage of material A, the standard mix was changed.

The actual results of February 2001 were:

Material A - 105 kg at ₹ 20 per kg

Material B - 95 kg at ₹ 9 per kg

Actual Output - 165 kg

Calculate the various material variances.

(B.Com. (Hons) Delhi)

Sol. As the Standard quantity and the Actual Quantity are not same, therefore Standard Quantity on the basis of Actual Output will be computed as follows :

Revised Standard Quantity:

$$\text{RSQ of A} = \frac{165}{160} \times 120 = 123.75 \text{ Kg.}$$

$$\text{RSQ of B} = \frac{165}{160} \times 80 = 82.50 \text{ Kg.}$$

1. $\text{MCV} = (\text{RSQ} \times \text{SP}) - (\text{AQ} \times \text{AP})$

$$\text{A} = (123.75 \times 20) - (105 \times 20) = ₹ 375 \text{ (Fav.)}$$

$$\text{B} = (82.5 \times 10) - (95 \times 9) = ₹ 30 \text{ (Adv.)}$$

$$\underline{₹ 345 \text{ (Fav.)}}$$

2. $\text{MPV} = \text{AQ} (\text{SP} - \text{AP})$

$$\text{A} = 105 (20 - 20) = \text{Nil}$$

$$\text{B} = 95 (10 - 9) = ₹ 95 \text{ (Fav.)}$$

3. $\text{MUV} = \text{SP} (\text{RSQ} - \text{AQ})$

$$\text{A} = 20 (123.75 - 105) = ₹ 375 \text{ (Fav.)}$$

$$\text{B} = 10 (82.50 - 95) = ₹ 125 \text{ (Adv.)}$$

$$\underline{₹ 250 \text{ (Fav.)}}$$

4. $\text{MMV} = \text{SP} (\text{SQ} - \text{AQ})$

$$\text{A} = 20 (120 - 105) = ₹ 300 \text{ (Fav.)}$$

$$\text{B} = 10 (80 - 95) = ₹ 150 \text{ (Adv.)}$$

$$\underline{₹ 150 \text{ (Fav.)}}$$

Verification:

(1) $\text{MCV} = \text{MPV} + \text{MUV}$
 $₹ 345 \text{ (Fav.)} = ₹ 95 \text{ (Fav.)} + ₹ 250 \text{ (Fav.)}$

$$₹ 345 \text{ (Fav.)} = ₹ 345 \text{ (Fav.)}$$

(2) $\text{MUV} = \text{MMV} + \text{MYV}$
 $₹ 250 \text{ (Adv.)} = ₹ 150 \text{ (Adv.)} + ₹ 100 \text{ (Adv.)}$

$$₹ 250 \text{ (Adv.)} = ₹ 250 \text{ (Adv.)}$$

Ques. 10. Design a 'Material Cost Analysis Form' and enter suitable figure from the details given below:

Production for the period - 192 units.

	Material X	Material Y
Standard price per ton	₹ 480	₹ 640
Actual price per ton	₹ 455	₹ 616
Actual Weight	16 tons	13 tons

Standard production for the period represented by the above figures is 400 units for which the standard quantity of materials are 30 tons of X and 25 tons of Y.

Sol.

Material	Standard			Actual		
	Q + Y	Price	Amount	Q + Y	Price	Amount
X	14.4	480	6,912	16	455	7,280
Y	12.0	640	7,680	13	616	8,008
	26.4		14,592	29		15,288

As the Standard Output and the Actual Output are not same, therefore Standard Quantity for Actual Output will be computed as follows:

$$X = \frac{30}{400} \times 192 = 14.4 \text{ tons}$$

$$Y = \frac{25}{400} \times 192 = 12.00 \text{ tons.}$$

1. MCV = Std. Cost of Materials – Actual Cost of Materials
 $\text{₹ } 14592 - \text{₹ } 15,228 = \text{₹ } 696 \text{ (Adv.)}$
2. MPV = AQ (SP – AP)
 $X = 16 (480 - 455) = \text{₹ } 400 \text{ (Fav.)}$
 $Y = 13 (640 - 616) = \text{₹ } 312 \text{ (Fav.)}$
₹ 712 (Fav.)
3. MUV = SP (RSQ – AQ)
 $X = 480 (14 \cdot 4 - 16) = \text{₹ } 768 \text{ (Adv.)}$
 $Y = 640 (12 - 13) = \text{₹ } 640 \text{ (Adv.)}$
₹ 1408 (Adv.)

Verification:

$$\begin{aligned} \text{MCV} &= \text{MPV} + \text{MUV} \\ \text{₹ } 696 \text{ (Adv.)} &= \text{₹ } 712 \text{ (Fav.)} + \text{₹ } 1408 \text{ (Adv.)} \\ \text{₹ } 696 \text{ (Adv.)} &= \text{₹ } 696 \text{ (Adv.)} \end{aligned}$$

Ques. 11. From the following calculate the material variances; actual production during the period was 192 units.

	Material A	Material B
Actual Price per ton	₹ 277.50	₹ 308
Standard Price per ton	₹ 240.00	₹ 320
Actual Weight	16 tons	13 tons

Budgeted Production during the period 400 units for which the standard quantity of materials are 30 tons of A and 25 tons of B.

Sol.

Material	Standard			Actual		
	Q + Y	Price (₹)	Amount (₹)	Q + Y	Price (₹)	Amount (₹)
A	14.4	240	3456	16	277.5	4440
B	12.0	320	3840	13	308.0	4004
	26.4		7296	29		8444

As the Standard Output and Actual Output are not same therefore the Standard Quantity for Actual Output will be calculated as follows :

$$\begin{aligned} \text{A} &= 192 \times \frac{30}{400} = 14.4 \text{ tons} \\ \text{B} &= 192 \times \frac{25}{400} = 12 \text{ tons} \end{aligned}$$

1. MCV = Standard Cost of Materials – Actual Cost of Materials
 $\text{₹ } 7296 - \text{₹ } 8444 = \text{₹ } 1148 \text{ (Adv.)}$
2. MPV = AQ (SP – AP)
 $A = 16 (240 - 277.50) = \text{₹ } 600 \text{ (Adv.)}$
 $B = 13 (320 - 308.00) = \text{₹ } 156 \text{ (Fav.)}$
₹ 444 (Adv.)
3. MUV = SP (SQ – AQ)
 $A = 240 (14.4 - 16) = \text{₹ } 384 \text{ (Adv.)}$
 $B = 320 (12 - 13) = \text{₹ } 320 \text{ (Adv.)}$
₹ 704 (Adv.)

Verification:

$$\begin{aligned} \text{MCV} &= \text{MPV} + \text{MUV} \\ \text{₹ } 1148 \text{ (Adv.)} &= \text{₹ } 444 \text{ (Adv.)} + \text{₹ } 704 \text{ (Adv.)} \\ \text{₹ } 1148 \text{ (Adv.)} &= \text{₹ } 1148 \text{ (Adv.)} \end{aligned}$$

Ques. 12. Calculate material variances from the following data:

Standard			Actual	
Material	Qty. (kg)	Price (₹)	Qty. (kg)	Price (₹)
A	10	8	10	7
B	8	6	9	7
C	4	12	5	11
	22		24	
Loss	2	Loss	3	
Yield	20	Yield =	21	

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Standard				Actual		
Material	Qty. (Kg.)	Rate (₹)	Amount (₹)	Qty. (Kg.)	Rate (₹)	Amount (₹)
A	10	8	80	10	7	70
B	8	6	48	9	7	63
C	4	12	48	5	11	55
	22		176	24		188
Loss	2		—	3		—
Yield	20		176	21		188

As the Standard Output and the Actual Output are not same, therefore the Standard Quantity on the basis of Actual Output will be calculated :

$$A = \frac{21}{20} \times 10 = 10.5 \text{ Kg.}$$

$$B = \frac{21}{20} \times 8 = 8.4 \text{ Kg.}$$

$$C = \frac{21}{20} \times 4 = 4.2 \text{ Kg.}$$

1. $MCV = (SQ \times SP) - (AQ \times AP)$

$$A = (10.5 \times 8) - (10 \times 7) = ₹ 14.0 \text{ (Fav.)}$$

$$B = (8.4 \times 6) - (9 \times 7) = ₹ 12.6 \text{ (Adv.)}$$

$$C = (4.2 \times 12) - (5 \times 11) = ₹ 4.6 \text{ (Adv.)}$$

$$\underline{₹ 3.2 \text{ (Adv.)}}$$

2. $MPV = AQ (SP - AP)$

$$A = (8 - 7) \times 10 = ₹ 10 \text{ (Fav.)}$$

$$B = 9 (6 - 7) = ₹ 9 \text{ (Adv.)}$$

$$C = 5 (12 - 11) = ₹ 5 \text{ (Fav.)}$$

$$\underline{₹ 6 \text{ (Fav.)}}$$

3. $MUV = SP (SQ - AQ)$

$$A = 8 (10.5 - 10) = ₹ 4 \text{ (Fav.)}$$

$$B = 6 (8.4 - 9) = ₹ 3.6 \text{ (Adv.)}$$

$$C = 12 (4.2 - 5) = ₹ 9.6 \text{ (Adv.)}$$

$$\underline{₹ 9.2 \text{ (Adv.)}}$$

4. MMV = SP (RSQ – AQ)

As the total Actual mix and total standard mix are not same, the RSQ will be computed.

RSQ

$$\begin{aligned} A &= \frac{24}{22} \times 10 = 10.91 \text{ Kg.} \\ B &= \frac{24}{22} \times 8 = 8.73 \text{ Kg.} \\ C &= \frac{24}{22} \times 4 = 4.36 \text{ Kg.} \end{aligned}$$

MMV

$$\begin{aligned} A &= 8 (10.91 - 10) = ₹ 7.28 \text{ (Fav.)} \\ B &= 6 (8.73 - 9) = ₹ 1.60 \text{ (Adv.)} \\ C &= 12 (4.36 - 5) = ₹ 7.68 \text{ (Adv.)} \\ &\underline{\hspace{1.5cm} ₹ 2.00 \text{ (Adv.)}} \end{aligned}$$

5. MYV = SC (AY – RSY)

$$\begin{aligned} &176/20 \left(3 - \frac{24}{22} \times 2 \right) \\ &8 \cdot 8 (3 - 2.181) = ₹ 7.20 \text{ (Adv.)} \end{aligned}$$

Verification:

$$\begin{aligned} (1) \quad \text{MCV} &= \text{MPV} + \text{MUV} \\ &3.20 \text{ (Adv.)} = 6 \text{ (Fav.)} + 9.20 \text{ (Adv.)} \\ &3.20 \text{ (Adv.)} = 3.20 \text{ (Adv.)} \\ (2) \quad \text{MUV} &= \text{MMV} + \text{MYV} \\ &9.20 \text{ (Adv.)} = 2.00 \text{ (Adv.)} + 7.20 \text{ (Adv.)} \\ &9.20 \text{ (Adv.)} = 9.20 \text{ (Adv.)} \end{aligned}$$

Ques. 13. A company is engaged in producing a standard mix using 60 kg of Material X and 40 kg of Material Y. The standard loss of production is 30%. The standard price of X is ₹ 5 per kg and of Y is ₹ 10 per kg. During the period, the actual results were:

X - 80 kg @ ₹ 4.50 per kg and Y - 70 kg @ ₹ 8.00 per kg Actual Yield 115 kg

Calculate the various material variances.

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Material	Standards			Actual		
	Q + Y	Price	Amount	Q + Y	Price	Amount
		(₹)	(₹)		(₹)	(₹)
X	60	5	300	80	4.50	360
Y	40	10	400	70	8.00	560
	100		700	150		920
Loss	30		—	35		—
Yield	70		700	115		920

As the standard output and actual output are not same, therefore standard quantity for actual output will be calculated.

SQ of Material X = 115/70 × 60 = 98.57 Kg.

SQ of Material Y = 115/70 × 40 = 65.71 Kg.

1. MCV = (SQ × SP) – (AQ × AP)

X = (98.57 × 5) – 80 × (4.50) = ₹ 132.85 (Fav.)

Y = (65.71 × 10) – (70 × 8) = ₹ 97.10 (Fav.)

₹ 229.95 (Fav.)

$$\begin{aligned}
 2. \text{ MPV} &= \text{AQ} (\text{SP} - \text{AP}) \\
 X &= 80(5 - 4 \cdot 50) && = ₹ 40 \text{ (Fav.)} \\
 Y &= 70(10 - 8) && = ₹ 140 \text{ (Fav.)} \\
 &&& \underline{₹ 180 \text{ (Fav.)}} \\
 3. \text{ MUV} &= \text{SP} (\text{SQ} - \text{AQ}) \\
 X &= 5(98 \cdot 57 - 80) && = ₹ 92 \cdot 85 \text{ (Fav.)} \\
 Y &= 10(65 \cdot 71 - 70) && = ₹ 42 \cdot 90 \text{ (Adv.)} \\
 &&& \underline{₹ 49 \cdot 95 \text{ (Fav.)}} \\
 4. \text{ MMV} &= \text{SP} (\text{RSQ} - \text{AQ}) \\
 X &= 5(90 - 80) && = ₹ 50 \text{ (Fav.)} \\
 Y &= 10(60 - 70) && = ₹ 100 \text{ (Adv.)} \\
 &&& \underline{₹ 50 \text{ Adv.}}
 \end{aligned}$$

$$\text{RSQ: } X = \frac{150}{100} \times 60 = 90 \text{ Kg.}$$

$$Y = \frac{150}{100} \times 40 = 60 \text{ Kg.}$$

$$\begin{aligned}
 5. \text{ MYU} &= \text{SC} (\text{AY} - \text{RSY}) \\
 &= 700/70 \left(115 - \frac{150}{100} \times 70 \right) \\
 &= 10(115 - 105) = ₹ 100 \text{ (Fav.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 (1) \quad \text{MCV} &= \text{MPV} + \text{MUV} \\
 &₹ 230 \text{ (Fav.)} = ₹ 180 \text{ (Fav.)} + ₹ 50 \text{ (Fav.)} \\
 &₹ 230 \text{ (Fav.)} = ₹ 230 \text{ (Fav.)} \\
 (2) \quad \text{MUV} &= \text{MMV} + \text{MYV} \\
 &₹ 50 \text{ (Fav.)} = ₹ 50 \text{ (Adv.)} + ₹ 100 \text{ (Fav.)} \\
 &₹ 50 \text{ (Fav.)} = ₹ 50 \text{ (Fav.)}
 \end{aligned}$$

Ques. 14. From the following information, calculate labour variances:
 Actual wages paid - ₹ 6000; Standard hours - 3,200;
 Standard hourly rate - ₹ 1.50; Actual hours paid - 3,000 hrs
 Idle Time - 100 hours (included in actual hours paid)

Sol. Actual Rate per hour = $\frac{₹ 6,000}{3,000 \text{ hrs}} = ₹ 2$

$$\begin{aligned}
 1. \quad \text{Labour Cost Variance (LCV)} &= (\text{ST} \times \text{SR}) - (\text{AT} \times \text{AR}) \\
 &= (3200 \times 1 \cdot 50) - (3000 \times 2) = ₹ 1200 \text{ (Adv.)} \\
 2. \quad \text{Labour Rate Variance (LRV)} &= \text{AT} (\text{SR} - \text{AR}) \\
 &= 3000(1 \cdot 50 - 2 \cdot 00) = ₹ 1,500 \text{ (Adv.)} \\
 3. \quad \text{Labour Efficiency Variance (LEV)} &= \text{SR} (\text{ST} - \text{AT}) \\
 &= 1 \cdot 50(3200 - 2900) = ₹ 450 \text{ (Fav.)} \\
 4. \quad \text{Idle Time Variance} &= \text{Idle Time} \times \text{SR} \\
 &= 100 \times 1 \cdot 50 = ₹ 150 \text{ (Adv.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 \text{LCV} &= \text{LRV} + \text{LEV} + \text{Idle Time var.} \\
 ₹ 1200 \text{ (Adv.)} &= ₹ 1500 \text{ (Adv.)} + ₹ 450 \text{ (Fav.)} + ₹ 150 \text{ (Adv.)} \\
 ₹ 1200 \text{ (Adv.)} &= ₹ 1200 \text{ (Adv.)}
 \end{aligned}$$

Ques. 15. From the following information, calculate the different labour variances:

Standard

Workers	No. of Workers	Rate per hour	Hrs. Worked	Amount (₹)
Men	100	3	100	30,000
Women	50	5	100	25,000
Boys	40	10	100	40,000

Actual

Workers	No. of Workers	Rate per hour	Hrs. Worked	Amount (₹)
Men	80	2.50	120	24,000
Women	60	5	120	36,000
Boys	50	8	120	48,000

Actual Production = 190 units

Standard Production = 200 units

Sol.

Standard				Actual		
Workers	Total Hours	Rate (₹)	Amount (₹)	Total Hours	Rate (₹)	Amount (₹)
Men	$100 \times 100 = 10,000$	3	30,000	$80 \times 120 = 9600$	2.50	24,000
Women	$50 \times 100 = 5,000$	5	25,000	$60 \times 120 = 7200$	5.00	26,000
Boys	$40 \times 100 = 4,000$	10	40,000	$50 \times 120 = 6000$	8.00	48,000
	$190 \times 100 = 19,000$		95,000	$190 \times 150 = 22800$		1,08,000

Standard Production = 200 Units

Actual Production = 190 Units

As the standard output and actual output are not same, therefore standard time of actual output will be calculated as follows:

Standard Time for Actual Output :

Men = $190/200 \times 19,000 = 9,500$ Hrs.

Women = $190/200 \times 5,000 = 4,750$ Hrs.

Boys = $190/200 \times 4,000 = 3,800$ Hrs.

1. LCV = $(ST \times SR) - (AT \times AR)$

Men = $(9500 \times 3) - (9600 \times 2.50) = ₹ 4,500$ (Fav.)

Women = $(4750 \times 5) - (7200 \times 5) = ₹ 12,250$ (Adv.)

Boys = $(3800 \times 10) - (6000 \times 8) = ₹ 10,000$ (Adv.)

₹ 17,750 (Adv.)

2. LRV = $AT (SR - AR)$

Men = $9600 (3 - 2.50) = ₹ 4,800$ (Fav.)

Women	= 7,200 (5 – 5)	= Nil
Boys	= 6000 (10 – 8)	= ₹ 12,000 (Fav.)
		<u>₹ 16,800 (Fav.)</u>
3. LEV	= SR (ST – AT)	
Men	= 3 (9500 – 9600)	= ₹ 300 (Adv.)
Women	= 5 (4750 – 7200)	= ₹ 12,250 (Adv.)
Boys	= 10 (3800 – 6,000)	= ₹ 22,000 (Adv.)
		<u>₹ 34,550 (Adv.)</u>
4. LMV	= SR (RST – AT)	
Revised Standard Time (RST)		
Men	= (22,800/19,000) × 10,000	= 12,000 Hrs.
Women	= (22,800/19,000) × 5,000	= 6,000 Hrs.
Boys	= (22,800/19,000) × 4,000	= 4,800 Hrs.
LMV		
Men	= 3 (12,000 – 9,600)	= ₹ 7,200 (Fav.)
Women	= 5 (6,000 – 7,200)	= ₹ 6,000 (Adv.)
Boys	= 10 (4,800 – 6,000)	= ₹ 12,000 (Adv.)
		<u>₹ 10,800 (Adv.)</u>
5. LYV	= SR (Actual Output – Revised Standard Output)	
Revised Standard Output = $\frac{22,800}{19,000} \times 200 = 240$ Units		
LYV	= $\frac{95,000}{200} \times (190 - 240)$	= ₹ 23,750 (Adv.)
Verification:		
(1)	LCV = LRV + LEV	
	₹ 17,750 (Adv.) = ₹ 16,800 (Fav.) + ₹ 34,550 (Adv.)	
	₹ 17,750 (Adv.) = ₹ 17,750 (Adv.)	
(2)	LEV = LMV + LYV	
	₹ 34,550 (Adv.) = ₹ 10,800 (Adv.) + ₹ 23,750 (Adv.)	
	₹ 34,550 (Adv.) = ₹ 34,550 (Adv.)	

Ques. 16. Calculate the different labour variances from the following information:

Workers	Hours	Rate per hour (₹)	Amount (₹)
Skilled	10	3.00	30
Semi-skilled	8	1.50	12
Unskilled	16	1.00	16
	34		58

The actual production was 1,000 units for which actual results are given below:

Workers	Hours	Rate per hour (₹)	Amount (₹)
Skilled	9,000	4.00	36,000
Semi-skilled	8,400	1.50	12,600
Unskilled	20,000	0.90	18,000
	37,400		66,600

(C.S. Inter)

Sol.

Workers	Standard			Actual		
	Total Hrs.	Rate (₹)	Amount (₹)	Total Hrs.	Rate (₹)	Amount (₹)
Skilled	10,000	3.00	30,000	9,000	4.00	36,000
Semi-skilled	8,000	1.50	12,000	8,400	1.50	12,600
Unskilled	16,000	1.00	16,000	20,000	0.90	18,000
	34,000		58,000	37,400		66,600

Standard Output = 10,000 units

Actual Output = 10,000 units

1. LCV	=	Standard Cost – Actual Cost	
		₹ 58,000 – ₹ 66,600	= ₹ 8,600 (Adv.)
2. LRV	=	AT (SR – AR)	
Skilled	=	9,000 (3 – 4.00)	= ₹ 9,000 (Adv.)
Semi-skilled	=	8,400 (1.50 – 1.50)	= Nil
Unskilled	=	20,000 (1.00 – 0.90)	= ₹ 2,000 (Fav.)
			₹ 7,000 (Adv.)
3. LEV	=	SR (ST – AT)	
Skilled	=	3.00 (10,000 – 9,000)	= ₹ 3,000 (Fav.)
Semi-skilled	=	1.50 (8,000 – 8,400)	= ₹ 600 (Adv.)
Unskilled	=	1.00 (16,000 – 20,000)	= ₹ 4,000 (Adv.)
			₹ 1,600 (Adv.)
4. LMV	=	SR (RST – AT)	
RST : Skilled	=	(37,400/34,000) × 10,000	= 11,000 Hrs.
Semi-skilled	=	(37,400/34,000) × 8,000	= 8,800 Hrs.
Unskilled	=	(37,400/34,000) × 16,000	= 17,600 Hrs.
LMV : Skilled	=	3.00 (11,000 – 9,000)	= ₹ 6,000 (Fav.)
Semi-skilled	=	1.50 (8,800 – 8,400)	= ₹ 600 (Fav.)
Unskilled	=	1.00 (17,600 – 20,000)	= ₹ 2,400 (Adv.)
			= ₹ 4,200 (Fav.)
5. LYV	=	SC (AY – RSY)	
	=	58,000/1,000 $\left(1,000 - \frac{37,400}{34,000} \times 1,000\right)$	
	=	58 (1,000 – 1,100)	= ₹ 5,800 (Adv.)
Verification			
(1) LCV	=	LRT + LEV	
₹ 8,600 (Adv.)	=	₹ 7,000 (Adv.) + ₹ 1,600 (Adv.)	
₹ 8,600 (Adv.)	=	₹ 8,600 (Adv.)	
(2) LEV	=	LMV + LYU	
₹ 1,600 (Adv.)	=	₹ 4,200 (Fav.) + ₹ 5,800 (Adv.)	
₹ 1,600 (Adv.)	=	₹ 1,600 (Adv.)	

Ques. 17. The standard labour and the actual labour engaged during the month are given below:

	Skilled	Semi-skilled	Unskilled
(a) Standard no. of workers in a group	30	10	10
(b) Standard Rate (in ₹) per hour	5	3	2
(c) Actual number of workers employed in the group	24	15	12
(d) Actual Rate (in ₹) per hour	6	2.5	2

During the month the group produced 200 hrs. of work.

(I.C.W.A. Inter)

Sol.

Workers	Standard			Actual		
	Total Hrs.	Rate (₹)	Amount (₹)	Total Hrs.	Rate (₹)	Amount (₹)
Skilled	6,000	5	30,000	4,800	6.00	28,800
Semi-skilled	2,000	3	6,000	3,000	2.50	7,500
unskilled	2,000	2	4,000	2,400	2.00	4,800
	10,00		40,000	10,200		41,100

- LCV = SC – AC
 = ₹ 40,000 – ₹ 41,100 = ₹ 1,100 (Adv.)
- LRV = AT (SR – AR)

Skilled = 4,800 (5 – 6) = ₹ 4,800 (Adv.)
 Semi-skilled = 3,000 (3 – 2.50) = ₹ 1,500 (Fav.)
 Unskilled = 2,400 (2 – 2) = Nil

₹ 3,300 (Adv.)
- LEV = SR (ST – AT)

Skilled = 5 (6,000 – 4,800) = ₹ 6,000 (Fav.)
 Semi-skilled = 3 (2,000 – 3,000) = ₹ 3,000 (Adv.)
 Unskilled = 2 (2,000 – 2,400) = ₹ 800 (Adv.)

₹ 2,200 (Fav.)
- LMV = SR (RST – AT)

Skilled = 5 (6,120 – 4,800) = ₹ 6,600 (Fav.)
 Semi-skilled = 3 (2,040 – 3,000) = ₹ 2,880 (Adv.)
 Unskilled = 2 (2,040 – 2,400) = ₹ 720 (Adv.)

₹ 3,000 (Adv.)

RST :

Skilled = (10,200 / 10,000) × 6,000 = 6,120 Hrs.
 Semi-skilled = (10,200 / 10,000) × 2,000 = 2,040 Hrs.
 Unskilled = (10,200 / 10,000) × 2,000 = 2,040 Hrs.
- Idle Time
 Variance = SR (ST – AT)
 = $\frac{40,000}{10,000} (10,000 - 10,200)$
 = ₹ 800 (Adv.)

Verification

- LCV = LRV + LEV
 1,100 (Adv.) = 3,300 (Adv.) + 2,200 (Adv.)
- LEV = LMV + Idle Time Variance
 2,200 (Fav.) = 3,000 (Fav.) + 800 (Adv.)

Ques. 18. Calculate the Material Variances and Labour Variances from the following information.

Materials	Standard			Actual		
	Qty. (kg)	Price (₹)	Amount (₹)	Qty. (kg)	Price (₹)	Amount (₹)
A	450	20	9,000	450	19	8,550
B	360	10	3,600	360	11	3,960
	810		12,600	810		12,510
Loss	90		Loss	50		
Yield	720		Yield	760		

Labour	Standard			Actual		
	Hours	Rate (₹)	Amount (₹)	Hours	Rate (₹)	Amount (₹)
Skilled	2,400	2	4,800	2,400	2.25	5,400
Unskilled	1,200	1	1,200	1,200	1.25	1,500
	<u>3,600</u>		<u>6,000</u>	<u>3,600</u>		<u>6,900</u>

Sol. As the Standard Output and Actual Output are not same, therefore Standard Quantity for Actual Output is to be calculated.

$$A = \frac{760}{720} \times 450 = 475 \text{ Kgs.}$$

$$B = \frac{760}{720} \times 360 = 380 \text{ Kgs.}$$

$$1. \text{ MCV} = (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP})$$

$$A = (475 \times 20) - (450 \times 19) = ₹ 950 \text{ (Fav.)}$$

$$B = (380 \times 10) - (360 \times 11) = ₹ 160 \text{ (Adv.)}$$

$$\underline{₹ 790 \text{ (Fav.)}}$$

$$2. \text{ MPV} = \text{AQ} (\text{SP} - \text{AP})$$

$$A = 450 (20 - 19) = ₹ 450 \text{ (Fav.)}$$

$$B = 360 (10 - 11) = ₹ 360 \text{ (Adv.)}$$

$$\underline{₹ 90 \text{ (Fav.)}}$$

$$3. \text{ MUV} = \text{SP} (\text{SQ} - \text{AQ})$$

$$A = 20 (475 - 450) = ₹ 500 \text{ (Fav.)}$$

$$B = 10 (380 - 360) = ₹ 200 \text{ (Fav.)}$$

$$\underline{₹ 700 \text{ (Fav.)}}$$

$$4. \text{ MYV} = \text{SR} (\text{AY} - \text{SY})$$

$$= \frac{12,600}{720} (760 - 720) = ₹ 700 \text{ (Fav.)}$$

Verification

$$(1) \quad \begin{array}{l} \text{MCV} \\ ₹ 790 \text{ (Fav.)} \\ ₹ 790 \text{ (Fav.)} \end{array} = \begin{array}{l} \text{MPV} \\ ₹ 90 \text{ (Fav.)} \\ ₹ 790 \text{ (Fav.)} \end{array} + \begin{array}{l} \text{MUV} \\ ₹ 700 \text{ (Fav.)} \end{array}$$

$$(2) \quad \begin{array}{l} \text{MUV} \\ ₹ 700 \text{ (Fav.)} \end{array} = \begin{array}{l} \text{MYV} \\ ₹ 700 \text{ (Fav.)} \end{array}$$

Labour Variances

$$1. \quad \text{LCV} = (\text{SR} \times \text{RST}) - (\text{AR} \times \text{AT})$$

$$\text{RST : Skilled} = (760/720) \times 2400 = 2533.33$$

$$\text{Unskilled} = (760/720) \times 1200 = 1266.67$$

LCV :

$$\text{Skilled} = (2 \times 2533.33) - (2.25 \times 2400) = ₹ 333.34 \text{ (Adv.)}$$

$$\text{Unskilled} = (1 \times 1266.67) - (1.25 \times 1200) = ₹ 233.33 \text{ (Adv.)}$$

$$\underline{₹ 566.67 \text{ (Adv.)}}$$

$$2. \text{ LRV} = \text{AT} (\text{SR} - \text{AR})$$

$$\text{Skilled} = 2,400 (2 - 2.25) = ₹ 600 \text{ (Adv.)}$$

$$\text{Unskilled} = 1200 (1 - 1.25) = ₹ 300 \text{ (Adv.)}$$

$$\underline{₹ 900 \text{ (Adv.)}}$$

$$3. \text{LYU} = \text{SR} (\text{AY} - \text{SY})$$

$$\frac{6,000}{720} (760 - 720) = ₹ 333.33 (\text{Fav.})$$

Verification

$$\begin{aligned} \text{LCV} &= \text{LRV} + \text{LYV} \\ ₹ 566.67 (\text{Adv.}) &= ₹ 900 (\text{Adv.}) + ₹ 333.33 (\text{Fav.}) \\ ₹ 566.67 (\text{Adv.}) &= ₹ 566.67 (\text{Adv.}) \end{aligned}$$

Ques. 19. ABC Tiles Ltd. makes plastic tiles of standard size of 6" × 6" × 1/8". Form the following information, you are required to calculate materials:

(i) Cost variance in total; (ii) Price Variance; (iii) Usage Variance; (iv) Mix Variance and (v) Yield Variance
A standard mix of the compound required to produce an output of 20,000 square feet of tiles 1/8" thick is as:

Direct Materials	Quantity (kg)	Price Per kg (₹)
A	600	0.90
B	400	0.65
C	500	0.40

During December 2003, 8 mixed were processed and actual materials consumed were:

Direct Materials	Quantity (kg)	Price Per kg (₹)
A	5,000	0.85
B	2,900	0.60
C	4,400	0.45

Actual output for December, 2003 was 6,20,000 tiles.

(C.A. Final)

Sol. As per the problem, one mix of 20,000 square feet of tiles would produce 80,000 tiles as under :

$$= \frac{20,000 \times 144 \times \frac{1}{8}}{6 \times 6 \times \frac{1}{8}} = 80,000$$

Note : One square foot has been converted into inches *i.e.*, 12 × 12 = 144 inches. Now, Standard Quantity for Actual output is calculated as under :

$$A = \frac{600 \times 6,20,000}{80,000} = 4,650 \text{ Kgs.}$$

$$B = \frac{400 \times 6,20,000}{80,000} = 3,100 \text{ Kgs.}$$

$$C = \frac{500 \times 6,20,000}{80,000} = 3,875 \text{ Kgs.}$$

Standard Cost = SQ × SP

$$A = 4650 \times 0.90 = ₹ 4185$$

$$B = 3100 \times 0.65 = ₹ 2015$$

$$C = 3875 \times 0.40 = ₹ 1550$$

$$\underline{11625} \quad \underline{₹ 7,750}$$

Actual Cost = AQ × AP

$$A = 5000 \times 0.85 = ₹ 4,250$$

$$B = 2,900 \times 0.60 = ₹ 1,740$$

$$C = 4,400 \times 0.45 = ₹ 1,980$$

$$\underline{12,300} \quad \underline{₹ 7,970}$$

(i) Material Cost Variance (MCV) = Standard Cost – Actual Cost
= ₹ 7,750 – ₹ 7,970
= ₹ 220 (Adv.)

(ii) Material Price Variance (MPV) = (SP – AP) × AQ

$$A = (0.90 - 0.85) \times 5000 = ₹ 250 \text{ (Fav.)}$$

$$B = (0.65 - 0.60) \times 2900 = ₹ 145 \text{ (Fav.)}$$

$$C = (0.40 - 0.45) \times 4400 = ₹ 220 \text{ (Adv.)}$$

$$= ₹ 175 \text{ (Fav.)}$$

(iii) Material Usage Variance (MUJ) = (SQ – AQ) × SP

$$A = (4650 - 5000) \times 0.90 = ₹ 315 \text{ (Adv.)}$$

$$B = (3100 - 2900) \times 0.65 = ₹ 130 \text{ (Fav.)}$$

$$C = (3875 - 4400) \times 0.40 = ₹ 210 \text{ (Adv.)}$$

$$= ₹ 395 \text{ (Adv.)}$$

(iv) Material Mix Variance (MMV) = (Revised Std. Qty. – Actual Qty.) × SP

$$\text{Revised Std. Qty.} = \frac{\text{Total weight of Actual mix}}{\text{Total weight of Std. mix}} \times \text{Std. Qty.}$$

$$A = \frac{12,300}{11,625} \times 4650 = 4,920$$

$$B = \frac{12,300}{11,625} \times 3100 = 3,280$$

$$C = \frac{12,300}{11,625} \times 3875 = 4,100$$

MMV for

$$A = (4920 - 5000) \times 0.90 = ₹ 72 \text{ (Adv.)}$$

$$B = (3280 - 2900) \times 0.65 = ₹ 247 \text{ (Fav.)}$$

$$C = (4100 - 4400) \times 0.40 = ₹ 120 \text{ (Adv.)}$$

$$₹ 55 \text{ (Fav.)}$$

(v) Material Yield Variance (MYV) = (Std. yield – Actual yield) × SC

$$\text{Standard yield for Actual Input} = \frac{80,000 \times 8 \times 12,300}{12,000} = 6,56,000 \text{ tiles}$$

$$SC = \frac{7750}{6,20,000} = ₹ 0.0125$$

$$MYV = (656000 - 620000) \times 0.0125$$

$$= ₹ 450 \text{ (Adv.)}$$

Ques. 20. Standard cost specifications for a product are as under:

Time 5 hours per unit

Cost ₹ 5 per hour

Actual performance in a cost period:

Production – 2000 units

Hours taken –

Production 10,400 hours

Idle time 400 hours

Total time 10,800 hours

Payment made ₹ 56,160 (Average ₹ 5.20 per hour for 10,800 hours). Calculate Labour Variances.

Sol.

Standard for 200 units

Actual for 2000 units

$$10,000 \text{ Hrs.} \times ₹ 5 = ₹ 50,000$$

$$10,800 \text{ Hrs.} \times ₹ 5.20 = ₹ 56,160$$

$$1. \text{ Labour Cost Variance (LCV)} = SC - AC$$

$$= (50,000 - 56,160) = ₹ 6,160 \text{ (Adv.)}$$

$$2. \text{ Labour Rate Variance (LRV)} = (SR - AR) AT$$

$$= (5.00 - 5.20) \times 10,800 = ₹ 2,160 \text{ (Adv.)}$$

3. Labour Efficiency Variance (LEV) = (ST – AT) SR
 = (10,000 – 10,400) × 5 = ₹ 2,000 (Adv.)
4. Labour Idle Time Variance (LITV) = Idle Time × SR
 = 400 Hrs. × 5 = ₹ 2,000 (Adv.)

Verification

$$\text{LCV} = \text{LRV} + \text{LEV} + \text{LITV}$$

$$₹ 6,160 \text{ (Adv.)} = ₹ 2,160 \text{ (Adv.)} + ₹ 2,000 \text{ (Adv.)} + ₹ 2,000 \text{ (Adv.)}$$

$$₹ 6,160 \text{ (Adv.)} = ₹ 6,160 \text{ (Adv.)}$$

Ques. 21. Find out the different labour variances from the following information:

Standard	Actual
Output: 1,000 units Rate of Payment: ₹ 6 per unit Time Taken: 50 Hrs.	Output : 1,200 units Wages Paid : ₹ 8,000 Time Taken: 40 Hrs

Sol. Standard Rate (SR) per hour = $\frac{1000 \times 6}{50 \text{ Hrs.}} = ₹ 120 \text{ per hour}$

Actual Rate (AR) per hour = $\frac{₹ 8000}{40 \text{ Hrs.}} = ₹ 200 \text{ per hour}$

Since, standard output and actual output are not same, hence Revised Standard Time (RST) will be computed as follows :

$$\text{RST} = \frac{1200}{1000} \times 50 \text{ hrs.} = 60 \text{ Hrs.}$$

- Labour Cost Variance (LCV) = (RST × SR) – (AT × AR)
 = (120 × 60) – (40 × 200)
 = 7,200 – 8,000
 = ₹ 800 (Adv.)
- Labour Rate Variance (LRV) = AT (SR – AR)
 = 40 (120 – 200)
 = 40 × (– 80)
 = ₹ 3200 (Adv.)
- Labour Efficiency Variance (LEV)
 = SR (RST – AT)
 = 120 (60 – 40)
 = ₹ 2400 (Fav.)
- Labour Yield Variance (LYV) = SC (Actual output – Rev. Standard output)
 Rev. Standard output = $\frac{1000 \text{ units}}{50 \text{ Hrs.}} \times 40 \text{ Hrs.}$
 = 800 units

$$\text{LYV} = 6 (1200 – 800) = ₹ 2,400 \text{ (Fav.)}$$

Ques. 22. A gang of workers normally consists of 30 men, 15 women and 10 boys. They are paid at standard rate as under:

Men	₹ 0.80
Women	₹ 0.60
Boys	₹ 0.40

In a normal working week of 40 hours, the gang is expected to produce 2,000 units of output.

During the week ended on 31st March 2019, the gang consisted of 40 men, 10 women and 5 boys. The actual wages paid were at the rate of ₹ 0.70, ₹ 0.65 and ₹ 0.30 respectively. 4 Hours were lost due to abnormal idle time and 1,600 units were produced.

Calculate:

- (i) Labour Cost Variance,
- (ii) Labour Rate Variance,
- (iii) Labour Efficiency Variance,
- (iv) Labour Mix Variance,
- (v) Labour Idle Time Variance,
- (vi) Labour Yield Variance.

Sol.

Standard				
Workers	Hrs.	Total Hrs.	Rate (₹)	Amount (₹)
Men	30 × 40 =	1200	0.80	960
Women	15 × 40 =	600	0.60	360
Boys	10 × 40 =	400	0.40	160
	<u>55</u>	<u>2200</u>		<u>1,480</u>

Standard output = 2000 units

Actual				
Workers	Hrs.	Total Hrs.	Rate (₹)	Amount (₹)
Men	40 × 40 =	1600	0.70	920
Women	10 × 40 =	400	0.65	360
Boys	5 × 40 =	200	0.30	160
	<u>55</u>	<u>2200</u>		<u>1,440</u>
		Idle time (55 × 4)		
		<u>1980</u>		

Actual output = 1600 unit

Since, standard output and Actual output are not the same, hence Revised Standard Time (RST) will be computed as follows :

RST

$$\text{Men} = \frac{1200}{2000} \times 1600 = 960 \text{ Hrs.}$$

$$\text{Women} = \frac{600}{2000} \times 1600 = 480 \text{ Hrs.}$$

$$\text{Boys} = \frac{400}{2000} \times 1600 = 320 \text{ Hrs.}$$

1. Labour Cost Variance (LCV) = (RST × SR) – (AT × AR)

Men	=	(960 × 0.80) – (1600 × 0.70)	= ₹ 352 (Adv.)
Women	=	(480 × 0.60) – (400 × 0.65)	= ₹ 28 (Fav.)
Boys	=	(320 × 0.40) – (200 × 0.30)	= ₹ 68 (Fav.)
			<u>₹ 256 (Adv.)</u>

2. Labour Rate Variance (LRV) = AT (SR – AR)
- | | | |
|-------|----------------------|----------------|
| Men | = 1600 (0.80 – 0.70) | = ₹ 160 (Fav.) |
| Women | = 400 (0.60 – 0.65) | = ₹ 20 (Adv.) |
| Boys | = 20 (0.40 – 0.30) | = ₹ 20 (Fav.) |
| | | ₹ 160 (Fav.) |
3. Labour Efficiency Variance (LEV) = SR (RST – AT)
- | | | |
|-------|---------------------|----------------|
| Men | = 0.80 (960 – 1600) | = ₹ 512 (Adv.) |
| Women | = 0.60 (480 – 400) | = ₹ 48 (Fav.) |
| Boys | = 0.40 (320 – 200) | = ₹ 48 (Fav.) |
| | | ₹ 416 (Adv.) |
4. Labour Mix Variance (LMV) = SR (ST – AT)
- | | | |
|-------|----------------------|----------------|
| Men | = 0.80 (1200 – 1600) | = ₹ 320 (Adv.) |
| Women | = 0.60 (600 – 400) | = ₹ 120 (Fav.) |
| Boys | = 0.40 (400 – 200) | = ₹ 80 (Fav.) |
| | | ₹ 120 (Adv.) |
5. Labour Idle Time Variance = Idle Time × SR
- $$= 220 \times \frac{\text{₹ } 1480}{2200 \text{ Hrs.}}$$
- $$= 148 \text{ (Adv.)}$$
6. Labour Yield Variance = SC (Actual output – Rev. Standard output)
- Rev. Standard output = $\frac{2000 \text{ units}}{2200 \text{ Hrs.}} \times 198 \text{ Hrs.} = 1800 \text{ units}$
- $$SC = \frac{\text{₹ } 1480}{2000} = \text{₹ } 0.74$$
- $$LYV = 0.74 (1600 – 1800) = \text{₹ } 148 \text{ (Adv.)}$$

Verification

1. LCV = LRV + LEV
₹ 256 (Adv.) = ₹ 160 (Fav.) + ₹ 416 (Adv.)
2. LEV = LMV + Idle Time Var. + LYV
₹ 416 (Adv.) = ₹ 120 (Adv.) + ₹ 148 (Adv.) + ₹ 148 (Adv.)
₹ 416 (Adv.) = ₹ 416 (Adv.)

Ques. 23. A gang of workers usually consists of 10 men, 5 women and 5 boys in a factory. They are paid at a standard hourly rates of ₹ 1.25, ₹ 0.80, and ₹ 0.70 respectively. In a normal working week of 40 hours, the gang is expected to produce 1,000 units of output.

In a certain week, the gang consists of 13 men, 4 women and 3 boys. The Actual wages were paid at the rates of ₹ 1.20, ₹ 0.85 and ₹ 0.65 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced. Calculate various labour variances. (C.S. Inter 1998)

Sol.

Standard

Workers	Hrs.	Total Hrs.	Rate (₹)	Amount (₹)
Men	10 × 40 =	400	1.25	500
Women	5 × 40 =	200	0.80	160
Boys	5 × 40 =	200	0.70	140
	20	800		800

Standard output = 1,000 units

Actual				
Workers	Hrs.	Total Hrs.	Rate (₹)	Amount (₹)
Men	13	× 40 = 520	1.20	624
Women	4	× 40 = 160	0.80	136
Boys	3	× 40 = 120	0.70	78
	20	800		838
		Idle Time 40		
		760		

Actual output = 960 units

Since standard output and actual output are not same, hence RST will be computed.

RST :

$$\text{Men} = \frac{960}{1000} \times 400 = 384 \text{ Hrs.}$$

$$\text{Women} = \frac{960}{1000} \times 200 = 192 \text{ Hrs.}$$

$$\text{Boys} = \frac{960}{1000} \times 200 = 192 \text{ Hrs.}$$

- Labour Cost Variance (LCV) = (RST × SR) – (AT × AR)

Men	= (384 × 1.25) – (520 × 1.20)	= ₹ 144 (Adv.)
Women	= (192 × 0.80) – (160 × 0.85)	= ₹ 17.60 (Fav.)
Boys	= (192 × 0.70) – (120 × 0.65)	= ₹ 54.40 (Fav.)
		<u>₹ 72 (Adv.)</u>
- Labour Rate Variance (LRV) = AT (SR – AR)

Men	= 520 (1.25 – 1.20)	= ₹ 26 (Fav.)
Women	= 160 (0.80 – 0.85)	= ₹ 8 (Adv.)
Boys	= 120 (0.70 – 0.65)	= ₹ 6 (Fav.)
		<u>₹ 24 (Fav.)</u>
- Labour Efficiency Variance (LEV) = SR (RST – AT)

Men	= ₹. 1.25 (384 – 520)	= ₹ 170.00 (Adv.)
Women	= ₹. 0.80 (192 – 160)	= ₹ 25.60 (Fav.)
Boys	= ₹. 0.70 (192 – 120)	= ₹ 50.40 (Fav.)
		<u>= ₹ 94.00 (Adv.)</u>
- Labour Mix Variance (LMV) = SR (ST – AT)

Men	= ₹. 1.25 (384 – 520)	= ₹ 170.00 (Adv.)
Women	= ₹. 0.80 (192 – 160)	= ₹ 25.60 (Fav.)
Boys	= ₹. 0.70 (200 – 120)	= ₹ 56 (Fav.)
		<u>₹ 62 (Adv.)</u>
- Labour Idle time Variance (LITV) = Idle Times × SR

	$40 \times \frac{₹ 800}{800}$	= ₹ 40 (Adv.)
--	-------------------------------	---------------
- Labour Yield Variance (LYV) = SC (Actual output – Rev. Standard output)

Rev. Standard output	= $\frac{760 \text{ Hrs.}}{800 \text{ Hrs.}} \times 1000 \text{ units}$	
	= 950 units	

$$SC = \frac{\text{₹ } 800}{1000} = \text{₹ } 0.80$$

$$LYV = 0.80 (960 - 950) = \text{₹ } 8 \text{ (Fav.)}$$

Verification:

$$(i) \text{ LCV} = \text{LRV} + \text{LEV}$$

$$\text{₹ } 70 \text{ (Adv.)} = \text{₹ } 24 \text{ (Fav.)} + \text{₹ } 94 \text{ (Adv.)}$$

$$\text{₹ } 70 \text{ (Adv.)} = \text{₹ } 70 \text{ (Adv.)}$$

$$(iii) \text{ LEV} = \text{LMV} + \text{LITV} + \text{LYV}$$

$$\text{₹ } 94 \text{ (Adv.)} = \text{₹ } 62 \text{ (Adv.)} + \text{₹ } 40 \text{ (Adv.)} + \text{₹ } 8 \text{ (Fav.)}$$

$$\text{₹ } 94 \text{ (Adv.)} = \text{₹ } 94 \text{ (Adv.)}$$

Ques. 24. 100 skilled, 40 semi-skilled and 60 unskilled workers to work for 30 weeks to get a job completed. The standard weekly wages were ₹ 60, ₹ 36 and ₹ 24 respectively. The job was actually completed in 32 weeks by 80 skilled, 50 semi-skilled and 70 unskilled workers who were paid ₹ 65, ₹ 40 and ₹ 20 respectively as weekly wages.

Find out the various labour variances.

(I.C.W.A. Inter 1997)

Sol.

Standard

Workers	Time	Rate (₹)	Amount (₹)
Skilled	100 × 30 weeks = 3000	60	1,80,000
Semi-Skilled	40 × 30 weeks = 1200	36	43,200
Unskilled	60 × 30 weeks = 1800	24	43,200
	<u>200</u>	<u>6,000</u>	<u>2,66,400</u>

Actual

Workers	Time	Rate (₹)	Amount (₹)
Skilled	80 × 32 weeks = 2560	65	1,66,400
Semi-Skilled	50 × 32 weeks = 1600	40	64,400
Unskilled	70 × 32 weeks = 2240	20	44,800
	<u>200</u>	<u>6,400</u>	<u>2,75,200</u>

- Labour Cost Variance (LCV) = Standard Cost – Actual Cost
 = ₹ 2,66,400 – ₹ 2,75,200
 = ₹ 8,800 (Adv.)
- Labour Rate Variance (LRV) = AT (SR – AR)
 Skilled = 2560 (60 – 65) = ₹ 12,800 (Adv.)
 Semi-skilled = 1600 (36 – 40) = ₹ 6,400 (Adv.)
 Unskilled = 2240 (24 – 20) = ₹ 8,960 (Fav.)
₹ 10,240 (Adv.)
- Labour Efficiency Variance (LEV) = SR (ST – AT)
 Skilled = 60 (3000 – 2560) = ₹ 26,400 (Fav.)
 Semi-skilled = 36 (1200 – 1600) = ₹ 14,400 (Adv.)
 Unskilled = 24 (1800 – 2240) = ₹ 10,560 (Adv.)
₹ 1440 (Fav.)

$$4. \text{ Labour Mix Variance (LMV)} = \text{SR (RST - AT)}$$

RST:

$$\text{Skilled} = \frac{6400}{6000} \times 3000 = 3,200$$

$$\text{Semi-skilled} = \frac{6400}{6000} \times 1200 = 1,280$$

$$\text{Unskilled} = \frac{6400}{6000} \times 1800 = 1,920$$

LMV

$$\text{Skilled} = 60 (3200 - 2560) = ₹ 38,400 \text{ (Fav.)}$$

$$\text{Semi-skilled} = 36 (1280 - 1600) = ₹ 11,520 \text{ (Adv.)}$$

$$\text{Unskilled} = 24 (1920 - 2240) = ₹ 7,680 \text{ (Adv.)}$$

$$\underline{₹ 19,200 \text{ (Fav.)}}$$

$$5. \text{ Labour Idle Time Variance (LITV)} = \text{Idle Time} \times \text{SR}$$

$$= (6,000 - 6,400) \times \frac{2,66,400}{6,000}$$

$$= ₹ 17,760 \text{ (Adv.)}$$

Verification:

$$(i) \text{ LCV} = \text{LRV} + \text{LEV}$$

$$₹ 8800 \text{ (Adv.)} = ₹ 10,240 \text{ (Adv.)} + ₹ 1,440 \text{ (Fav.)}$$

$$₹ 8,800 \text{ (Adv.)} = ₹ 8,800 \text{ (Adv.)}$$

$$(ii) \text{ LEV} = \text{LMV} + \text{LITV}$$

$$₹ 1,440 \text{ (Fav.)} = ₹ 19,200 \text{ (Fav.)} + ₹ 17,760 \text{ (Adv.)}$$

$$₹ 1,440 \text{ (Fav.)} = ₹ 1,440 \text{ (Fav.)}$$

Ques. 25. The standard cost of material and labour for making of 5 units of a certain product are estimated as under:

Material: 80 kg at ₹ 1.50 per kg

Labour: 18 Hrs. at ₹ 1.25 per hour

On completion of the production, it was found that 75 kgs. of material costing ₹ 1.75 per kg has been consumed and the time taken was 16 hours at the rate of ₹ 1.50 per hour.

You are required to analyse material and labour variances.

Sol. Standard

Standard Qty. = 80 Kgs.

Standard Price = ₹ 1.50 per kg.

Standard Time = 18 Hrs.

Standard Rate = ₹ 1.25 per hour

Actual

Actual Qty. = 75 kgs.

Actual Price = ₹ 1.75 per kg.

Actual Time = 16 Hrs.

Actual Rate = ₹ 1.50 per hour

1. Material Cost Variance (MCV) = (SQ × SP) – (AQ × AP)

$$= (80 \times 1.50) - (75 \times 1.75)$$

$$= 120 - 131.25 = ₹ 11.25 \text{ (Adv.)}$$
2. Material Price Variance (MPV) = AQ (SP – AP)

$$= 75 (1.50 - 1.75)$$

$$= 75 (- 0.25)$$

$$= ₹ 18.75 \text{ (Adv.)}$$
3. Material Usage Variance (MUV) = SP (SQ – AQ)

$$= 1.50 (80 - 75)$$

$$= ₹ 7.5 \text{ (Fav.)}$$

Verification:

$$MCV = MPV + MUUV$$

$$₹ 11.25 \text{ (Adv.)} = ₹ 18.75 \text{ (Adv.)} + ₹ 7.50 \text{ (Fav.)}$$

$$₹ 11.25 \text{ (Adv.)} = ₹ 11.25 \text{ (Adv.)}$$

4. Labour Cost Variance (LCV) = $(ST \times SR) - (AT \times AR)$
 $= (18 \times 1.25) - (16 \times 1.50)$
 $= 22.50 - 24.00$
 $= ₹ 1.50 \text{ (Adv.)}$
5. Labour Rate Variance (LRV) = $AT (SR - AR)$
 $= 16 (1.25 - 1.50)$
 $= 16 \times (-0.25)$
 $= ₹ 4.00 \text{ (Adv.)}$
6. Labour Efficiency Variance (LEV) = $SR (ST - AT)$
 $= 1.25 (18 - 16)$
 $= 1.25 \times 2$
 $= ₹ 2.50 \text{ (Fav.)}$

Verification:

$$LCV = LRV + LEV$$

$$₹ 1.50 \text{ (Adv.)} = ₹ 4.00 \text{ (Adv.)} + ₹ 2.50 \text{ (Fav.)}$$

$$₹ 1.50 \text{ (Adv.)} = ₹ 1.50 \text{ (Adv.)}$$

7. Total Cost Variance = $MCV + LCV$
 $= ₹ 11.25 \text{ (Adv.)} + ₹ 1.50 \text{ (Adv.)}$
 $= ₹ 12.75 \text{ (Adv.)}$

Ques. 26. The standard cost for one limit of a product shows the following costs for material and labour:

Material = 4 pieces @ ₹ 5

Labour = 10 hours @ ₹ 1.25

11,400 units of the product were manufactured during the month of March 2019 with the following material and labour costs:

Material = 46,000 pieces @ ₹ 4.95

Labour = 1,13,600 hours @ ₹ 1.52

Calculate material and labour variances.

Sol.

Standard

Standard Quantity	= 4 pieces per unit	
Total standard Quantity	= $(11,400 \times 4)$	= 45,600 units
Standard Price	= ₹ 5 per unit	
Standard Time	= 10 hours per unit	
Total Standard Time	= $(11,400 \times 10)$ hours	= 1,14,000 hours
Standard Rate	= ₹ 1.25 per hour	

Actual

Total Actual Quantity	= 46,000 units	
Actual Price	= ₹ 4.95 per unit	
Total Actual Time	= 1,13,600 hours	
Actual Rate	= ₹ 1.52 per hour	
1. Material Cost Variance	= $(SQ \times SP) - (AQ \times AP)$ $= (45,600 \times 5) - (46,000 \times 4.95)$ $= (2,28,000 - 2,27,700)$ $= ₹ 300 \text{ (Fav.)}$	
2. Material Price Variance	= $AQ (SP - AP)$ $= 46,000 (5 - 4.95)$ $= ₹ 2,300 \text{ (Fav.)}$	

$$\begin{aligned}
 3. \text{ Material Usage Variance} &= SP (SQ - AQ) \\
 &= 5 (45,600 - 46,000) \\
 &= ₹ 2000 \text{ (Adv.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 MCV &= MPV + MUV \\
 ₹ 300 \text{ (Fav.)} &= ₹ 2,300 \text{ (Fav.)} + ₹ 2,000 \text{ (Adv.)}
 \end{aligned}$$

$$\begin{aligned}
 4. \text{ Labour Cost Variance} &= (ST \times SR) - (AT \times AR) \\
 &= (1,14,000 \times 1.25) - (1,13,600 \times 1.52) \\
 &= (1,42,500 - 1,72,672) \\
 &= ₹ 30,172 \text{ (Adv.)}
 \end{aligned}$$

$$\begin{aligned}
 5. \text{ Labour Rate Variance} &= AT (SR - AR) \\
 &= 1,13,600 (1.25 - 1.52) \\
 &= ₹ 30,672 \text{ (Adv.)}
 \end{aligned}$$

$$\begin{aligned}
 6. \text{ Labour Efficiency Variance} &= SR (ST - AT) \\
 &= 1.25 (1,14,000 - 1,13,600) \\
 &= ₹ 500 \text{ (Fav.)}
 \end{aligned}$$

Verification:

$$\begin{aligned}
 LCV &= LRV + LEV \\
 ₹ 30,172 \text{ (Adv.)} &= ₹ 30,672 \text{ (Adv.)} + ₹ 500 \text{ (Fav.)} \\
 &= ₹ 30,172 \text{ (Adv.)}
 \end{aligned}$$

Ques. 27. You are given below the following data for the month of April, 2014:

	Budgeted	Actual
Fixed Overheads	₹ 20,000	₹ 20,400
Units of Production	10,000	10,400
Standard Time for One unit	4 hours	—
Actual Hours Worked	—	40,200 hours

Calculate: (i) Fixed Overhead Expenditure Variance; (ii) Fixed Overhead Volume Variance; (iii) Fixed Overhead Cost Variance; (iv) Fixed Overhead Efficiency Variance; and (v) Fixed Overhead Capacity Variance.

(B.Com, HPU, 2008; B.Com. (Hons.), Delhi)

Sol.

$$\text{Standard Rate Percent} = \frac{20,000}{10,000} = 2 \text{ PU}$$

$$\begin{aligned}
 \text{(i) FOEV} &= \text{Budgeted Fixed Overhead} - \text{Actual Fixed overhead} \\
 &= 20,000 - 20,400 = 400 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) FOVV} &= (\text{Actual output} \times \text{SR}) - \text{BFO} \\
 &= 10,400 \times 2 - 20,000 = 800 \text{ F}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) FOCV} &= \text{Actual output} \times \text{SR} - \text{AFO} \\
 &= (10,400 \times 2) - 20,400 = 400 \text{ F}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv) Fixed Overhead Efficiency variance} &= \text{SR} (\text{Actual output} - \text{Std. output}) \\
 &= 2 \left(10,400 - \frac{10,000h}{4,000h} \times 40,200 \right) = 700 \text{ F}
 \end{aligned}$$

$$\begin{aligned}
 \text{(v) Fixed Overhead Capacity variance} &= \text{SR} (\text{Std. output} - \text{Budgeted output}) \\
 &= 2 \left(\frac{10,000}{40,000} \times 40,200 - 10,000 \right) = 100 \text{ F}
 \end{aligned}$$

Ques.30. Following information is available from the cost records of a manufacturing unit for May, 2019:

	Standard	Actual
Production	10,000 tons	11,500 tons
Working days	25	24

Fixed Overheads	₹ 5,00,000	₹ 6,00,000
Variable Overheads	₹ 2,50,000	₹ 3,00,000

Calculate the following variances:

- | | |
|----------------------------------------------|----------------------------------------------|
| (a) Total Variable Overheads Variance; | (b) Variable Overheads Expenditure Variance; |
| (c) Variable Overheads Efficiency Variance; | (d) Total Fixed Overheads Variance; |
| (e) Fixed Overheads Expenditure Variance; | (f) Fixed Overheads Volume Variance; |
| (g) Fixed Overheads Efficiency Variance; and | (h) Fixed Overheads Calendar Variance. |

Sol.

	Standard	Actual
Output	10,000 tons	11,500 tons
Working days	25	24
FO	₹ 5,00,000	₹ 6,00,000
VO	₹ 2,50,000	₹ 3,00,000

$$SR = \frac{2,50,000}{10,000} = ₹ 25 \text{ (Variable overhead)}$$

$$SR = \frac{5,00,000}{10,000 \text{ ton}} = 50 \text{ per ton (fixed overhead)}$$

$$\begin{aligned} \text{(a) T.V.O.V} &= \text{Actual Output} \times SR - \text{AVO} \\ &= 11,500 \times 25 - 3,00,000 \\ &= 12,500 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{(b) V.O.E.V.} &= \text{Budget V.O.} - \text{AVO} \\ &= 2,50,000 - 3,00,000 = 50,000 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{(c) V.O. Efficiency variance:} \\ &= SR (\text{Actual quantity} - \text{Std. quantity}) \\ &= 25 (11,500 - 10,000) = 37,000 \text{ F} \end{aligned}$$

$$\begin{aligned} \text{(d) F.O.V} &= \text{Actual output} \times SR - \text{AFO} \\ &= 11,500 \times 50 - 6,00,000 = 25,000 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{(e) FOEV} &= \text{Budget FO} - \text{AFO} \\ &= 5,00,000 - 6,00,000 = 1,00,000 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{(f) FOVV} &= \text{Actual output} \times SR - \text{FO} \\ &= 11,500 \times 50 - 5,00,000 = 75,000 \text{ F} \end{aligned}$$

$$\begin{aligned} \text{(g) F.O. Efficiency variance} \\ &= SR (\text{Actual output} - \text{Std. Quantity}) \\ &= 50 \left(11,500 - \frac{10,000}{25} \times 24 \right) = 95,000 \text{ F} \end{aligned}$$

$$\begin{aligned} \text{(h) F.O.C.V} &= \text{Change in output due to difference in standard and actual working days} \times \text{Standard rate} \\ &\quad \text{per unit} \\ &= \frac{10,000}{25} \times 1 \times 50 = 20,000 \text{ A} \end{aligned}$$

Ques. 31. The following information was obtained from the records of K. Ltd., a manufacturing company, using standard costing system:

	Standard	Actual
Production	4,000 units	3,800 units
Working days	20	21
Fixed Overheads	₹ 40,000	₹ 39,000
Variable Overheads	₹ 24,000	₹ 24,000

You are required to calculate the following Overhead Variances:

- (a) Variable Overhead Variance:

(i) Expenditure Variance; and (ii) Efficiency Variance

(b) Fixed Overhead Variance:

(i) Expenditure Variance; (ii) Volume Variance;

(iii) Efficiency Variance; and (iv) Calendar Variance

Sol.

(a) (i) V.O. Exp. V. = B.V.O. – A.V.O

$$= 24,000 - 24,000 = 0$$

(ii) V.O. Eff. V. = SR (Actual output – Std. output)

$$= \frac{24,000}{4,000} (3,800 - 4,000) = 1200 \text{ A}$$

(b) (i) F.O.E.V. = B.FO – AFO

$$= 40,000 - 39,000 = 1,000 \text{ F}$$

(ii) F.O.V.V. = Actual output × SR – B.F.O

$$SR = \frac{40,000}{4,000} = 10 \text{ PU}$$

$$= 3,800 \times 10 - 40,000 = 2,000 \text{ A}$$

(iii) F.O. Efficiency Variance = SR (Actual output – Std. output)

$$= 10 \left(3,800 - \frac{4,000}{20} \times 21 \right)$$

$$4000 \text{ A}$$

(iv) F.O. C. V. = Increase in output due to increase in working days × SR

$$= \frac{4,000}{20} \times 1 \times 10 = 2000 \text{ F}$$

Ques.32. V. Ltd. has furnished you the following information for the month of September, 2014:

	Budgeted	Actual
Production	30,000 units	32,500 units
Man Hours	30,000 Hrs.	33,000 Hrs.
Fixed Overheads	₹ 45,000	₹ 50,000
Variable Overheads	₹ 60,000	₹ 68,000
Working Days	25	26

Calculate Overheads Variance.

(C.A. Inter)

Sol.

$$SR(\text{fix overhead}) = \frac{45,000}{30,000 \text{ units}} = 1.5 \text{ PU}$$

(i) F.O. V. = SR × Actual output – AFO

$$= 1.5 \times 32,500 - 50,000 = 1250 \text{ A}$$

(ii) F.O. Exp. V. = BFO – AFO

$$= 45,000 - 5,000 = 5,000 \text{ A}$$

(iii) F.O. V.V. = SR × Actual output – B.F.O

$$= 1.5 \times 32,500 - 45,000 = 3,750 \text{ F}$$

(iv) F.O. Cap. V. = SR (Std. output – Rev. Budgeted output)

$$= 1.5 \left(\frac{30,000 \text{ units}}{30,000 \text{ h}} \times 33,000 \text{ h} - \frac{30,000 \text{ units}}{25} \times 26 \right)$$

$$= 1.5 (33,000 - 31,200) = 2700 \text{ F}$$

(v) F.O. Eff. V. = SR (Actual output – Std. output)

$$= 1.5 (32,500 - 33,000)$$

$$= 750 \text{ A}$$

$$\begin{aligned}
 \text{(vi) V.O.V.} &= \text{SR} \times \text{Actual output} - \text{AV. O} \\
 &= \left(\frac{60,000}{30,000} \times 32,500 \right) - 68,000 \\
 &= 3000 \text{ A}
 \end{aligned}$$

Ques. 33. From the following information calculate:

- (a) Efficiency Variance; (b) Capacity Variance; (c) Calendar Variance; (d) Volume Variance; (e) Expenditure Variance; and (f) Fixed Overhead Variance.

	Budgeted	Actual
Man Hours per day	16,000	16,800
Output per Man hour in units	2.00	1.80
Fixed Overheads	₹ 6,40,000	₹ 6,72,000
No. of Working Days	20	22

Sol.

	Budgeted	Actual
Working days	20	22
Fixed overheads	₹ 6,40,000	₹ 6,72,000
Output	3,20,000 × 2 = 6,40,000 units	3,69,600 × 1.8 = 6,65,280 units
Total Hours	16,000 × 20 = 3,20,000 h	16,800 × 22 = 3,69,600 h

$$\text{SR} = 6,40,000 \div 6,40,000 \text{ Units} = ₹ 1 \text{ PU}$$

$$\text{(a) F.O. Eff. V.} = \text{SR} (\text{Actual output} - \text{Std output}) \\ = 1 (6,65,280 - 7,39,200) = 73,920 \text{ (A)}$$

$$\text{(b) F.O. Cap. V.} = \text{SR} (\text{Std. output} - \text{R.Bud. out.}) \\ = 1 \left(\frac{6,40,000}{3,20,000} \times 3,69,600 - \frac{6,40,000}{20} \times 22 \right) \\ = 1 (7,39,200 - 7,04,000) = 35,200 \text{ F}$$

$$\text{(c) F.O. Cal.V.} = \text{Increase in output due to increase in days} \times \text{SR} \\ = \frac{6,40,000}{20} \times 2 \times 1 = ₹ 64,000 \text{ F}$$

$$\text{(d) F.O. V. V.} = \text{Actual output} \times \text{SR} - \text{BFO} \\ = 6,65,280 \times 1 - 6,40,000 \\ = 25,280 \text{ F}$$

$$\text{(e) F.O. Exp. V.} = \text{Budgeted FO} - \text{A.F.O.} \\ = 6,40,000 - 6,72,000 = 32,000 \text{ A}$$

$$\text{(f) F.O. V.} = \text{Actual output} \times \text{SR} - \text{AFO} \\ = 6,65,280 \times 1 - 6,72,000 = 6,720 \text{ A}$$

$$\text{Verifications} = \text{I} = \text{II} + \text{III}$$

$$\text{III} = \text{IV} + \text{V} + \text{VI}$$

Ques. 35. The following data has been collected from the cost records of a unit for computing the various Fixed Overhead Variances for the month of June, 2018:

Number of budgeted working days	25
Budgeted man-hours per day	6,000
Budgeted Output per man hour (in units)	1
Budgeted Fixed Overheads (₹)	1,50,000
Actual no. of Working days	27
Actual man-hours per day	6,300
Actual Output per man hour (in units)	0.9
Actual Fixed Overheads incurred	₹ 1,56,000

Calculate:

- | | |
|------------------------------------------|-----------------------------------|
| (1) Fixed Overhead Expenditure Variance; | (2) Calendar Variance; |
| (3) Capacity Variance; | (4) Efficiency Variance; |
| (5) Volume Variance; and | (6) Fixed Overhead Cost Variance. |

(ICWA Inter, Dec. 1995)

Sol.

	Budgeted	Actual
Working days	25	27
Fixed overhead	₹ 1,50,000	₹ 1,56,000
Total Hours	6,000 × 25 = 1,50,000 h	6,300 × 27 = 1,70,100 h
Output	1,50,000 h × 1 = 1,50,000 u	= 1,70,100 × 0.9 = 1,53,090 u

$$SR = \frac{₹ 1,50,000}{1,50,000 \text{ units}} = ₹ 1 \text{ PU}$$

- F.O. Exp. V. = BFO – A.F.O
= 1,50,000 – 1,56,000 = 6,000 (A)
- F.O. Cal. V. = Increase in output due to increase in working days × SR
= $\frac{1,50,000}{25} \times 2 \times 1 = 12,000$ (F)
- F.O. Cap. V. = SR (Std. output – R.B. outputed)
= $1 \left(\frac{1,50,000 \text{ u}}{1,50,000 \text{ h}} \times 1,70,100 \text{ h} - \frac{1,50,000 \text{ u}}{25} \times 27 \right)$
= 1 (1,70,100 – 1,62,000) = 8100 (F)
- F.O. Eff. V. = SR (Actual output – Std output)
= 1 (1,53,090 – 1,50,000)
= 3,090 (A)
- F.O. V. V. = Actual output × SR – BFO
= 1,53,090 × 1 – 1,50,000 = 3,090 (F)
- F.O Cost V. = Actual Output × SR – AFO
= 1,53,090 × 1 – 1,56,000 = 2,910 (A)

Ques.37. The following data are available with respect to particular department for weekly operations:

- | | |
|-----------------------------------------|---------------|
| (a) Standard Output for 40 Hours a week | = 2,000 units |
| (b) Standard Fixed Overheads | = ₹ 2,000 |
| (c) Actual Output | = 1,800 units |
| (d) Actual Hours Worked | = 32 hours |
| (e) Actual Fixed Overheads | = ₹ 2,250 |

Compute Overhead Variances.

(B.Com. H.P.U., April, 2007)

Sol.

	Budgeted	Actual
Hours	40	32
Output	2000 units	1800 units
F. overhead	₹ 2000	₹ 2250

$$SR = \frac{2,000}{2,000} = ₹ 1 \text{ PU}$$

(i) F.O.V. = Actual output × SR – A.F.O.
= 1800 × 1 – 2250 = 450 (A)

(ii) F.O. Exp. V. = B.F.O. – A.F.O.
= 2000 – 2250 = 250 (A)

(iii) F.O.V.V. = Actual output × SR – B.F.O.
= 1800 × 1 – 2000 = 200 (A)

(iv) F.O. Capacity variance
= SR(Std output – R.B.O.)
= 1 $\left(\frac{2000}{40} \times 32 - 2000 \right)$
= (1600 – 2000) = 400 (A)

(v) F.O. Eff. V. = SR (Actual output – Std output)
= 1 (1800 – 2000) = 200 (F).

Ques. 38. Green Star Ltd. has budgeted the following sales for the month of December, 2018:

Product	Quantity (Units)	Price per unit (₹)
A	7,000	8
B	9,000	10
C	5,000	6

As against this, Actual Sales were:

Product	Quantity (units)	Price per unit (₹)
A	6,000	9
B	10,000	8
C	5,500	7

You are required to calculate:

- (i) Sales Value Variance; (ii) Sales Price Variance;
 (iii) Sales Volume Variance; (iv) Sales Mix Variance; and
 (v) Sales Quantity Variance.

Sol.

Budgeted				Actual		
Product	Q	R	Amt. (₹)	Q	R	Amt. (₹)
A	7,000	8	56,000	6,000	9	54,000
B	9,000	10	90,000	10,000	8	80,000
C	5,000	6	30,000	5,500	7	38,500
			21,000	1,76,000	21,500	1,72,500

- (1) Sales value variable

$$\begin{aligned} & \text{Total Actual sale} - \text{Total Budgeted sale} \\ & = 1,72,500 - 1,76,000 = 3,500 \text{ A} \end{aligned}$$

- (2) Sales price variance = (AP – SP) Aq

$$A = (9 - 8) \quad 6000 = 6000 \text{ F}$$

$$B = (8 - 10) \quad 10000 = 20000 \text{ A}$$

$$C = (7 - 6) \quad 5,500 = 5,500 \text{ F}$$

$$\underline{8,500 \text{ A}}$$

- (3) Sales volume variance = (Aq – Sq) SP

$$A = (6000 - 7000) \quad 8 = 8000 \text{ A}$$

$$B = (10000 - 9000) \quad 10 = 10000 \text{ F}$$

$$C = (5500 - 5000) \quad 6 = 3000 \text{ F}$$

$$\underline{5000 \text{ F}}$$

- (4) Sales Mix. variance = (Aq – Rsq) SP

$$A = (6000 - 7000/21000 \times 21500) \quad 8 = 9333 \text{ A}$$

$$B = (10000 - 9000/21000 \times 21500) \quad 10 = 7857 \text{ F}$$

$$C = (5500 - 5000/21000 \times 21500) \quad 6 = 2286 \text{ F}$$

$$\underline{810 \text{ F}}$$

- (5) Sales Quantity variance = (Rsq – sq) SP

$$A = (7000/21000 \times 21500 - 7000) \quad 8 = 1333 \text{ A}$$

$$B = (9000/21000 \times 21500 - 9000) \quad 10 = 2143 \text{ F}$$

$$C = (5000/21000 \times 21500 - 5000) \quad 6 = 714 \text{ F}$$

$$\underline{4190 \text{ F}}$$

Ques. 39. Calculate Sales Margin Variances from the following data:

Product	Budgeted Sales		Actual Sales	
	Quantity (units)	Price per unit (₹)	Quantity (Units)	Price per unit (₹)
Alfa	1,800	200	2,000	210
Beta	1,200	180	1,000	160
Gamma	1,000	210	1,200	200

The cost per unit of product Alfa, Beta and Gamma was ₹ 170; ₹ 150 and ₹ 175 respectively.

Sol.

- (i) Total sales margin variance

$$= \text{Actual profit} - \text{Budgeted profit}$$

$$A = [2000 (210 - 170)] - [1800 (200 - 170)] = 26000 \text{ (F)}$$

$$B = [1000 (160 - 150)] - [1200 (180 - 150)] = 26000 \text{ A}$$

$$C = [1200 (200 - 175)] - [1000 (210 - 175)] = \frac{5000 \text{ A}}{5000 \text{ A}}$$

(ii) Sales margin price variance

$$= Aq (\text{Actual margin per unit} - \text{Budgeted margin per unit})$$

$$A = 2000 (40 - 30) = 20000 \text{ F}$$

$$B = 1000 (10 - 30) = 20000 \text{ A}$$

$$C = 1200 (25 - 35) = \frac{12000 \text{ A}}{12000 \text{ A}}$$

(iii) Sales margin volume variance

$$= \text{Budgeted profit P.U.} (Aq - \text{Bud. quantity})$$

$$A = 30 (2000 - 1800) = 6000 \text{ F}$$

$$B = 30 (1000 - 1200) = 6000 \text{ A}$$

$$C = 35 (1200 - 1000) = 7000 \text{ F}$$

$$\frac{7000 \text{ F}}$$

(iv) Sales margin quantity variance

$$= \text{Budgeted profit per cent (overall)}^{(1)} \times (\text{Total Actual quantity} - \text{Total Budgeted quantity})$$

$$= 31.25 (4200 - 4000) = 6250 \text{ F}$$

Working Note 1:

$$(1) = \frac{54,000 + 36,000 + 35,000}{4,000} = 31.25$$

(v) Sales margin mix variance

$$= \text{Total Actual quantity} (\text{Budgeted margin per unit on Actual mix}^{(2)} - \text{Budgeted profit per unit})$$

$$= 4200 (31.428 - 31.25) = 750 \text{ F}$$

Working Note 2:

$$(i) = \frac{(30 \times 2,000) + (30 \times 1,000) + (35 \times 1,200)}{4,200} = 31.428$$

Ques. 40. Compute the missing data indicated by the question marks from the following:

Particulars	Products	
	R	S
Standard (in units)	?	400
Actual (in units)	500	?
Price per unit:		
Standard (in ₹)	12	15
Actual (in ₹)	15	20
Sales Price Variance	?	?
Sales Volume Variance (in ₹)	1,200 (F)	?
Sales Value Variance	?	?

Sales Mix Variance for both the products together ₹450 (F).

Sol.

(1) Sales Price Variance = AQ (Actual Selling Price – Standard Selling Price)
For 'R' = 500 units (₹ 15 – ₹ 12) = ₹ 1,500 (F) **Ans.**

(2) Sales Value Variance = Sales Price Variance + Sales Volume Variance
For 'R' = 1,500 (F) + ₹ 1,200 (F) = ₹ 2,700 (F) **Ans.**

- (3) Sales Volume Variance = Standard Selling Price (AQ – SQ)
 For 'R' = ₹ 1,200 (F) = ₹ 12 (500 – SQ units)
 $\frac{₹ 1,200}{₹ 12} = 500 - \text{SQ units}$
 $100 \text{ units} = 500 - \text{SQ units}$
 Thus, SQ = (500 – 100) units = 400 units.

- (4) **Calculation of Actual Quantity sold of Product 'S':**
 Let's assume Actual Quantity sold of Product 'S' = 'X' units
 SQ of 'R' and 'S' is 400 units each
 Therefore, Standard mixing proportion is 1:1.
 Sales Mix Variance = Standard Selling Price (Actual Mix – Standard Mix)

Product	SP (in ₹)	Standard Mix (1:1) Units	Actual Mix (Units)	Variance (₹)
R	12	250 + 0.5X	500	—
S	15	250 + 0.5X	X	—
		500 + X	500 + X	450 (F) – Given

Therefore, ₹450 (F) = [₹ 12 (500 – 250 – 0.5 X) + ₹ 15 (X – (250 – 0.5 X))]
 $450 = 12 (250 - 0.5 X) + 15 (0.5 X - 250)$
 $450 = 3,000 - 6 X + 7.50 X - 3,750$
 $450 = 1.5 X - 750$
 $1.5X = 750 + 450 = 1,200$
 $X = 1,200/1.5 = 800 \text{ units.}$

Thus, Actual Quantity sold for product 'S' = 800 units

- (5) Sales Price Variance for 'S' = AQ (Actual Selling Price – Standard Selling Price)
 = 800 units (₹20 – ₹15) = ₹4,000 (F)
 (6) Sales Volume Variance for 'S' = Standard Selling Price (AQ – SQ)
 = ₹ 15 (800 units – 400 units) = ₹6,000 (F)
 (7) Sales Value Variance for 'S' = Sales Price Variance + Sales Volume Variance
 = ₹4,000 (F) + 6,000 (F)
 = ₹ 10,000 (F)

Ques. 41. The following are the details regarding production and working hours in a factory during a week:

Budgeted Production	88 units
Actual Production	75 units
Standard Hours per unit	10
Actual Working Hours	600

You are required to calculate:

- (a) Efficiency Ratio; (b) Activity Ratio; (c) Capacity Ratio

Sol. Standard Hours for Actual Output = Actual Output × Standard Hours per unit of Output
 = 75 Units × 10 hrs. = 750 hours
 Budgeted Hours = Budgeted Output × Standard Hours per unit
 = 88 Units × 10 hrs. = 880 hours
 (a) Efficiency Ratio = Standard Hours for Actual Output ÷ Actual Hours Worked × 100
 = $10,000 \div 8,000 \times 100 = 125\%$
 (b) Activity Ratio = Standard Hours for Actual Output ÷ Budgeted Hours
 = $750 \div 880 \times 100 = 85.23\%$
 (c) Capacity Ratio = Actual Hours Worked ÷ Budgeted Hours × 100
 = $600 \div 880 \times 100 = 68.18\%$

Ques. 42. The following data is available relating to works department of Guleria Ltd.:

Standard Working Hours	8 Hours daily, 5 days per week
Maximum Capacity	80 Employees
Actual Capacity	60 Employees
Actual hours expected to be worked per 4 weeks	9,600 man-hours
Maximum hours expected to be earned per 4 weeks	12,800 man-hours
Actual hours worked in the 4 week period	8,000 man-hours
Standard hours earned in the 4 week period	10,000 man-hours

During the budget period of 4 weeks, there was a national holiday for one day due to special event. Calculate the following ratios:

- (a) Efficiency Ratio; (b) Activity Ratio; (c) Capacity Ratio
 (d) Standard Capacity Usage Ratio (e) Actual Capacity Usage Ratio (f) Calendar Ratio

Sol.

(a) Efficiency Ratio = Standard Hours for Actual Output ÷ Actual Hours Worked × 100
 = $10,000 \div 8,000 \times 100 = 125\%$

(b) Activity Ratio = Standard Hours for Actual Output ÷ Budgeted Hours × 100
 = $10,000 \div 9,600 \times 100 = 104.17\%$

(c) Capacity Ratio = Actual Hours Worked ÷ Budgeted Hours × 100
 = $8,000 \div 9,600 \times 100 = 83.33\%$

(d) Standard Capacity Usage Ratio = Budgeted Working Hours ÷ Maximum Possible Working Hrs. × 100
 = $9,600 \div 12,800 \times 100 = 75\%$

(e) Actual Capacity Usage Ratio = Actual Hours Worked ÷ Maximum Possible Working Hrs. × 100
 = $8,000 \div 12,800 \times 100 = 62.5\%$

(f) Calendar Ratio = Actual No. of days worked in the Budget Period ÷ Budgeted No. of working days in the Budget Period × 100
 = $(5 \text{ days} \times 4 \text{ weeks}) - \text{One special holiday} \div (5 \text{ days} \times 4 \text{ weeks}) \times 100$
 = $(20 - 1) \div 20 \times 100 = 95\%$

Ques. 43. A factory produces two products M and N. M takes 10 hours to produce and N requires 16 hours as per the budget. A month has 25 budgeted days of 8 hours each. The factory employs 50 workers. They actually worked for 9 hours daily for 24 days because there was an unexpected holiday for one day. Actual Output : M – 500, N – 400.

Calculate: (a) Efficiency Ratio; (b) Capacity Ratio (c) Activity Ratio; and (d) Calendar Ratio.

Sol.

Total Budgeted man-hours in the month = $50 \times 8 \times 25 = 10,000$ hours

Total Actual hours worked during the month = $50 \times 9 \times 24 = 10,800$ hours

Budgeted hours for Actual Output = $(10 \times 500) + (16 \times 400) = 11,400$ hours

(a) Efficiency Ratio = Standard Hours for Actual Output ÷ Actual Hours Worked × 100
 = $11,400 \div 10,800 \times 100 = 105.55\%$

(b) Capacity Ratio = Actual Hours Worked ÷ Budgeted Hours × 100
 = $10,800 \div 10,000 \times 100 = 108\%$

(c) Activity Ratio = Budgeted Hours for Actual Output ÷ Budgeted Hours × 100
 = $11,400 \div 10,000 \times 100 = 114\%$

(d) Calendar Ratio = Actual days worked in the month ÷ Budgeted days in the month × 100
 = $24 \div 25 \times 100 = 96\%$



MARGINAL COSTING AND BREAK-EVEN ANALYSIS

■ Short Answer Type Questions

Ques. 18. Given:

Sales = ₹10,00,000
 Fixed Cost = ₹1,20,000
 Variable Cost = ₹7,60,000

- (i) What is Break-even point?
 (ii) What is P/V Ratio?

Sol.

Sales = ₹10,00,000
 Fixed Cost = ₹1,20,000
 Variable Cost = ₹7,60,000

$$(i) \text{ Break-even Point} = \frac{\text{Fixed Cost}}{\text{Contribution}} \times \text{Sales}$$

$$= \frac{₹1,20,000}{₹(10,00,000 - 7,60,000)} \times ₹10,00,000$$

$$\therefore \text{Break-even Point} = \frac{₹1,20,000}{₹2,40,000} \times ₹10,00,000 = ₹5,00,000$$

$$(ii) \text{ P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{S - V}{S} \times 100$$

$$\therefore \text{P/V Ratio} = \frac{₹(10,00,000 - 7,60,000)}{₹10,00,000} \times 100 = \frac{₹2,40,000}{₹10,00,000} \times 100 = 24\%$$

Ques. 19. Given:

Sales = ₹15,00,000
 P/V Ratio = 50%
 M/S Ratio = 40%

- (i) What is Break-even point?
 (ii) What is the amount of profit?

Sol.

Sales = ₹15,00,000
 P/V Ratio = 50%
 M/S Ratio = 40%

(i) **Calculation of Break-even Point:**

$$\text{Margin of Safety Ratio (M/S)} = \frac{\text{Sales} - \text{B.E.P.}}{\text{Sales}} \times 100$$

$$40 = \frac{₹(15,00,000 - \text{B.E.P.})}{₹15,00,000} \times 100$$

$$\text{B.E.P.} = ₹(15,00,000 - ₹6,00,000) = ₹9,00,000$$

(ii) Calculation of Profit:

$$\text{Margin of Safety} = 40\% \text{ of Sales} = \frac{40}{100} \times ₹15,00,000 = ₹6,00,000$$

$$₹6,00,000 = \frac{\text{Profit}}{\text{P/V Ratio}} \text{ or Profit} = ₹6,00,000 \times \frac{50}{100}$$

$$\therefore \text{Profit} = ₹3,00,000$$

Ques. 20. Given:

Break-even Sales = 5,000 units

Fixed Costs = ₹10,000

(i) What is Contribution per unit?

(ii) If Selling Price is ₹6 per unit, what is the amount of variable cost per unit?

Sol.

(i) Break-even Sales = 5,000 units

Fixed Costs = ₹10,000

$$\text{B.E.P. (in Units)} = \frac{\text{Fixed Costs}}{\text{Contribution Per Unit}}$$

$$5,000 = \frac{₹10,000}{\text{Contribution Per Unit}}$$

$$5,000 \times \text{Contribution Per Unit} = ₹10,000$$

$$\therefore \text{Contribution per unit} = \frac{₹10,000}{5,000} = ₹2.00$$

(ii) SP per unit = ₹6.00

$$\therefore \text{Variable cost per unit} = (\text{Sales} - \text{Contribution}) \text{ per unit} \\ = ₹(6.00 - 2.00) = ₹4.00$$

Ques. 21. From the following particulars, calculate Fixed Cost:

	<u>Amt. (in ₹)</u>
Sales	6,00,000
Direct Materials	1,80,000
Direct Wages	1,50,000
Direct Expenses	10,000
Profit @ of 20% on Sales	

Sol.**Calculation of fixed cost:**

	<u>Amount (in ₹)</u>
Sales	6,00,000
Less: Variable Costs:	
Direct Material	1,80,000
Direct Wages	1,50,000
Direct Expenses	<u>10,000</u>
	<u>(3,40,000)</u>
∴ Contribution	2,60,000
Less: Profit @20% of Sales - $\left(\frac{20}{100} \times ₹6,00,000\right)$	(1,20,000)
∴ Fixed Cost	<u><u>1,40,000</u></u>

Ques. 22. From the following information, calculate amount of profit earned during the year 2010 by using Marginal Costing Technique:

	<u>Amt. (in ₹)</u>
Fixed Cost	5,00,000
Variable Cost	₹10 per unit
Selling Price	₹15 per unit
Output level	₹1,50,000 units

(HPU, B. Com III, 2011)

Sol. Calculation of Profit under Marginal Costing

	Amount (in ₹)
Sales – (1,50,000 units × ₹15)	22,50,000
(–) Variable Costs @ ₹10 p.u.	<u>15,00,000</u>
∴ Contribution	7,50,000
Less: Fixed Cost	<u>5,00,000</u>
∴ Profit	<u>2,50,000</u>

Ques. 23. From the following data, calculate variable cost:

	Amt. (in ₹)
Sales	2,00,000
Fixed Cost	60,000
Profit	28,000

Sol. Calculation of Variable Cost:

	Amount (in ₹)
Sales	2,00,000
(–) Fixed Cost	60,000
(–) Profit	<u>28,000</u>
∴ Variable Cost	<u>1,12,000</u>

Ques. 24. X Co. Ltd. has earned a contribution of ₹4,00,000 and net profit ₹3,50,000 on sales of ₹16,00,000. What is the margin of safety (M/S)?

Sol. Calculation of Margin of Safety (M/S):

Contribution	=	4,00,000
Profit	=	3,50,000
Sales	=	16,00,000
∴ Margin of Safety (M/S) = $\frac{\text{Profit}}{\text{Contribution}} \times \text{Sales}$		
= $\frac{₹3,50,000}{₹4,00,000} \times ₹16,00,000$		

∴ M/S = ₹14,00,000

Ques. 25. From the following data, calculate the Break-even point and turnover required to earn a profit of ₹54,000.

	Amt. (in ₹)
Fixed Overheads	1,80,000
Variable Cost per unit	20
Selling Price per unit	200

Sol. (i) Calculation of Break-even Point:

$$\text{B.E.P. (in units)} = \frac{\text{Fixed Cost}}{\text{Contribution Per Unit}} = \frac{₹1,80,000}{₹(200 - 20)} = \frac{₹1,80,000}{₹180}$$

∴ B.E.P. = 1,000 units

(ii) Calculation of Turnover, i.e., Sales to earn a Profit of ₹54,000:

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{C p.u.}}{\text{SP p.u.}} = \frac{₹(200 - 20)}{₹200} \times 100 \\ &= \frac{₹180}{₹200} \times 100 = \mathbf{90\%} \end{aligned}$$

$$\begin{aligned}\text{Turnover} &= \frac{\text{Fixed Cost} + \text{Profit}}{\text{P/V ratio}} = \frac{180,000 + 54,000}{90\%} \\ &= \frac{2,34,000}{90} \times 100 = ₹2,60,000\end{aligned}$$

■ Practical Questions

Ques. 1. From the following information, calculate break-even point.

Total Fixed Costs	₹ 40,000
Variable costs (per unit)	₹ 2
Selling Price (per unit)	₹ 3

Sol.

$$\begin{aligned}\text{BEP} &= \frac{\text{FC}}{\text{C}} \\ &= \frac{40,000}{3 - 2} = 40,000 \text{ units}\end{aligned}$$

40,000 units multiplied by selling price *i.e.*, ₹ 3 = ₹ 1,20,000. At BEP, total sales and total costs will be ₹ 1,20,000.

Ques. 2. From the following data, calculate:

- P/V Ratio
 - Profit when sales are ₹ 20,000.
 - New break-even point if selling price is reduced by 20%.
- | | |
|------------------|----------|
| Fixed Costs | ₹ 4,000 |
| Break-even Sales | ₹ 10,000 |

Sol.

- Break-even Sales = $\frac{\text{Fixed cost}}{\text{P/V Ratio}}$
 $10,000 = \frac{4,000}{\text{P/V Ratio}}$

or $\text{P/V Ratio} = \frac{4,000}{10,000} = \frac{4}{10} \times 100$
 $= 40\%$

- Sales = $\frac{\text{F.C.} + \text{Profit}}{\text{P/V Ratio}}$
 $20,000 = \frac{4,000 + \text{Profit}}{40\%}$
 $\text{Profit} = \left(20,000 \times \frac{40}{100} \right) - 4,000$
 $= 8,000 - 4,000$
 $= ₹ 4,000$

- $\text{P/V Ratio} = 40\%$
 $\text{Variable Cost Ratio} = (100 - 40)\% = 60\%$

At sales of ₹ 20,000, Variable Cost = $20,000 \times \frac{60}{100} = ₹ 12,000$

Revised Sales = ₹ 20,000 – 20% of 20,000
 $= ₹ 16,000$

$$\begin{aligned}\text{C} &= \text{Sales} - \text{Variable Cost} \\ &= ₹ 16,000 - ₹ 12,000 \\ &= ₹ 4,000\end{aligned}$$

$$\text{P/V Ratio} = \frac{4,000}{16,000} \times 100 = 25\%$$

Now $\text{BEP} = \frac{\text{FC}}{\text{P/V Ratio}}$
 $= \frac{4,000}{25} \times 100 = ₹ 16,000$

- Ques. 3.** Calculate P/V Ratio and Profit or Loss in the following cases. Given that Marginal Cost is ₹ 37 per unit, selling price is ₹ 45 per unit; fixed costs ₹ 25,600 per annum.
- (i) when production is of 3000 units;
 (ii) when production is of 3600 units;
 (iii) when production is of 7000 units.

Sol.

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

or

$$= \frac{S - V}{S} \times 100$$

$$= \frac{45 - 37}{45} \times 100 = 17.77\%$$

Calculation of Profit or Loss

(i) At 3,000 units level

$$\text{Sales Value} = 45 \times 3,000 = ₹ 1,35,000$$

$$\text{Variable Costs} = 37 \times 3,000 = ₹ 1,11,000$$

Profit or Loss

$$S \times \text{P/V Ratio} = P + F$$

$$1,35,000 \times \frac{17.77}{100} = P + 25,600$$

$$24000 - 25600 = P$$

or

$$\text{Loss} = ₹ 1600$$

alternatively

$$S - V = P + F$$

$$135000 - 111000 = P + 25,600$$

$$P = - 1,600$$

$$\text{Loss} = ₹ 1,600$$

(ii) At 3600 units level

$$\text{Sales} = 45 \times 3600 = 1,62,000$$

$$\text{Variable costs} = 37 \times 3600 = 1,33,200$$

$$S - V = P + F$$

$$162000 - 133200 = P + 25,600$$

$$P = ₹ 3200$$

(iii) At 7,000 units level

$$\text{Sales} = 45 \times 7,000 = 3,15,000$$

$$\text{Variable costs} = 37 \times 7,000 = 2,59,000$$

$$S - V = P + F$$

$$315000 - 259000 = P + 25,600$$

$$P = ₹ 30,400$$

- Ques. 4.** From the following data, calculate B.E.P., present position, and margin of safety:

Total costs ₹ 60,000

Fixed costs ₹ 30,000

Sales ₹ 1,00,000

Sol.

(i)

$$\text{BEP} = \frac{\text{F.C.} \times \text{Sales}}{\text{Sales} - \text{V.C.}}$$

$$= \frac{30,000 \times 1,00,000}{1,00,000 - 30,000} = ₹ 42,857$$

(ii) Present Position = Present Sales – Present Cost

$$= ₹ 1,00,000 - 60,000$$

$$= ₹ 40,000$$

(iii) Margin of Safety = Present Sales – BEP Sales

$$= 1,00,000 - 42,857$$

$$= ₹ 57,143.$$

Ques. 5. Calculate break-even point from the following information:

Sales	₹ 3,00,000
Fixed Costs	₹ 75,000
Direct materials	₹ 1,00,000
Direct Labour	₹ 60,000
Direct expenses	₹ 40,000

Sol. Variable Cost = 1,00,000 + 60,000 + 40,000 = 2,00,000

Sales = ₹ 3,00,000

Contribution = 3,00,000 – 2,00,000 = ₹ 1,00,000

$$P/V \text{ Ratio} = \frac{C}{S} \times 100$$

$$= \frac{1,00,000}{3,00,000} \times 100 = 33.33\%$$

$$B.E.P. = \frac{FC}{P/V \text{ Ratio}}$$

$$= \frac{75,000}{33.33} \times 100 = ₹ 2,25,000$$

Ques. 6. From the following information calculate:

(i) P/V Ratio; (ii) Fixed Cost; (iii) Sales Volume to earn a profit of ₹ 40,000, When

Sales = ₹ 1,00,000

Profit = ₹ 10,000

Variable cost on sales = ₹ 70%

Sol. Sales = ₹ 1,00,000

V.C. = 70%

or
$$= \frac{70}{100} \times 100,000 = ₹ 70,000$$

(i)
$$P/V \text{ Ratio} = \frac{S - V.C.}{S} \times 100$$

$$= \frac{100,000 - 70,000}{100,000} \times 100 = 30\%$$

(ii) Contribution = F.C. + Profit
 30,000 = F.C. + 10,000

F. C. = ₹ 20,000

(iii)
$$S = \frac{FC + \text{Profit}}{P/V \text{ Ratio}}$$

$$= \frac{20,000 + 40,000}{30} \times 100$$

$$= ₹ 2,00,000$$

Ques. 7. The following data are given for two years:

Year	Sales (₹)	Profit (₹)
I	1,20,000	8,000
II	1,40,000	13,000

Calculate: (i) P/V ratio; (ii) Break-even point; (iii) Profit when sales are ₹ 1,80,000; (iv) Margin of Safety for II year; (v) Sales required to earn a profit of ₹ 12,000.

Sol. (i)
$$P/V \text{ Ratio} = \frac{\text{Change in profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{5,000}{20,000} \times 100$$

$$= 25\%$$

$$(ii) \quad P/V \text{ Ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

$$25\% = \frac{\text{Contribution}}{1,40,000}$$

or $\text{Contribution} = 1,40,000 \times \frac{25}{100} = ₹ 35,000$

$$\text{Contribution} = \text{F.C.} + \text{Profit}$$

$$35,000 = \text{F.C.} + 13,000$$

$$\text{FC} = ₹ 22,000$$

$$\text{BEP} = \frac{22,000}{25\%} = ₹ 88,000$$

$$(iii) \quad \text{Sales} = \frac{\text{FC} + \text{DP}}{P/V \text{ Ratio}}$$

$$1,80,000 = \frac{22,000 + \text{DP}}{25\%}$$

$$\text{DP} = \left(1,80,000 \times \frac{25}{100} \right) - 22,000$$

$$\text{DP} = 45,000 - 22,000$$

$$= ₹ 23,000$$

$$(iv) \quad \text{Margin of safety for year II} = \frac{13,000}{25} \times 100 = ₹ 52,000$$

$$(v) \quad \text{Sales} = \frac{22,000 + 12,000}{25} \times 100$$

$$= ₹ 1,36,000$$

Ques. 8. From the following data calculate:

(i) P/V Ratio; (ii) Fixed cost; (iii) Break-even point; (iv) Profit on the budgeted sales is ₹ one crore.

Year	Total Sales (₹ in '000)	Total Costs (₹ in '000)
I	7,000	5,800
II	9,000	6,600

(I.C.W.A. June 1991)

Sol.

$$\text{Ist Year Profit} = \text{Sales} - \text{Cost}$$

$$= 7,000 - 5800 = ₹ 1,200$$

$$\text{IInd Year Profit} = 9000 - 6600 = ₹ 2,400$$

$$(i) \quad P/V \text{ Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{1200}{2000} \times 100 = 60\%$$

$$(ii) \quad \text{Sales} \times P/V \text{ Ratio} = \text{F.C.} + \text{Profit}$$

$$70,00,000 \times \frac{60}{100} = \text{F.C.} + 12,00,000$$

$$42,00,000 = \text{F.C.} + 12,00,000$$

$$\text{FC} = ₹ 30,00,000$$

$$(iii) \quad \text{BEP} = \frac{\text{FC}}{P/V \text{ Ratio}}$$

$$= \frac{30,00,000}{60} \times 100$$

$$= ₹ 50,00,000$$

$$\begin{aligned}
 \text{(iv) Sales} \times \text{P/V Ratio} &= \text{F.C.} + \text{DP} \\
 1,00,00,000 \times \frac{60}{100} &= 30,00,000 + \text{DP} \\
 \text{DP} &= 60,00,000 - 30,00,000 \\
 &= ₹ 30,00,000
 \end{aligned}$$

Ques. 9. The following information is obtained from the records of a company:

Sales	₹ 40,000
Variable Costs	₹ 20,000
Fixed Costs	₹ 12,000

(i) Calculate P/V Ratio, Break-even Point and Margin of Safety.

(ii) Calculate the effects of:

- 10% increase in fixed costs.
- 10% decrease in variable costs
- 10% increase in selling price
- 10% increase in selling price along with an increase of fixed overheads ₹2,400.
- 10% decrease in sales price.
- 10% decrease in sales price together with 10% decrease in variable costs. (Himachal University)

Sol.

$$C = S - VC$$

$$C = 40,000 - 20,000 = ₹ 20,000$$

$$\text{(i) (a) P/V Ratio} = \frac{C}{S} \times 100 = \frac{20,000}{40,000} \times 100 = 50\% \quad C = \text{Fixed Cost} + \text{Profit}$$

$$\begin{aligned}
 &= 12,000 + (40,000 - 20,000 - 12,000) \\
 &= 20,000
 \end{aligned}$$

$$\text{(b) B.E.P.} = \frac{FC}{P/V \text{ Ratio}} = \frac{12,000}{50} \times 100 = ₹ 24,000$$

$$\begin{aligned}
 \text{(c) M/S} &= \text{Sales} - \text{B.E.P. Sales} \\
 &= 40,000 - 24,000 \\
 &= ₹ 16,000
 \end{aligned}$$

(ii) (a) When 10% increase in fixed costs

$$FC = ₹ 12,000$$

$$\text{New FC} = 12,000 + 1,200 = ₹ 13,200$$

$$\text{(a) BEP} = \frac{FC}{P/V \text{ Ratio}} = ₹ \frac{13,200}{50} \times 100 = ₹ 26,400$$

$$\text{(b) M/S} = 40,000 - 26,400 = ₹ 13,600$$

(b) When 10% decrease in variable costs

$$\text{Variable cost} = 20,000$$

$$\text{New Variable cost} = 20,000 - 2,000 = ₹ 18,000$$

$$\text{Contribution} = 40,000 - 18,000 = ₹ 22,000$$

$$P/V \text{ Ratio} = \frac{22,000}{40,000} \times 100 = 55\%$$

$$\text{BEP} = \frac{12,000}{55} \times 100 = ₹ 21818.18$$

$$M/S = 40,000 - 21818.18 = ₹ 18,181.82$$

(c) 10% increase in Selling Price

$$P/V \text{ Ratio} = \frac{44,000 - 20,000}{44,000} \times 100 = 54.55\%$$

$$\text{BEP} = \frac{12,000}{54.55} \times 100 = ₹ 22,000$$

$$\text{BEP} = 44,000 - 22,000 = ₹ 22,000$$

(d) 10% increase in selling price with increase in fixed costs by ₹ 2,400

$$P/V \text{ Ratio} = \frac{44,000 - 20,000}{44,000} \times 100 = 54.55\%$$

$$BEP = \frac{14,400}{54.55} \times 100 = ₹ 26,400$$

$$M/S = ₹ 44,000 - 26,400 \\ = ₹ 17,600$$

(e) 10% decrease in sales price

$$P/V \text{ Ratio} = \frac{36,000 - 20,000}{36,000} \times 100 \\ = 44.44\%$$

$$BEP = \frac{12,000}{44.44} \times 100 = ₹ 27,000$$

$$M/S = 36,000 - 27,000 = ₹ 9,000$$

(f) 10% decrease in sales with 10% decrease in variable costs

$$P/V \text{ Ratio} = \frac{36,000 - 18,000}{36,000} \times 100 \\ = 50\%$$

$$BEP = \frac{12,000}{50} \times 100 = ₹ 24,000$$

$$= ₹ 36,000 - 24,000 = ₹ 12,000$$

Ques. 10. From the following information calculate:

(i) P/V Ratio, (ii) Fixed costs, (iii) Variable costs, (iv) Margin of safety for profit of ₹ 10,000.

Year	Sales (₹)	Profit/Loss (₹)
2019	25,000	5,000 (Loss)
2020	75,000	5,000 (Profit)

Sol.

Year	Sales (₹)	Profit/loss (₹)
2019	25,000	5,000 (Loss)
2020	75,000	5,000 (Profit)
Change in Sales and Profit	50,000	10,000

(i) P/V Ratio

$$= \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{10,000}{50,000} \times 100 = 20\%$$

(ii) Fixed Costs

$$= S \times P/V \text{ Ratio} = P + FC$$

Putting the values of year 2019 or 2020 in the equation.

$$\text{Fixed Cost for 2019} = 25,000 \times \frac{20}{100} = - 5000 + FC$$

$$5000 + 5000 = FC$$

$$\text{Fixed Cost for 2019} = ₹ 10,000$$

$$\text{Fixed Cost for 2020} = 75,000 \times \frac{20}{100} = 5,000 + FC$$

$$= 10,000$$

(iii) Variable costs for 2019 and 2020

For 2019

$$\begin{aligned}
 S - V &= P + F \\
 25,000 - V &= -5,000 + 10,000 \\
 -V &= -5,000 + 10,000 - 25,000 \\
 -V &= -20,000 \\
 V &= 20,000
 \end{aligned}$$

Variable cost = ₹ 20,000

For 2020

$$\begin{aligned}
 S - V &= P + F \\
 75,000 - V &= 5,000 + 10,000 \\
 -V &= 15,000 - 75,000 \\
 V &= 60,000
 \end{aligned}$$

(iv) Margin of Safety at a Profit of ₹ 10,000

$$\begin{aligned}
 \text{M/S} &= \frac{\text{Profit}}{\text{P/V Ratio}} \times 100 \\
 &= \frac{10,000}{20} \times 100 \\
 &= ₹ 50,000.
 \end{aligned}$$

Ques. 11. The following figures relate to a company manufacturing various products:

Year	Sales (₹)	Profits (₹)
2019	1,50,000	4,000
2020	1,90,000	11,500

Calculate : (i) P/V Ratio; (ii) Profit of sales of ₹ 1,20,000; (iii) Sales for a profit of ₹ 20,000; (iv) Margin of Safety in 2020; (v) Variable Cost in 2019.

- Sol.**
- (i) $\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$
- $$= \frac{7,500}{40,000} \times 100 = 18.75\%$$
- $$18.75\% = \frac{\text{Contribution}}{1,50,000}$$
- Contribution = 1,50,000 × 18.75%
- $$= ₹ 28,125$$
- FC = 28,125 – 4,000 = ₹ 24,125
- (ii) $1,20,000 = \frac{24,125 + \text{DP}}{18.75} \times 100$
- $$22,500 = 24,125 + \text{DP}$$
- DP = – 1,625
- or Loss = ₹ 1,625
- (iii) $\text{Sales} = \frac{24,125 + 20,000}{18.75} \times 100$
- $$= ₹ 2,35,333$$
- (iv) $\text{M/S} = \frac{\text{Profit}}{\text{P/V Ratio}}$
(Year 2020)
- $$= \frac{11,500}{18.75} \times 100 = ₹ 61,333$$
- (v) Variable cost (Year 2019) = S – C
- $$= 1,50,000 - 28,125$$
- $$= ₹ 1,21,875$$

Ques. 12. The Sales and Profit during two years were as following:

Year	Sales (₹)	Profit (₹)
2019	1,50,000	20,000
2020	1,70,000	25,000

Calculate : (i) P/V Ratio and Fixed Cost; (ii) Break-even Point; (iii) The Sales required to earn a profit of ₹ 40,000; (iv) Profit when sales are ₹ 2,50,000; (v) Margin of Safety at a profit of ₹ 50,000; (vi) Variable Costs.

Sol. (i)
$$\text{P/V Ratio} = \frac{\text{Change in profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{5,000}{20,000} \times 100 = 25\%$$

(ii) To calculate BEP, fixed expenses have to be found out at first.

Contribution in the year 2019 is = Sales × P/V Ratio

$$= 1,50,000 \times \frac{25}{100} = ₹ 37,500$$

$$\begin{aligned} \text{Fixed Expenses} &= \text{Contribution} - \text{Profit} \\ &= 37,500 - 20,000 \\ &= ₹ 17,500 \end{aligned}$$

$$\text{Contribution in the year 2020 is} = 1,70,000 \times \frac{25}{100} = 42,500$$

$$\therefore \text{Fixed Cost} = 42,500 - 25,000 = 17,500$$

$$\text{BEP} = \frac{\text{FC}}{\text{P/V Ratio}} = \frac{17,500}{25} \times 100 = ₹ 70,000$$

(iii) Contribution = F.C. + Profit

$$= 17,500 + 40,000 = ₹ 57,500$$

$$\begin{aligned} \text{Sales required to earn a contribution of ₹ 57,500} &= \frac{\text{Contribution}}{\text{P/V Ratio}} \\ &= \frac{57,500}{25} \times 100 = ₹ 2,30,000 \end{aligned}$$

(iv) Profit when sales are ₹ 2,50,000

$$\begin{aligned} \text{Contribution} &= \text{Sales} \times \text{P/V Ratio} \\ &= 2,50,000 \times \frac{25}{100} = ₹ 62,500 \end{aligned}$$

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{Fixed Expenses} \\ &= 62,500 - 17,500 \\ &= ₹ 45,000 \end{aligned}$$

(v) Margin of Safety at a profit of ₹ 50,000 :

$$\begin{aligned} \text{M/S} &= \frac{\text{Profit}}{\text{P/V Ratio}} = \frac{50,000}{25} \times 100 \\ &= ₹ 2,00,000 \end{aligned}$$

(vi) Variable Cost of two periods :

Variable cost = Sales – Profit – Fixed Expenses

$$\text{Year 2019} = ₹ 1,50,000 - 20,000 - 17,500 = ₹ 1,12,500$$

$$\text{Year 2020} = ₹ 1,70,000 - 25,000 - 17,500 = ₹ 1,27,500$$

Ques. 13. Given:

Sales	₹ 5,00,000
Variable Costs	₹ 3,75,000

Gross Profit	₹ 1,25,000
Fixed Costs	₹ 37,500
Net Profit	₹ 87,500

Calculate : (i) P/V Ratio; (ii) B.E.P.; (iii) Net Profit when sales are ₹ 7,00,000; (iv) Margin of Safety when sales are ₹ 6,00,000; (v) Sales required to earn a profit of ₹ 1,00,000; (vi) Additional sales required to cover an increase of ₹ 4,000 annual in the sales manager's salary.

Sol.

$$S = ₹ 5,00,000$$

$$V.C. = ₹ 3,75,000$$

$$F.C. = ₹ 37,500$$

$$\text{Net Profit} = ₹ 87,500$$

$$C = 5,00,000 - 3,75,000 = 1,25,000$$

$$(i) \quad P/V \text{ Ratio} = \frac{C}{S} \times 100 \\ = \frac{1,25,000}{5,00,000} \times 100 = 25\%$$

$$(ii) \quad B.E.P. = \frac{37,500}{25} \times 100 = ₹ 1,50,000$$

$$(iii) \quad 7,00,000 = \frac{37,500 + DP}{25} \times 100$$

$$1,75,000 = 37,500 + DP$$

$$DP = ₹ 1,37,500$$

$$(iv) \quad 6,00,000 = \frac{37,500 + \text{Profit}}{25} \times 100$$

$$\text{Profit} = ₹ 1,12,500$$

$$M/S = \frac{1,12,500}{25} \times 100$$

$$= ₹ 4,50,000$$

$$(v) \quad \text{Sales} = \frac{37,500 + 100,000}{25} \times 100$$

$$= ₹ 5,50,000$$

$$(vi) \quad FC = 37,500 + 4,000 = ₹ 41,500$$

$$\text{Sales} = \frac{41,500 + 87,500}{25} \times 100$$

$$= ₹ 5,16,000$$

$$\text{Additional Sales} = 5,16,000 - 5,00,000$$

$$= ₹ 16,000$$

Ques. 14. You are given the following information:

Material	₹ 120 per unit
Labour	₹ 30 per unit
Overheads	₹ 12 per unit
Selling Price	₹ 270 per unit
Fixed costs	₹ 14,00,000
Sales	₹ 40,50,000

During the forthcoming year the workers will be entitled to a wage increase of 10% from the beginning of the year and material cost, variable overheads and fixed overheads are expected to increase by 7.5%, 5% and 3% respectively.

Calculate :

(i) New sale price in the forthcoming year if the current P/V ratio is to be maintained.

(ii) Number of units that would require to be sold during the forthcoming year so as to yield the same amount of profit as in the current year, assuring that selling price per unit will not be increased.

Sol.

(i)

	₹	₹
Selling Price		270
Less :		
Material	120	
Labour	30	
Overheads	12	162
Contribution		108

Contribution

$$P/V \text{ Ratio} = \frac{C}{S} \times 100 = \frac{108}{270} \times 100 = 40\%$$

For forthcoming year :

	₹
New Material cost 120 + 7.5% of 120	129.00
New Labour cost 30 + 10% of 30	33.00
New overhead 12 + 5% of 12	12.60
Total variable cost	174.60

So, new selling price = $\frac{174.60}{60} \times 100 = ₹ 291$ per unit

[∵ Selling Price = Variable cost + C; Selling Price = 60% + 40%]

(ii) For current year :

$$\text{Total units sold} = \frac{40,50,000}{270} = 15,000 \text{ units}$$

	₹
Total Sales	40,50,000
Less : Total Variable cost (120 + 30 + 12) × 15,000 units	24,30,000
Contribution	16,20,000
Less : Fixed Cost	14,00,000
Profit	2,20,000

For forthcoming year :

	₹
Selling Price per unit	270.00
Less : Variable cost per unit	174.60
Contribution	95.40

Total Contribution = Profit + Fixed Cost

$$= 2,20,000 + (14,00,000 + 3\% \text{ of } 14,00,000)$$

$$= 2,20,000 + 14,42,000$$

$$= ₹ 16,62,000$$

$$\text{No. of units to be sold} = \frac{\text{Total Contribution}}{\text{Contribution per unit}}$$

$$= \frac{16,62,000}{95.40} = 17421.38$$

or = 17,422 units

Ques. 15. ABC Co. Ltd. presents the following information:

Material	₹ 50 per unit
Labour	₹ 80 per unit
Variable overheads	75% of Labour Cost
Fixed Costs	₹ 2,40,000
Selling price	₹ 230 per unit

Find out:

- (a) How many units are to be made and sold in a year in order to break-even?
 (b) How many units are to be made and sold for a profit of ₹ 1,00,000?
 (c) If the selling price is reduced by ₹ 15 per unit, how many units are to be sold to break-even?

(I.C.W.A. Inter)

Sol.

$$VC = 50 + 80 + 60 = ₹ 190$$

$$C = S - VC$$

$$= 230 - 190$$

$$= ₹ 40$$

$$\begin{aligned} \text{(a) B.E.P.} &= \frac{FC}{C} \\ &= \frac{2,40,000}{40} \\ &= 6,000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{(b) Sales} &= \frac{FC + DP}{C} \\ &= \frac{2,40,000 + 1,00,000}{40} \\ &= 8,500 \text{ units} \end{aligned}$$

(c) If selling price is reduced by ₹ 15 per unit, then :

$$C = 215 - 190 = ₹ 25$$

$$\text{Sales} = \frac{2,40,000}{25}$$

$$= 9,600 \text{ units}$$

Ques. 16. You are given the following data:

Direct Materials	₹ 2,05,000
Direct Labour	₹ 75,000
Variable overheads	₹ 1,00,000
Fixed overheads	₹ 60,000
Sales	₹ 5,00,000

Calculate: (i) B.E.P. (ii) What will be B.E.P. when there is an increase of 10% in (a) Fixed Costs and

(b) Variable Costs?

(C.S. Inter)

Sol.

$$\begin{aligned} \text{(i) VC} &= 2,05,000 + 75,000 + 1,00,000 \\ &= ₹ 3,80,000 \end{aligned}$$

$$\begin{aligned} C &= 5,00,000 - 3,80,000 \\ &= ₹ 1,20,000 \end{aligned}$$

$$\begin{aligned} \text{BEP} &= \frac{FC}{C} \times S \\ &= \frac{60,000}{1,20,000} \times 5,00,000 \\ &= ₹ 2,50,000 \end{aligned}$$

(ii) (a) 10% increase in FC and new FC is ₹ 66,000 :

$$\begin{aligned} \text{B.E.P.} &= \frac{66,000}{120,000} \times 5,00,000 \\ &= ₹ 2,75,000 \end{aligned}$$

(b) 10% increase in VC and new VC is ₹ 4,18,000 :

$$\begin{aligned} C &= 5,00,000 - 4,18,000 \\ &= ₹ 82,000 \\ \text{BEP} &= \frac{60,000}{82,000} \times 5,00,000 \\ &= ₹ 3,65,854 \end{aligned}$$

Ques. 17. The following data relate to a company for the year 2019.

	First Six Months	Last Six Months
Sales	₹ 4,05,000	₹ 4,50,000
Total Cost	₹ 3,60,000	₹ 3,87,000

Assuming that fixed costs incurred were uniform in both half years, calculate the following:

(i) P/V Ratio; (ii) Fixed expenses; (iii) Break-even Sales; (iv) Margin of Safety.

Sol.

		Sales ₹	Total cost ₹	Profit ₹
(i)	First 6 months	4,05,000	3,60,000	45,000
(ii)	Last 6 months	4,50,000	3,87,000	63,000
		45,000	–	18,000

$$\begin{aligned} \text{(i) P/V Ratio} &= \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 \\ &= \frac{18,000}{45,000} \times 100 \\ &= 40\% \end{aligned}$$

$$\begin{aligned} \text{(ii) Fixed Expenses} &= (S \times P/V \text{ Ratio}) - \text{Profit} \\ &= \left(4,05,000 \times \frac{40}{100} \right) - 45,000 \\ &= 1,62,000 - 45,000 \\ &= ₹ 1,17,000 \end{aligned}$$

(iii) Break-Even Sales

$$\begin{aligned} \text{B.E.P.} &= \frac{\text{F.C.}}{\text{P/V Ratio}} \\ &= \frac{1,17,000}{40} \times 100 \\ &= ₹ 2,92,500 \end{aligned}$$

(iv) Margin of Safety (M/S)

$$\begin{aligned} \text{M/S for the first six months} &= \text{Actual Sales} - \text{B.E.P. Sales} \\ &= 4,05,000 - 2,92,500 \\ &= ₹ 1,12,500 \text{ for first 6 months and} \\ \text{M/S for the last six months} &= 4,50,000 - 2,92,500 \\ &= ₹ 1,57,500 \text{ for last 6 months} \end{aligned}$$

Ques. 18. The following particulars are available from a company record for the month of March 2019:

Variable Cost per unit	₹ 14
Fixed factory overheads	₹ 5,40,000
Fixed selling overheads	₹ 2,52,000
Selling price per unit	₹ 24

Calculate: (i) B.E.P.; (ii) How many units must be sold to earn income of ₹ 60,000 per month?

(iii) How many units must be sold to earn a net income of 25% of cost?

(iv) What should be the selling price per unit if the break-even is brought down to 1,20,000 units?

Sol.

(i)
$$\text{B.E.P.} = \frac{\text{FC}}{\text{C}}$$

$$\text{C} = \text{S} - \text{VC}$$

$$24 - 14 = ₹ 10$$

$$\text{FC} = 5,40,000 + 2,52,000 = 7,92,000$$

$$\text{BEP} = \frac{7,92,000}{10} = 79,200 \text{ units}$$

(ii)
$$\text{Sales} = \frac{\text{FC} + \text{DP}}{\text{C}}$$

$$= \frac{7,92,000 + 60,000}{10} = 85,200 \text{ units}$$

(iii) Let total cost = X
Profit = $X \times 25\% = \frac{X}{4}$
Sales = Cost + Profit

$$= X + \frac{X}{4}$$

$$= \frac{5X}{4}$$
P/V Ratio = $\frac{\text{C}}{\text{S}} \times 100$

$$= \frac{10}{24} \times 100$$

$$= 41.67\%$$
Sales \times P/V Ratio = FC + Profit

$$\frac{5X}{4} \times \frac{41.67}{100} = 7,92,000 + \frac{X}{4}$$

$$0.520875 X = \frac{31,68,000 + X}{4}$$

$$2.0835 X = 31,68,000 + X$$

$$X = \frac{31,68,000}{1.0835}$$

$$= ₹ 29,23,857.87$$
Cost = ₹ 29,23,858
Profit (25%) = ₹ 7,30,964
Sales = ₹ 36,54,822
Sales (in units) = $36,54,822/24$
= 1,52,284 units

$$\begin{aligned}
 \text{(iv)} \quad \text{B.E.P.} &= \frac{\text{FC}}{\text{S} - \text{VC}} \\
 1,20,000 &= \frac{7,92,000}{\text{S} - 14} \\
 1,20,000 \text{ S} &= 16,80,000 + 7,92,000 \\
 1,20,000 \text{ S} &= 24,72,000 \\
 \text{S} &= \frac{24,72,000}{1,20,000} \\
 \text{S} &= ₹ 20.6
 \end{aligned}$$

Ques. 19. A company manufactures uniform products and sells at ₹ 200 per unit. Variable cost per unit ₹ 120 and fixed costs for the year is ₹ 96,000.

Compute:

- (i) P/V Ratio; (ii) Break-even point sales; (iii) Number of units to be sold for earning a profit of ₹ 1,20,000; (iv) Number of units to be sold for earning ₹ 1,00,000 after income tax. Assume tax rate to be 50%; (v) Profit when sale is ₹ 5,43,200.

Sol.

(i)
$$\text{P/V Ratio} = \frac{\text{C}}{\text{S}} \times 100$$

$$\begin{aligned}
 \text{C} &= \text{Sale} - \text{VC} \\
 \text{C} &= ₹ 200 - 120 \\
 &= ₹ 80 \text{ per unit} \\
 \text{P/V Ratio} &= \frac{80}{200} \times 100 = 40\%
 \end{aligned}$$

(ii)
$$\text{Sales at B.E.P.} = \frac{\text{F.C.}}{\text{P/V Ratio}}$$

$$\begin{aligned}
 &= \frac{₹ 96,000}{40\%} \\
 &= ₹ 2,40,000
 \end{aligned}$$

(iii) No. of units to be sold for a profit of ₹ 1,20,000

$$\begin{aligned}
 &= \frac{\text{FC} + \text{Profit}}{\text{C per unit}} = \frac{96,000 + 1,20,000}{80} \\
 &= 2700 \text{ units}
 \end{aligned}$$

(iv) No. of units to be sold for a profit of ₹ 1,00,000 after tax :

$$\begin{aligned}
 \text{Profit before tax} &= \frac{1,00,000 \times 100}{50} \\
 &= ₹ 2,00,000 \\
 \text{No. of units} &= \frac{\text{FC} + \text{Profit}}{\text{C per unit}} \\
 &= \frac{96,000 + 2,00,000}{80} = 3700 \text{ units}
 \end{aligned}$$

(v) Profit when sales are ₹ 5,43,200

$$\begin{aligned}
 \text{Profit} &= (\text{Sales} \times \text{P/V Ratio}) - \text{FC} \\
 &= \left(5,43,200 \times \frac{40}{100} \right) - 96,000 \\
 &= 2,17,280 - 96,000 = ₹ 1,21,280
 \end{aligned}$$

Ques. 20. Given:

Sales	1,00,000 units	₹ 100,000
Variable Costs		₹ 60,000
Fixed Costs		₹ 30,000

- (A) Find out P/V Ratio, B.E.P. and Margin of Safety.
 (B) Compute the impact of the following on profit-earning.

- (i) 20% increase in selling price
- (ii) 10% decrease in selling price
- (iii) 5% decrease in sales quantity
- (iv) 10% decrease in fixed costs
- (v) 10% increase in variable costs.

Sol.

(A) Calculation of P/V Ratio, B.E.P. and M/S

$$\begin{aligned} \text{P/V Ratio} &= \frac{C}{S} \times 100 = \frac{1,00,000 - 60,000}{100,000} \times 100 \\ &= \frac{40,000}{1,00,000} \times 100 = 40\% \end{aligned}$$

$$\begin{aligned} \text{B.E.P. (in ₹)} &= \frac{\text{FC}}{\text{P/V Ratio}} \\ &= \frac{30,000}{40\%} = ₹ 75,000 \end{aligned}$$

$$\begin{aligned} \text{M/S} &= \text{Actual Sales} - \text{B.E.P. Sales} \\ &= 1,00,000 - 75,000 = ₹ 25,000 \end{aligned}$$

(B) Present Profit = (S × P/V Ratio) – F.C.

$$\begin{aligned} &= \left(1,00,000 \times \frac{40}{100} \right) - 30,000 \\ &= 40,000 - 30,000 \\ &= ₹ 10,000 \end{aligned}$$

(i) Impact of 20% of increase in selling price

$$\text{Sales} = 1,00,000 + 20\% \text{ of } 1,00,000 = ₹ 1,20,000$$

$$\text{Contribution} = 1,20,000 - 60,000 = ₹ 60,000$$

$$\text{New P/V Ratio} = \frac{60,000}{1,20,000} \times 100 = 50\%$$

$$\begin{aligned} \text{Profit} &= \left(1,20,000 \times \frac{50}{100} \right) - 30,000 \\ &= ₹ 30,000 \end{aligned}$$

Profit will increase by ₹ 20,000.

(ii) Impact of 10% decrease in selling price

$$\text{Sales} = 1,00,000 - 10\% \text{ of } 1,00,000 = ₹ 90,000$$

$$\text{Contribution} = 90,000 - 60,000 = ₹ 30,000$$

$$\text{New P/V Ratio} = \frac{30,000}{90,000} \times 100 = 33.33\%$$

$$\begin{aligned} \text{Profit} &= \left(90,000 \times \frac{33.33}{100} \right) - 30,000 \\ &= 30,000 - 30,000 \\ &= \text{Zero} \end{aligned}$$

Profit will decline by ₹ 10,000.

(iii) Impact of 5% decrease in sales units

$$\text{Unit sold} = 1,00,000 - 5\% \text{ of } 1,00,000 = 95,000$$

$$\text{Sales} = 95,000 \times ₹ 1 = ₹ 95,000$$

$$\text{Contribution} = 95,000 - 60,000 = ₹ 35,000$$

$$\text{New P/V Ratio} = \frac{35,000}{95,000} \times 100 = \frac{700}{19} \%$$

$$\text{Profit} = \left(95,000 \times \frac{700}{1900} \right) - 30,000$$

$$= 35,000 - 30,000 = ₹ 5,000$$

Profit will decline by ₹ 5,000.

(iv) Impact of 10% decrease in fixed costs

$$F.C. = 30,000 - 10\% \text{ of } 30,000 = ₹ 27,000$$

$$\text{Profit} = \left(1,00,000 \times \frac{40}{100} \right) - 27,000$$

$$= 40,000 - 27,000$$

$$= ₹ 13,000$$

Profit will increase by ₹ 3,000.

(v) Impact of 10% increase in variable costs :

$$\text{Variable Cost} = 60,000 + 10\% \text{ of } 60,000 = ₹ 66,000$$

$$\text{Contribution} = 1,00,000 - 66,000 = ₹ 34,000$$

$$\text{New P/V Ratio} = \frac{34,000}{1,00,000} \times 100 = 34\%$$

$$\text{Profit} = \left(1,00,000 \times \frac{34}{100} \right) - 30,000$$

$$= ₹ 4,000$$

Profit will decline by ₹ 6,000.

Ques. 21. The following data relate to a company:

Fixed overheads ₹ 40,000

P/V Ratio 30%

Find out: (i) Sales for a profit of ₹ 18,000 (ii) B.E.P. (iii) What will be B.E.P. if P/V Ratio is changed to 45%?

Sol. (i) Sales at a profit of ₹ 18,000

$$S \times \text{P/V Ratio} = P + F$$

$$\text{or } S \times \frac{30}{100} = 18,000 + 40,000$$

$$\text{or } S = \frac{58,000 \times 100}{30}$$

$$\text{or } \text{Sales} = ₹ 1,93,333.33$$

(ii) BEP

$$S \times \text{P/V Ratio} = F$$

$$\text{or } S \times \frac{30}{100} = 40,000 \quad (\because \text{on BEP} = \text{No profit and No loss})$$

$$S = \frac{40,000 \times 100}{30} = ₹ 1,33,333.33$$

(iii) Change in BEP

When P/V Ratio is changed to 45%, BEP will be

$$S \times \text{P/V Ratio} = F$$

$$S \times \frac{45}{100} = 40,000$$

$$S = \frac{40,000 \times 100}{45} = ₹ 88,888.88$$

$$\text{Shifting in the BEP} = 133,333.33 - 88,888.88$$

$$= ₹ 44,444.45$$

Ques. 22. Calculate break even point, P/V Ratio, and Margin of Safety in the following case:

Fixed Costs = ₹ 80,000

Variable cost per unit = ₹ 4

Estimated sale for the period = ₹ 2,00,000

Selling price per unit = ₹ 20

Also find out the sales to earn the profit of 10% on sales.

Sol.

Contribution = Sales – Variable cost

$$= ₹ 20 - ₹ 4$$

$$= ₹ 16$$

$$(i) \quad P/V \text{ Ratio} = \frac{C}{S} \times 100$$

$$= \frac{16}{20} \times 100 = 80\%$$

$$(ii) \quad B.E.P. \text{ (in ₹)} = \frac{FC}{P/V \text{ Ratio}}$$

$$= \frac{80,000}{80} \times 100$$

$$= ₹ 1,00,000$$

$$B.E.P. \text{ (in units)} = \frac{₹ 1,00,000}{20}$$

$$= 5,000 \text{ units}$$

$$(iii) \quad \text{Margin of Safety (M/S)} = \text{Sales} - B.E.P. \text{ Sales}$$

$$= ₹ 2,00,000 - 1,00,000$$

$$= ₹ 1,00,000$$

$$M/S \text{ as } \% = \frac{M/S}{\text{Sales}} \times 100$$

$$= \frac{1,00,000}{2,00,000} \times 100 = 50\%$$

Selling price for 6,000 B.E.P. units

Selling Price = V.C. + Contribution per unit

$$C \text{ per unit} = \frac{F.C.}{B.E.P.}$$

$$= \frac{80,000}{6,000} = ₹ 13.33$$

Selling price per unit = 4 + 13.33

$$= ₹ 17.33$$

(iv) Price to earn profit of 10% on Sales

Let x be the sales

$$x \times P/V \text{ Ratio} = FC + \text{Profit}$$

$$x \times \frac{80}{100} = 80,000 + \frac{10}{100}x$$

$$\frac{8}{10}x = 80,000 + \frac{1}{10}x$$

$$\frac{7}{10}x = 80,000$$

$$x = 80,000 \times \frac{10}{7} = ₹ 1,14,286$$

$$\text{Sales (in ₹)} = \frac{F.C.}{1 - \frac{VC + 10\% \text{ of Price}}{\text{Price}}}$$

$$= \frac{80,000}{1 - \frac{4 + 2}{20}} = \frac{80,000 \times 20}{14}$$

$$= ₹ 1,14,286$$

Ques. 23. From the following information, prepare a profit graph:

Period	Sales (₹)	Profit/Loss (₹)
I Year	1,00,000	10,000 (Loss)
II Year	3,00,000	30,000 (Profit)

Show from profit graph:

(a) P/V Ratio

(b) B.E.P.; (c) Profit at the sale of ₹ 3,00,000

Sol. (a)
$$\text{P/V Ratio} = \frac{\text{change in profit}}{\text{change in sales}} \times 100$$

$$= \frac{30,000 - (-10,000)}{3,00,000 - 100,000} \times 100$$

or

$$= \frac{40,000}{2,00,000} \times 100$$

$$= 20\%$$

(b)
$$\text{B.E.P.} = \frac{\text{FC}}{\text{P/V Ratio}}$$

$$\text{FC} = (\text{Sales} \times \text{P/V Ratio}) - \text{Profit}$$

For II Year

$$\text{FC} = \left(3,00,000 \times \frac{20}{100} \right) - 30,000$$

$$= 60,000 - 30,000$$

$$= ₹ 30,000$$

$$\text{B.E.P.} = \frac{30,000}{20} \times 100$$

$$= ₹ 1,50,000$$

(c) Profit at the sale of ₹ 3,00,000

$$\text{Profit} = (\text{Sales} \times \text{P/V Ratio}) - \text{FC}$$

$$= \left(3,00,000 \times \frac{20}{100} \right) - 30,000$$

$$= ₹ 60,000 - ₹ 30,000$$

$$= ₹ 30,000$$

Ques. 24. From the following data, you are required to present on graph paper a profit volume graph to show the B.E.P. of the company:

	('000 ₹)
Sales	600
Marginal Cost	350
Fixed Cost	150

Determine B.E.P. and M/S.

Sol.
$$C = S - VC$$

$$600 - 350 = ₹ 250$$

$$\text{B.E.P.} = \frac{\text{FC}}{\text{P/V Ratio}}$$

$$\text{P/V Ratio} = \frac{C}{S} \times 100$$

$$= \frac{250}{600} \times 100$$

$$= 41.666\%$$

$$\begin{aligned} \text{B.E.P.} &= \frac{1,50,000}{41.666} \times 100 \\ &= ₹ 3,60,000 \\ \text{M/S} &= \text{Actual Sales} - \text{Sales at BEP} \\ &= 6,00,000 - 3,60,000 \\ &= ₹ 2,40,000 \end{aligned}$$

Ques. 25. Sales and profits of two years were:

Year	Sales (₹)	Profit (₹)
2017	1,00,000	10,000
2018	1,50,000	20,000

Find out:

- B.E.P., FC and P/V Ratio
- What will be the amount of sales for profit of ₹ 40,000?
- What will be profit if sales are of ₹ 1,20,000?
- Margin of safety when profit is 15% on sales in 2017.

Sol. (a)
$$\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{10,000}{50,000} \times 100 = 20\%$$

$$20\% = \frac{\text{Contribution}}{1,00,000}$$

or
$$\text{Contribution} = 1,00,000 \times \frac{20}{100} = ₹ 20,000$$

$$\text{Fixed cost} = 20,000 - 10,000 = ₹ 10,000$$

$$\text{B.E.P.} = \frac{10,000}{20} \times 100 = ₹ 50,000$$

(b)
$$\text{Sales} = \frac{10,000 + 40,000}{20} \times 100$$

$$= ₹ 2,50,000$$

(c)
$$1,20,000 = \frac{10,000 + \text{DP}}{20} \times 100$$

$$24,000 = 10,000 + \text{DP}$$

$$\text{DP} = ₹ 14,000$$

(d) M/S when profit equals 15% of sales in 2017:

$$\text{Profit} = 1,00,000 \times \frac{15}{100} = ₹ 15,000$$

$$\text{M/S} = \frac{\text{Profits}}{\text{P/V Ratio}}$$

$$\frac{15,000}{20} \times 100 = ₹ 75,000$$

Ques. 26. A company produces a single article and sells it at ₹ 200 each. The marginal cost of production is ₹ 120 each and fixed cost for the month is ₹ 8,000.

Calculate: (i) P/V Ratio; (ii) Sales to earn a profit of ₹ 10,000; (iii) Profit at sales of ₹ 60,000

Sol.
$$C = S - VC$$

$$C = 200 - 120 = ₹ 80$$

(i) P/V Ratio
$$= \frac{C}{S} \times 100$$

$$= \frac{80}{200} \times 100 = 40\%$$

$$\begin{aligned}
 \text{(ii) Sales} &= \frac{\text{FC} + \text{Profit}}{\text{P/V Ratio}} \\
 &= \frac{8,000 + 10,000}{40} \times 100 \\
 &= \frac{18,000 \times 100}{40} = ₹ 45,000
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) Sales} &= \frac{\text{FC} + \text{Profit}}{\text{P/V Ratio}} \\
 60,000 &= \frac{8,000 + \text{Profit}}{40} \times 100
 \end{aligned}$$

$$\begin{aligned}
 \text{or Profit} &= \left(\frac{60,000 \times 40}{100} \right) - 8,000 \\
 &= ₹ 24,000 - 8,000 \\
 &= ₹ 16,000
 \end{aligned}$$

Ques. 27. Sales of an industry in the first half of the year 2019 amounted to ₹ 2,70,000 and profit earned was ₹ 7,200. Sales in the second half of 2019 amounted to ₹ 3,42,000 and profit earned was ₹ 20,700. Calculate:

(i) P/V Ratio; (ii) Fixed cost; (iii) Profit when sales are ₹ 2,16,000

(iv) Sales to earn a profit of ₹ 36,000

Sol.

$$\begin{aligned}
 \text{(i) P/V Ratio} &= \frac{\text{Change in Profits}}{\text{Change in Sales}} \times 100 \\
 &= \frac{20,700 - 7,200}{3,42,000 - 2,70,000} \times 100 \\
 &= \frac{13,500}{72,000} \times 100 = 18.75\%
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) Sales} \times \text{P/V Ratio} &= \text{FC} + \text{Profit} \\
 2,70,000 \times \frac{18.75}{100} &= \text{FC} + 7,200 \\
 \text{FC} &= 50,625 - 7,200 \\
 &= ₹ 43,425
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) Sales} &= \frac{\text{FC} + \text{Profit}}{\text{P/V Ratio}} \\
 2,16,000 &= \frac{43,425 + \text{Profit}}{18.75} \times 100 \\
 \text{Profit} &= \left(\frac{2,16,000 \times 18.75}{100} \right) - 43,425 \\
 &= 40,500 - 43,425 \\
 \text{Loss} &= ₹ 2,925
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv) Sales} &= \frac{\text{FC} + \text{Profit}}{\text{P/V Ratio}} \\
 \text{Sales} &= \frac{43,425 + 36,000}{18.75} \times 100 \\
 &= \frac{79,425}{18.75} \times 100 \\
 &= ₹ 4,23,600
 \end{aligned}$$

Ques. 28. A company has maximum capacity of 4,40,000 per annum. Normal capacity is regarded as 3,60,000 units in a year. Variable manufacturing cost (including material and labour) in ₹ 2.20 per unit. Fixed factory overhead is ₹ 1,08,000 per annum. Selling and distribution cost of a fixed nature is ₹ 50,400 per annum and variable ₹ 0.60 per unit. Sale price is ₹ 4 per unit. Calculate:

(i) B.E.P., P/V Ratio and Margin of Safety.

- (ii) Number of units to be sold to earn a profit of ₹ 12,000 in a year.
 (iii) Sales value needed to earn a profit of 10% on sales.
 (iv) Selling price per unit to bring down B.E.P. to 1,20,000 units.

Sol.

Normal capacity = 3,60,000 units

$$\begin{aligned}\text{Variable cost} &= ₹ 2.20 + 0.60 \\ &= ₹ 2.80 \text{ per unit}\end{aligned}$$

$$\begin{aligned}\text{Fixed Cost} &= ₹ 108,000 + 50,400 \\ &= ₹ 158,400\end{aligned}$$

Selling Price = ₹ 4 per unit

$$(i) \quad \text{BEP} = \frac{\text{FC}}{\text{C per unit}}$$

$$C = ₹ 4 - 2.80 = ₹ 1.20 \text{ per unit}$$

$$\text{Hence, BEP} = \frac{1,58,400}{1.20} = 1,32,000 \text{ units}$$

$$\begin{aligned}\text{P/V Ratio} &= \frac{C}{S} \times 100 \\ &= \frac{1.20}{4} \times 100 = 30\%\end{aligned}$$

$$\begin{aligned}\text{Margin of Safety (M/S)} &= \text{Capacity Sales} - \text{BEP Sales} \\ &= 3,60,000 \text{ units} - 1,32,000 \text{ units} \\ &= 2,28,000 \text{ units}\end{aligned}$$

$$\begin{aligned}\text{M/S (in ₹)} &= 2,28,000 \times ₹ 4 \\ &= ₹ 9,12,000\end{aligned}$$

$$\begin{aligned}(ii) \text{ Units for profit of ₹ 12,000} &= \frac{\text{FC} + \text{Desired Profit}}{\text{C per unit}} \\ &= \frac{158400 + 12000}{1.20} = 1,42,000 \text{ units}\end{aligned}$$

(iii) Sales value for a profit of 10% on sales

Let x be the sales

$$x \times \text{P/V Ratio} = \text{FC} + \text{Profit}$$

$$x \times \frac{30}{100} = 1,58,400 + \frac{10}{100}x$$

$$= \frac{3}{10}x = 1,58,400 + \frac{1}{10}x$$

$$2x = 1,58,400$$

$$x = ₹ 7,92,000$$

(iv) Selling price for BEP to 1,20,000 units

$$\begin{aligned}C &= \frac{\text{FC}}{\text{New BEP}} \\ &= \frac{1,58,400}{1,20,000} = ₹ 1.32\end{aligned}$$

$$\begin{aligned}\text{Selling price} &= C + \text{V.C.} \\ &= ₹ 1.32 + 2.80 \\ &= ₹ 4.12\end{aligned}$$

Ques. 29. A plant is operating at 50% capacity. The fixed costs are ₹ 4,50,000. The variable costs are ₹ 15,00,000 and the sales amount to ₹ 22,50,000.

Calculate the break-even-point and find out the percentage of capacity at which the plant operate to earn a profit of ₹ 6,00,000.

Sol. Contribution = Sales – V. C.
 = 22,50,000 – 15,00,000
 = ₹ 7,50,000

$$P/V \text{ Ratio} = \frac{C}{S} \times 100$$

$$= \frac{7,50,000}{22,50,000} \times 100$$

$$= 33\frac{1}{3} \% \text{ or } \frac{1}{3}$$

BEP

Sales × P/V Ratio = FC

$$\text{Sales} \times \frac{1}{3} = 4,50,000$$

BEP = 4,50,000 × 3 = ₹ 13,50,000

Plant capacity to earn a profit of ₹ 6,00,000

Required Sales × P/V Ratio = FC + Profit

$$\text{Required Sales} \times \frac{1}{3} = 4,50,000 + 6,00,000$$

Sales = 10,50,000 × 3 = ₹ 31,50,000

Percentage of capacity = $\frac{31,50,000}{22,50,000} \times 50 = 70\%$

Ques. 30. There are two similar plants under the same management. The management desires to merge these two plants. The following particulars are available:

	Plant I	Plant II
Capacity Operation	100 %	60 %
Sales	₹ 900 lakhs	₹ 360 lakhs
Variable Costs	₹ 660 lakhs	₹ 270 lakhs
Fixed Costs	₹ 120 lakhs	₹ 60 lakhs

You are required to calculate:

- (a) what would be the capacity of merged plant to be operated for the purpose of break-even, and
- (b) what would be the profitability on working at 75% of merged capacity?

Sol. (a) Standard of profitability of the merged plants
 (At 100% capacity for both the plants)

	Plant I ₹ (lakhs)	Plant II ₹ (lakhs)	Merged Plant ₹ (lakhs)
Sales	900	600	1,500
Variable Costs	660	450	1,110
Fixed costs	120	60	180
Contribution	240	150	390
Profit	120	90	210
P/V Ratio $\left(\frac{C}{S} \times 100\right)$	26.7%	25%	26%

$$\text{Break even sales} = \frac{F.C.}{P/V \text{ Ratio}}$$

$$= \frac{180}{26} \times 100$$

$$= ₹ 692.31 \text{ Lakhs}$$

$$\begin{aligned}\text{Percentage of BEP capacity} &= \frac{692.31}{1500} \times 100 \\ &= 46.154\%\end{aligned}$$

(b) At 75% of capacity

	₹ (lacs)
Sales	1,125.500
Contribution 75% of ₹ 390 Lacs	292.50
Fixed Costs	180.00
Profit	112.50
Percentage of profit to sales	10%

Ques. 31. The price structure of a cycle made by Avon Cycle Ltd. is as follows:

per cycle	(₹)
Material	540
Labour	180
Variable	180
	<u>900</u>
Fixed Overheads	450
Profit	450
Selling Price	<u>1800</u>

This is based on the manufacture of one lakh cycles per annum.

The company expects that due to competition they will keep the total profits intact. What level of production will have to be reached, i.e., how many cycles will have to be made to get the same amount of profits, if:

- (a) the selling price is reduced by 10%?
 (b) the selling price is reduced by 20%?

Sol.

$$\text{Sales} = \frac{\text{Fixed Costs} + \text{Desired Profit}}{\text{Contribution per unit}}$$

$$\begin{aligned}\text{(a) If the Selling Price is reduced by 10\%} \\ &= \frac{4,50,00,000 + 4,50,00,000}{1620 - 900} \\ &= \frac{9,00,00,000}{720} = 1,25,000 \text{ cycles}\end{aligned}$$

$$\begin{aligned}\text{(b) If the Selling Price is reduced by 20\%} \\ &= \frac{4,50,00,000 + 4,50,00,000}{1440 - 900} \\ &= \frac{9,00,00,000}{540} = 1,66,667 \text{ cycles}\end{aligned}$$

Ques. 32. Mr. Shubham has invested ₹ 1,00,000 in his business. He wants a 15% return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60% of sales, his fixed costs are ₹ 50,000 p.a. show supporting computations for each of the following.

- (i) what sales-volume must be obtained to break-even?
 (ii) what sales-volume must be obtained to get his 15% return on investment?
 (iii) Mr. Shubham estimates that even if he closed the doors of his business, he would incur ₹ 20,000 expenses per year. At what sales would he be better off by locking his sales up?

Sol.

$$\text{(i) BEP} = \frac{\text{FC}}{\text{P/V Ratio}}$$

$$\begin{aligned}\text{P/V Ratio} &= 100 - \text{V.C. Ratio} \\ &= 100 - 60 = 40\%\end{aligned}$$

$$\text{BEP} = 50,000/40\% = ₹ 1,25,000$$

$$(ii) S = \frac{FC + DP}{P/V \text{ Ratio}}$$

$$= \frac{50,000 + 15,000}{40\%} = ₹ 162,500$$

$$(iii) \text{ Sales} = \frac{FC + (\text{Loss})}{P/V \text{ Ratio}}$$

$$= \frac{50,000 + (-20,000)}{40\%} = ₹ 75,000$$

Ques. 33. During an year Divya Enterprises operated at loss. The accountant tabulated the following data for the same year.

	₹
Fixed expenses	40,000
Variable expenses	60,000
Sales	80,000

Mr. X the advertising manager has proposed for undertaking an extensive campaign which would cost ₹ 7,200.

- (a) What amount of sales would be necessary to break-even:
- (i) if the advertising plan is discarded?
 - (ii) if the advertising plan is undertaken?
- (b) Top management has indicated that in order to continue operations, annual net income should be at least ₹ 6,000. What amount of sales would provide this net income assuming that advertisement campaign authorised?

Sol.

$$(a) P/V \text{ ratio} = \frac{C}{S} \times 100$$

$$= \frac{40,000 + (-20,000)}{80,000} \times 100 = 25\%$$

$$(i) \text{ BEP when sales plan is discarded} = \frac{\text{Fixed Cost}}{P/V \text{ Ratio}}$$

$$= \frac{40,000}{25} \times 100$$

$$= ₹ 1,60,000$$

$$(ii) \text{ BEP when sales plan is undertaken} = \frac{\text{Fixed cost} + \text{Proposed Advertising Expenditure}}{P/V \text{ Ratio}}$$

$$= \frac{40,000 + 7,200}{25} \times 100$$

$$= ₹ 1,88,800$$

$$(b) \text{ Sales} = \frac{FC + \text{Profit}}{P/V \text{ Ratio}}$$

$$= \frac{(40,000 + 7,200) + 6,000}{25} \times 100$$

$$= ₹ 2,12,800$$

Ques. 34. Jai Engineering works operating at 70% capacity presents the following information:

Break-even point	₹ 120 crore
P/V Ratio	40%
Margin of Safety	₹ 30 crore

The company's management has decided to increase production to 95% capacity level with the following modifications:

- (i) Selling price will be reduced by 8%.
- (ii) Variable cost will be reduced by 5% of sales.
- (iii) Fixed cost will increase by ₹ 12 crore including depreciation on additions but excluding interest on additional capital.

(iv) Additional capital of ₹ 30 crore will be needed for capital expenditure and working capital.
Required (a) Indicate the sales figure that will be needed to earn ₹ 6 crore over and above the present profit and also to meet 20% interest on additional capital.

(b) What will be revised (i) BEP, (ii) P/V Ratio and (iii) Margin of Safety.

Sol.

Actual Sales Volume = Margin of Safety + BEP

$$\begin{aligned}\text{Actual Sales Volume} &= ₹ (30 + 120) \text{ crore} \\ &= ₹ 150 \text{ crore}\end{aligned}$$

$$\text{P/V Ratio} = \frac{C}{S} \times 100$$

$$\begin{aligned}\therefore C &= (\text{P/V Ratio} \times S) \\ C &= 40/100 \times 150 \\ &= ₹ 60 \text{ crore}\end{aligned}$$

$$\text{BEP} = \frac{\text{FC}}{\text{P/V Ratio}}$$

$$120 = \frac{\text{FC}}{40\%} \Rightarrow \text{FC} = ₹ 48 \text{ crore}$$

$$\begin{aligned}\therefore \text{Profit} &= C - \text{FC} = ₹ (60 - 48) \text{ crore} \\ &= ₹ 12 \text{ crore}\end{aligned}$$

$$\begin{aligned}\text{Now Sales} &= \text{FC} + \text{Variable Cost} + \text{Profit} \\ 150 &= 48 + \text{VC} + 12\end{aligned}$$

$$\Rightarrow \text{VC} = 90$$

$$(a) \text{ Desired Profit} = ₹ (12 + 6) \text{ crore} = ₹ 18 \text{ crore}$$

$$\begin{aligned}\text{Revised FC} &= \text{Old} + \text{Increase} + \text{Interest burden} \\ &= 48 + 12 + 6 = ₹ 66 \text{ crore}\end{aligned}$$

$$\text{New Selling Price} = (100 - 8) = 92\%$$

$$\text{Percentage of old variable cost of sales} = \frac{90}{150} \times 100 = 60\%$$

$$\text{New variable cost percentage} = (60 - 5) = 55\%$$

$$\therefore \text{V.C.} = 92 \times \frac{55}{100} = 50.6$$

$$\text{New P/V Ratio} = \frac{92 - 50.6}{92} \times 100 = 45\%$$

$$\begin{aligned}\text{Desired Sales} &= \frac{\text{FC} + \text{DP}}{\text{P/V Ratio}} = \frac{66 + 18}{45} \times 100 \\ &= ₹ 186.67 \text{ cr.}\end{aligned}$$

$$\begin{aligned}(b) (i) \text{ BEP} &= \frac{\text{FC}}{\text{P/V Ratio}} \\ &= \frac{66}{45} \times 100 = 146.67 \text{ cr.}\end{aligned}$$

(ii) P/V Ratio = 45% (as calculated earlier)

$$\begin{aligned}(iii) \text{ M/S} &= \text{Sales} - \text{BEP Sales} \\ &= ₹ (186.67 - 146.67) \text{ crore} \\ &= ₹ 40 \text{ crore}\end{aligned}$$

Ques. 35. Aditya Ltd is a multi-product company. It has the following costs and output data for the year 2019:

Products

	A	B	C
Sales mix (in value)	40%	35%	25%
Selling price per unit (₹)	10	12.5	15
V.C. per unit (₹)	5	7.5	9

Total Fixed Costs: ₹ 1,00,000

Total Sales: ₹ 2,50,000

The Company has proposed to replace product C by product P. Estimated costs and output data are:

Products			
	A	B	P
Sales mix (in value)	50%	30%	20%
Selling price per unit (₹)	10	12.5	14
V.C. per unit (₹)	5	7.5	7

Total Fixed Costs ₹ : ₹ 1,00,000

Total Sales : ₹ 2,50,000

Calculate BEP for the company as a whole in the two situations. Is the proposal worthwhile? Use P/V Ratio for the analysis.

Sol.

Situation I

	A	B	C
(I) Selling price per unit (in ₹)	10	12.5	15
(II) Variable cost per unit (in ₹)	5	7.5	9
(III) Contribution (I – II)	5	5	6
(IV) P/V Ratio $\left(\frac{\text{III}}{\text{I}} \times 100\right)$	50%	40%	40%
(V) Composite P/V Ratio	20% (40% of 50%)	14% (35% of 40%)	10% (25% of 40%)

Total Composite P/V Ratio = (20% + 14% + 10%) = 44%

$$\text{Old Composite B.E.P} = \frac{\text{TFC}}{\text{Total Composite P/V Ratio}}$$

$$= ₹ \left(\frac{1,00,000}{44} \times 100 \right) = ₹ 2,27,273$$

Situation II

	A	B	P
(I) Selling price per unit (in ₹)	10	12.5	14
(II) Variable cost per unit (in ₹)	5	7.5	7
(III) Contribution (I – II)	5	5	7
(IV) P/V Ratio $\left(\frac{\text{III}}{\text{I}} \times 100\right)$	50%	40%	50%
(V) Composite P/V Ratio	25% (50% of 50%)	12% (30% of 40%)	10% (20% of 50%)

Total Composite P/V Ratio = (25 + 12 + 10)% = 47%

$$\text{New Composite BEP} = \frac{\text{TFC}}{\text{Total Composite P/V Ratio}}$$

$$= ₹ \left(\frac{1,00,000}{47\%} \right) = ₹ 2,12,766$$

On Comparison of both the situations we find that the proposal is worthwhile since the BEP has gone down.

Ques. 36. The sales manager of Corus Ltd. requests you to compute the sales volume to :

(i) Break-even, (ii) make a profit of ₹ 4 per unit, (iii) make a profit of 30% of sales, (iv) make a profit of ₹ 12,000 per annum, (v) make a loss of 10% of sales.

Cost data are as below:

Sales 4,000 units @ ₹ 10 per unit.

Out of pocket costs ₹ 5 per unit.

Burden ₹ 12,000 for 4,000 units.

Profit on 4,000 units : ₹ 8,000

Sol. (i) $\text{B.E.P. (in units)} = \frac{\text{FC}}{\text{S} - \text{V.C}} = \frac{12,000}{10 - 5} = 2,400 \text{ units}$

$$\text{B.E.P. (in ₹)} = \frac{\text{FC}}{1 - \frac{\text{V.C.}}{\text{S}}} = \frac{12,000}{1 - \frac{5}{10}} = \frac{12,000 \times 10}{5} = ₹ 24,000$$

(ii) Sales to earn a profit of ₹ 4 per unit:

$$\text{Sales (in units)} = \frac{\text{FC}}{\text{S} - (\text{V.C.} + \text{Profit per unit})} = \frac{12,000}{10 - (5 + 4)} = 12,000 \text{ units}$$

$$\begin{aligned} \text{Sales (in ₹)} &= \frac{\text{FC}}{1 - \left(\frac{\text{V.C.} + \text{Profit per unit}}{\text{S}} \right)} \\ &= \frac{12,000}{1 - \left(\frac{5 + 4}{10} \right)} = \frac{12,000}{\frac{1}{10}} = ₹ 1,20,000 \end{aligned}$$

(iii) Sales to earn profit of 30% of sales:

$$\begin{aligned} \text{Sales (in units)} &= \frac{\text{FC}}{\text{S} - (\text{VC} + \% \text{ of Sales})} \\ &= \frac{12,000}{10 - (5 + 30\% \text{ of } 10)} = \frac{12,000}{10 - 8} = 6,000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Sales (in ₹)} &= \frac{\text{FC}}{1 - \frac{(\text{VC} + \% \text{ of Sales})}{\text{S}}} \\ &= \frac{12,000}{1 - \left(\frac{5 + 30\% \text{ of } 10}{10} \right)} = \frac{12,000}{2/10} = ₹ 60,000 \end{aligned}$$

(iv) Sales to earn profit of ₹ 12,000:

$$\text{Sales (in units)} = \frac{\text{FC} + \text{Profit}}{\text{S} - \text{V.C.}} = \frac{12,000 + 12,000}{10 - 5} = 4,800 \text{ units}$$

$$\text{Sales (in ₹)} = \frac{\text{FC} + \text{Profit}}{1 - \frac{\text{VC}}{\text{S}}} = \frac{12,000 + 12,000}{1 - \frac{5}{10}} = \frac{24,000}{5/10} = ₹ 48,000$$

(v) Sales at loss of 10% of Sales:

$$\begin{aligned} \text{Sales (in units)} &= \frac{\text{FC}}{\text{S} - (\text{V} - \% \text{ of Sales})} \\ &= \frac{12,000}{10 - (5 - 10\% \text{ of } 10)} = \frac{12,000}{10 - (5 - 1)} = 2,000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Sales (in ₹)} &= \frac{\text{F.C.}}{1 - \frac{(\text{V.C.} - \% \text{ of Sales})}{\text{S}}} = \frac{12,000}{1 - \frac{(5 - 10\% \text{ of } 10)}{10}} \\ &= \frac{12,000}{1 - \frac{4}{10}} = ₹ 20,000 \end{aligned}$$

Alternatively,

(iii) Let x be the sales

$$x \times \text{P/V Ratio} = \text{FC} + \text{Profit}$$

$$x \times \frac{50}{100} = 12,000 + \frac{30}{100} x$$

$$\frac{20x}{100} = 12,000 \quad x = \frac{12,00,000}{20} = ₹ 60,000$$

(v) $x \times \text{P/V Ratio} = \text{F.C.} - \text{Loss}$

$$x \times \frac{50}{100} = 12,000 - \frac{10}{100} x$$

$$\frac{60}{100}x = 12,000$$

$$x = \frac{12,000 \times 100}{60} = ₹ 20,000$$

Ques. 37. From the following information, calculate:

(i) B.E.P. (in units); and

(ii) B.E.P. (in rupees)

Sales of 50,000 units @ ₹6 per unit

Variable Cost @ ₹4 per unit

Total Fixed Cost = ₹80,000

(B. Com III, HPU, 2010)

Sol. (i) B.E.P. (in Units) = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

$$\frac{₹80,000}{(\text{SP} - \text{VC}) \text{ per unit}} = \frac{₹80,000}{₹(6.00 - 4.00)}$$

$$\therefore \text{B.E.P.} = \frac{₹80,000}{₹2.00} = \mathbf{40,000 \text{ units}}$$

(ii) B.E.P. (in ₹) = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}} \times \text{SP per unit}$

$$= \frac{₹ 80,000}{₹ (6.00 - 4.00)} \times 6.00 = \frac{₹80,000}{₹2.00} \times ₹6.00$$

$$\therefore \text{B.E.P. (in ₹)} = \mathbf{₹2,40,000}$$

Ques. 38. A factory engaged in manufacturing plastic buckets is working to 40% capacity and produces 10,000 buckets per annum. The present cost break-up for one bucket is as under:

	₹
Material	10
Labour	3
Overheads	5 (60% fixed)

The selling price is ₹20 per bucket.

If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity, the selling price falls by 5% accompanied by a similar fall in the prices of material. You are required to calculate the profit at 50% and 90% capacities, and also calculate break-even points for the same capacity production.

Sol.

**Statement Showing Profit and Break-even Point
at 50% and 90% Capacity Levels**

Particulars	50% (12,500 units)		90% (22,500 units)	
	Amount (in ₹)		Amount (in ₹)	
	Per Unit	Total	Per Unit	Total
Sales — (A)	19.40	2,42,000	19.00	4,27,500
Variable Cost:				
Material	10.00	1,25,000	9.50	2,13,750
Labour	3.00	37,500	3.00	67,500
Variable Overheads	2.00	25,000	2.00	45,000
∴ Total Variable Cost — (B)	15.00	1,87,500	14.50	3,26,250
Contribution — [(A) – (B)]	4.40	55,000	4.50	1,01,250
Less: Fixed Cost	—	(30,000)	—	(30,000)
Thus, Net Profit	—	25,000	—	71,250
Break-even Point (in Units) = $\frac{\text{Fixed Cost}}{\text{Contribution Per Unit}}$	$\frac{₹30,000}{₹4.40}$	= 6,818 units	$\frac{₹30,000}{₹4.50}$	= 6,667 units
Break-even Profit (in Sales Value)	6,818 units × ₹19.40	= ₹1,32,269	6,667 units × ₹19.00	= ₹1,26,673

Ques. 39. You are given the following information for the year 2019-20 of Mayur & Company Ltd.:

	Amount (in ₹)
Variable Cost	6,00,000
Fixed Cost	4,00,000
Net Profit	2,00,000
Sales	12,00,000

Required:

- (a) P/V Ratio
 (b) Profit when sales amounted to ₹14,00,000; and
 (c) Sales required to earn a profit of ₹6,00,000.

Sol.

Marginal Cost Statement

Particulars	Amount (in ₹)
Sales	12,00,000
Less: Variable Cost	6,00,000
Contribution	6,00,000
Less: Fixed Cost	4,00,000
Profit	2,00,000

- (a) $P/V \text{ Ratio} = \text{Contribution} / \text{Sales} \times 100$
 $= ₹6,00,000 / ₹12,00,000 \times 100$
 $= 50\% \text{ Ans.}$
- (b) Profit when sales amounted ₹14,00,000:
 Profit = Contribution – Fixed Cost
 $= ₹14,00,000 \times 50/100 - 4,00,000$
 $= ₹7,00,000 - ₹4,00,000$
 $= ₹3,00,000 \text{ Ans.}$
- (c) Sales Required to earn a Profit of ₹6,00,000:
 Required Sales = Fixed Cost + Desired Profit/ P/V Ratio
 $= ₹4,00,000 + ₹6,00,000/50\%$
 $= ₹10,00,000/50 \times 100 = ₹20,00,000 \text{ Ans.}$

Ques. 40. A Singh Company furnishes you the following informations:

Year	Amount (in ₹)	
	Sales	Profit/Loss
2013	4,00,000	(-) 40,000 (Loss)
2014	8,00,000	80,000

You are required to compute:

- (i) P/V Ratio;
 (ii) Fixed Cost;
 (iii) Break-even sales volume;
 (iv) Profit or loss at a sale volume of ₹6,00,000;
 (v) The amount of sales required to earn a profit of ₹3,00,000;
 (vi) Margin of safety for the year 2014.

(B.Com III HPU, 2015)

Sol.

Analytical Table

Year	Amt. (in ₹)	
	Sales	Profit/Loss
2014	8,00,000	80,000
2013	(-) 4,00,000	(-)40,000
∴ Change	4,00,000	1,20,000

$$(i) \text{ P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{₹1,20,000}{₹4,00,000} \times 100 = 30\%$$

(ii) **Fixed Cost** = Contribution – Profit/+Loss

For 2013: Fixed Cost = 30% of ₹4,00,000 + ₹40,000 = ₹(1,20,000 + 40,000) = ₹1,60,000

For 2014: Fixed Cost = 30% of ₹8,00,000 – ₹80,000 = ₹(2,40,000 – 80,000) = ₹1,60,000

(iii) **Break-even Sales Volume:**

$$\text{B.E.P. (in sales value)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{₹1,60,000}{30\%} = \frac{₹1,60,000}{30} \times 100 = ₹ 5,33,333$$

(iv) **Profit or Loss at a Sales Volume of ₹ 6,00,000:**

	Amt. (in ₹)
Sales	<u>6,00,000</u>
Contribution @ 30% of ₹ 6,00,000	1,80,000
(-) Fixed Cost	<u>(1,60,000)</u>
∴ Profit	<u>20,000</u>

(v) **Sales Required to earn a Profit of ₹3,00,000:**

$$\begin{aligned} \text{Required Sales} &= \frac{\text{Fixed cost} + \text{Desired Profit}}{\text{P/V Ratio}} \\ &= \frac{₹(1,60,000 + 3,00,000)}{30\%} = \frac{₹4,60,000}{30} \times 100 \\ &= ₹15,33,333 \quad \text{Ans.} \end{aligned}$$

(vi) **Margin of safety (M/S) for the year 2014:**

$$\begin{aligned} \text{M/S 2014} &= (\text{Actual sales} - \text{Break-even sales}) \\ &= ₹(8,00,000 - 5,33,333) \\ &= ₹2,66,667 \quad \text{Ans.} \end{aligned}$$

■ Additional Practical Questions

Ques. 41. Rama Ltd. provides you the following data:

	Amt. (in ₹)
Sales	8,00,000
Variable Costs	3,20,000
Fixed Costs	4,00,000

It is proposed to reduce the selling price by 20%. Calculate: (a) New P/V Ratio; (b) New Break-even point; (c) Additional sales required to obtain the same amount of profit as before.

Sol. (i) **New P/V Ratio** = $\frac{\text{Contribution}}{\text{Sales}} \times 100$

$$\begin{aligned}
 &= \frac{(\text{Sales less 20\%}) - \text{Variable Cost}}{\text{Sales}} \times 100 \\
 &= \frac{\text{₹}(80,000 - 20\% \text{ of } 8,00,000) - \text{₹}3,20,000}{\text{₹}(8,00,000 - 20\% \text{ of } 8,00,000)} \times 100 \\
 &= \frac{\text{₹}(8,00,000 - 1,60,000) - \text{₹}3,20,000}{\text{₹}(8,00,000 - 1,60,000)} \times 100 \\
 \therefore \quad \text{New P/V Ratio} &= \frac{\text{₹}6,40,000 - 3,20,000}{\text{₹}6,40,000} \times 100 \\
 &= \frac{\text{₹}3,20,000}{\text{₹}6,40,000} \times 100 = \mathbf{50\%} \\
 \text{(ii) New Break-even Point} &= \frac{\text{Fixed Cost}}{\text{New P/V Ratio}} = \frac{\text{₹}4,00,000}{50\%} = \frac{\text{₹}4,00,000}{50} \times 100 = \mathbf{\text{₹}8,00,000} \\
 \text{(iii) Additional Sales Required to obtain the same amount of Profit as before, i.e., ₹ 80,000 (8,00,000 – 3,20,000 – 4,00,000):} \\
 \text{Required Sales} &= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{New P/V Ratio}} \\
 &= \frac{\text{₹}(4,00,000 + 80,000)}{50\%} = \frac{\text{₹}4,80,000}{50} \times 100 \\
 \therefore \text{Required Sales} &= \mathbf{\text{₹}9,60,000} \\
 \text{Thus, Additional Sales Required} &= \text{₹}(9,60,000 - 8,00,000) = \mathbf{\text{₹}1,60,000}
 \end{aligned}$$

Ques. 42. From the following particulars, calculate:

- (i) Break-even sales,
- (ii) Margin of Safety,
- (iii) Sales to earn profit of ₹40,000.

	Amt. (in ₹)
Sales	2,00,000
Total Costs	1,60,000
Variable Costs	1,20,000

Sol.

$$\begin{aligned}
 \text{(i) Break-even Sales} &= \frac{\text{Fixed Cost}}{\text{P/V Ratio}} \\
 \text{P/V Ratio} &= \frac{C}{S} \times 100 = \frac{S - VC}{S} \times 100 \\
 &= \frac{\text{₹}(2,00,000 - 1,20,000)}{\text{₹}2,00,000} \times 100 \\
 &= \frac{\text{₹}80,000}{\text{₹}2,00,000} \times 100 \\
 \therefore \text{P/V Ratio} &= 40\%. \\
 \text{Total Cost} &= \text{₹}1,60,000 \\
 \text{Variable Cost} &= \text{₹}1,20,000 \\
 \therefore \text{Fixed Cost} &= (\text{TC} - \text{VC}) = \text{₹}(1,60,000 - 1,20,000) = \text{₹}40,000 \\
 \text{Thus, Break-even Sales} &= \frac{\text{₹}40,000}{40\%} = \frac{\text{₹}40,000}{40} \times 100 = \mathbf{\text{₹}1,00,000} \\
 \text{(ii) Margin of Safety} &= \text{Actual Sales} - \text{Break-even Sales} \\
 &= \text{₹}(2,00,000 - 1,00,000) = \mathbf{\text{₹}1,00,000} \\
 \text{(iii) Sales to earn Profit of ₹ 40,000:} \\
 \text{Required Sales} &= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}} \\
 &= \frac{\text{₹}(40,000 + 40,000)}{40\%}
 \end{aligned}$$

$$= \frac{₹80,000}{40} \times 100$$

$$= ₹ 2,00,000$$

Ques. 43. (a) From the following particulars, find out the Break-even point:

	<u>Amt. (in ₹)</u>
Selling price per unit	30
Variable Cost per unit	25
Fixed Expenses	64,000

(b) What should be the selling price per unit, if the Break-even point is brought down to 8,000 units?

Sol.

(a) **Break-even Point** = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

$$\therefore \text{B. E. P.} = \frac{₹64,000}{(30 - 25)} = \frac{₹64,000}{₹5} = ₹ 12,800$$

(b) **Calculation of Selling Price per unit, if B.E.P. is 8,000 units:**

$$\text{New Contribution} = \frac{\text{Fixed Cost}}{\text{New B.E.P.}} = \frac{₹64,000}{8,000 \text{ units}} = ₹8$$

$$\text{Selling Price Per Unit} = \text{Contribution per unit} + \text{VC per unit}$$

$$= ₹(8+25) = ₹33$$

Ques. 44. You are given the following data for the year 2015 of the Company:

	<u>Amt. (in ₹)</u>
Variable Cost	12,00,000
Fixed Cost	6,00,000
Net Profit	2,00,000
Sales	20,00,000

Variable Overheads @60% on Direct Labour

Find out: (a) P/V Ratio, (b) B.E.P., (c) Profit when sales amounted to ₹24,00,000, (d) Sales required to earn a profit of ₹4,00,000.

Sol.

(a) P/V Ratio

$$= \frac{C}{S} \times 100 = \frac{S - VC}{S} = \frac{₹(20,00,000 - 12,00,000)}{₹20,00,000} \times 100$$

$$= \frac{₹8,00,000}{₹20,00,000} \times 100 = 40\%$$

(b) Break-even Point = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{₹6,00,000}{40\%} = \frac{₹6,00,000}{40} \times 100 = ₹15,00,000$

(c) Profit when Sales amounted to ₹24,00,000:

	<u>Amt. (in ₹)</u>
Sales	<u>24,00,000</u>
Contribution @ 40% of 24,00,000	9,60,000
(-) Fixed Cost	<u>6,00,000</u>
∴ Profit	<u>3,60,000</u>

(d) Sales required to earn a profit of ₹ 4,00,000:

$$\text{Required Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}}$$

$$= \frac{₹(6,00,000 + 4,00,000)}{40\%} = \frac{₹10,00,000}{40} \times 100$$

$$= ₹ 25,00,000$$

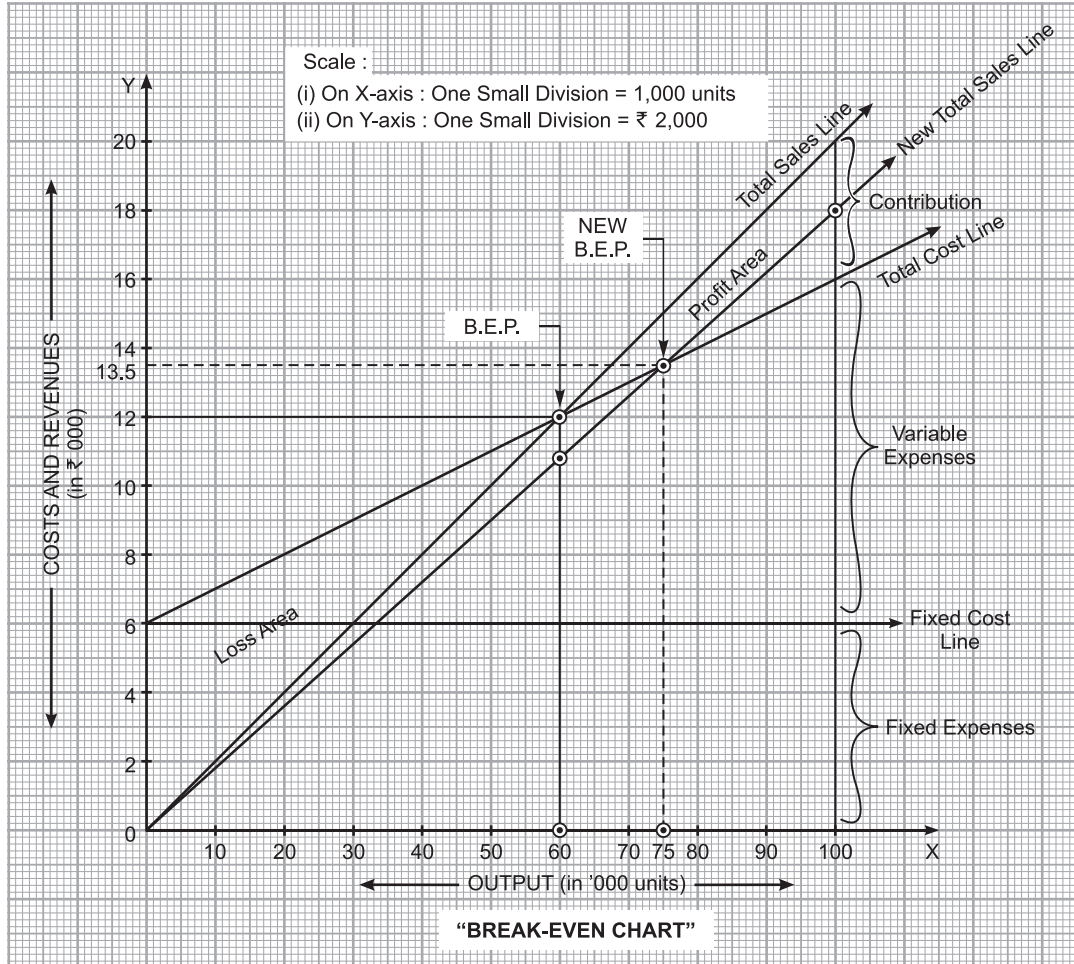
Ques. 45. You are given the following data for the coming year of a factory:

	<u>Amt. (in ₹)</u>
Budgeted Output	1,00,000 units
Fixed Expenses	6,00,000
Variable Expenses	₹10 per unit

Selling Price ₹20 per unit

Draw a Break-even Chart showing the Break-even point. If the selling is reduced to ₹18 per unit, what will be the new Break-even point?

Sol.



- (i) **Original P/V Ratio** = $\frac{S-V}{S} \times 100 = \frac{₹(20-10)}{₹20} \times 100 = 50\%$
- New P/V Ratio** = $\frac{₹(18-10)}{₹18} \times 100 = \frac{₹8}{₹18} \times 100 = 44.44\%$
- Original B.E.P.** = $\frac{F.C.}{P/V \text{ Ratio}} = \frac{₹6,00,000}{50\%} = \frac{₹6,00,000}{50} \times 100 = ₹ 12,00,000$
- Or **Original B.E.P. (in units)** = $\frac{₹ 12,00,000}{₹20} = 60,000 \text{ units}$
- (ii) **New B.E.P.** = $\frac{₹6,00,000}{44.44\%} = \frac{₹6,00,000}{44.44} \times 100 = ₹13,50,000 \text{ Approx.}$
- Or **New B.E.P. (in units)** = $\frac{₹50,000}{₹18} = 75,000 \text{ units}$

Ques. 46. Assuming that the Cost structure and selling prices remain the same in both the periods. Calculate the following:

- (i) Profit-Volume Ratio
- (ii) B.E.P. for Sales
- (iii) Profit when sales are ₹2,00,000
- (iv) Sales required to earn a profit of ₹40,000
- (v) Margin of Safety in both the periods.

Period	Amt. (in ₹)	
	Sales	Profit
I	2,40,000	18,000
II	2,80,000	26,000

Sol.

Analytical Table

Period	Amt. (in ₹)	
	Sales	Profit
II	2,80,000	26,000
I	2,40,000	18,000
∴ Change	40,000	8,000

$$(i) \text{ P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{₹8,000}{₹40,000} \times 100 = 20\%$$

$$(ii) \text{ Break-even Sales} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

Fixed Cost = Contribution – Profit

Period – I:

$$\text{Fixed Cost} = (20\% \text{ of } 2,40,000 - 18,000) = ₹ (48,000 - 18,000) = ₹30,000$$

Period – II:

$$\text{Fixed Cost} = (20\% \text{ of } 2,80,000 - 26,000) = ₹ (56,000 - 26,000) = ₹30,000$$

$$\therefore \text{ Break-even Sales} = \frac{₹30,000}{20\%} = \frac{₹30,000}{20} \times 100 = 1,50,000.$$

(iii) Profit when Sales are ₹2,00,000:

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{Fixed Cost} = (20\% \text{ of } 2,00,000 - 30,000) \\ &= ₹ (40,000 - 30,000) \\ &= ₹ 10,000 \end{aligned}$$

(iv) Required Sales to earn a Profit of ₹ 40,000:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{FC} + \text{DP}}{\text{P/V Ratio}} = \frac{₹(30,000 + 40,000)}{20\%} \\ &= \frac{₹70,000}{20} \times 100 = ₹3,50,000 \end{aligned}$$

(v) Margin of Safety (M/S) = (AS – Break-even Sales)

$$\text{Period – I: M/S} = ₹ (2,40,000 - 1,50,000) = ₹90,000$$

$$\text{Period – II: M/S} = ₹ (2,80,000 - 1,50,000) = ₹ 1,30,000$$

Ques. 47. The Anky Company Ltd. furnishes you the following data:

Year	Amt. (in ₹)	
	Sales	Profit/Loss
2019	2,00,000	(-) 40,000 (Loss)
2020	4,00,000	60,000

You are required to compute:

- (i) P/V Ratio;
- (ii) Fixed Cost;
- (iii) Break-even Sales Volume;
- (iv) Profit or loss at a sale volume of ₹3,00,000;
- (v) The amount of sales required to earn a profit of ₹1,50,000.

Sol.

Analytical Table

Periods	Amt. (in ₹)	
	Sales	Profit or Loss
2018	4,00,000	60,000
2017	(2,00,000)	(-) 40,000 +
∴ Change	2,00,000	1,00,000

$$(i) \text{ P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{₹1,00,000}{₹2,00,000} \times 100 = 50\%$$

(ii) Fixed Cost = Contribution – Profit (+ Loss)

$$\text{For 2017: Fixed Cost} = (50\% \text{ of } 2,00,000 + 40,000) = ₹(1,00,000 + 40,000) \\ = ₹1,40,000$$

$$\text{For 2018: Fixed Cost} = (50\% \text{ of } 4,00,000 + 60,000) = ₹(2,00,000 + 60,000) \\ = ₹2,60,000$$

$$(iii) \text{ Break-even Sales Volume} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{₹1,40,000}{50\%} \\ = \frac{₹1,40,000}{50} \times 100 = ₹2,80,000$$

(iv) Profit or Loss at a Sales Volume of ₹ 3,00,000:

	Amt. (in ₹)
Sales	<u>3,00,000</u>
Contribution @ 50% of Sales	1,50,000
Less: Fixed Cost	<u>(1,40,000)</u>
∴ Profit	<u>10,000</u>

(v) Sales Required to earn a Profit of ₹ 1,50,000:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{FC} + \text{Desired Profit}}{\text{P/V Ratio}} \\ &= \frac{₹(1,40,000 + 1,50,000)}{50\%} = \frac{₹2,90,000}{50\%} \\ &= \frac{₹2,90,000}{50} \times 100 \\ &= ₹5,80,000 \end{aligned}$$

Ques. 48. A Company budgets for a production of 1,50,000 units, the variable cost per unit is ₹14 and fixed cost is ₹2 per unit. The company fixes its selling price to fetch a profit of 25% on cost.

- (i) What is the Break-even point?
 (ii) What is the P/V Ratio?
 (iii) If it reduces its selling price by 5%, how does the revised selling price affect the break-even point and the P/V Ratio?

Sol.

Output = 1,50,000 units

Fixed Cost = ₹ 2.00 per unit

∴ **Total Fixed Cost** = (1,50,000 units × ₹2.00) = ₹ **3,00,000**

Calculation of Selling Price Per unit:	Amt. (in ₹)
Variable cost per unit	14.00
Fixed cost per unit	<u>2.00</u>
∴ Total cost per unit	16.00
(+) Price @ of 25% of Cost – (25% of 16)	<u>4.00</u>
∴ Selling price per unit	<u>20.00</u>

$$(i) \text{ Break-even point} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{\text{Fixed Cost}}{(\text{SP} - \text{VC}) \text{ per unit}}$$

$$\therefore \text{B.E.P.} = \frac{\text{₹ } 3,00,000}{\text{₹ } (20.00 - 14.00)} = \frac{\text{₹ } 3,00,000}{\text{₹ } 6.00}$$

$$= \text{50,000 units}$$

$$(ii) \text{ P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Selling Price per unit}} \times 100$$

$$= \frac{\text{₹ } (20.00 - 14.00)}{\text{₹ } 20} \times 100$$

$$= \frac{\text{₹ } 6}{\text{₹ } 20} \times 100 = \text{30\%}$$

(iii) **Calculation of Break-even point and P/V Ratio, if a company reduces selling price by 5%:**

New Selling Price per unit = (₹ 20.00 – 5% of ₹ 20.00) = ₹ 19.00

New Break-even point = $\frac{\text{Fixed Cost}}{\text{New Contribution per unit}} = \frac{\text{₹ } 3,00,000}{\text{₹ } (19.00 - 14.00)}$

$$\therefore = \frac{\text{₹ } 3,00,000}{\text{₹ } 5} = \text{60,000 units}$$

$$\text{New P/V Ratio} = \frac{\text{New Contribution per unit}}{\text{New Selling Price per unit}} \times 100$$

$$= \frac{\text{₹ } (19.00 - 14.00)}{\text{₹ } 19.00} \times 100 = \frac{\text{₹ } 5.00}{\text{₹ } 19.00} \times 100$$

$$= \text{26.32\%}$$

Ques. 49. From the following find out:

- (a) Break-even point;
 (b) P/V Ratio;
 (c) Profit for the sales of ₹5,00,000;
 (d) Margin of Safety from the sales of ₹5,00,000;
 (e) Required sales to earn a profit of ₹80,000;

- (f) Additional sales required to cover an increase of ₹5,000 p.a. in sales manager's salary:

	<u>Amt. (in ₹)</u>
Sales	6,00,000
Less: Variable Costs and overheads	<u>(4,50,000)</u>
∴ Gross profit	1,50,000
Less: Fixed Overheads	<u>(45,000)</u>
∴ Net Profit	<u>1,05,000</u>

Sol.

$$(a) \text{ Break-even Point} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{₹}45,000}{25\%} = \frac{\text{₹}45,000}{25} \times 100 = \text{₹ } 1,80,000$$

$$(b) \text{ P/V Ratio} = \frac{C}{S} \times 100 = \frac{S - V}{S} \times 100 = \frac{\text{₹}(6,00,000 - 4,50,000)}{\text{₹}6,00,000} \times 100$$

$$= \frac{\text{₹}1,50,000}{\text{₹}6,00,000} \times 100 = 25\%$$

- (c) Profit for Sales of ₹ 5,00,000:

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{Fixed Cost} \\ &= 25\% \text{ of } \text{₹} 5,00,000 - \text{₹} 45,000 \\ &= \text{₹} (1,25,000 - 45,000) \\ &= \text{₹ } 80,000 \end{aligned}$$

- (d) Margin of Safety (M/S) from Sales of ₹ 5,00,000:

$$\begin{aligned} \text{M/S} &= \text{Actual Sales} - \text{Break even Sales} \\ &= \text{₹} (5,00,000 - 1,80,000) \\ &= \text{₹ } 3,20,000 \end{aligned}$$

- (e) Sales Required to earn a Profit of ₹ 80,000:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{FC} + \text{DP}}{\text{P/V Ratio}} = \frac{\text{₹}(45,000 + 80,000)}{25\%} \\ &= \frac{\text{₹}1,25,000}{25} \times 100 \\ &= \text{₹ } 5,00,000 \end{aligned}$$

- (f) Additional Sales Required to Cover an Increase of ₹ 5,000 p.a. in Sales Manager Salary to maintain same profitability, i.e., ₹ 10,500:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{T. Fixed Cost} + \text{DP}}{\text{P/V Ratio}} = \frac{\text{₹}(45,000 + 5,000) + \text{₹}1,05,000}{25\%} \\ &= \frac{\text{₹}(50,000 + 1,05,000)}{25} \times 100 = \frac{\text{₹}1,55,000}{25} \times 100 \end{aligned}$$

Thus, Additional Sales required = ₹(6,20,000 – 6,00,000) = ₹ 20,000

Ques. 50. VS Ltd., a multi-product company furnishes you the following data relating to the year 2019-20:

Particulars	Amt. (in ₹)	
	First Half of the Year	Second Half of the Year
Sales	90,000	1,00,000
Total Cost	80,000	86,000

Assuming that there is no change in prices and variable costs and that the fixed expenses are incurred equally in the two half year periods. Calculate for the year 2019-20:

- (i) P/V Ratio;

- (ii) Fixed Cost;
 (iii) Break-even Sales;
 (iv) Percentage of Margin of Safety

Sol.

Analytical Table

Year	Amt. (in ₹)		
	Sales	Total Cost	Profit
Second half Year	1,00,000	86,000	14,000
First half year	90,000	80,000	10,000
∴ Change	10,000	6,000	4,000

$$(i) \text{ P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{₹4,000}{₹10,000} \times 100 = 40\%$$

(ii) **Fixed Cost** = Contribution – Profit

First half Year:

$$\text{Fixed Cost} = (40\% \text{ of } ₹90,000 - ₹10,000) = ₹(36,000 - 10,000) = ₹26,000$$

Second half Year:

$$\text{Fixed Cost} = (40\% \text{ of } ₹1,00,000 - ₹14,000) = ₹(40,000 - 14,000) = ₹26,000$$

Thus, **Total Fixed Cost for the year** = ₹(26,000 + 26,000) = ₹52,000

$$(iii) \text{ Break-even Sales} = \frac{\text{Total Fixed Cost}}{\text{P/V Ratio}} = \frac{₹52,000}{40\%} = \frac{₹52,000}{40} \times 100 = ₹1,30,000$$

(iv) **Percentage of Margin of Safety:**

Margin of Safety (M/S) for the year = (Actual Sales – Break-even Sales)

$$= ₹(1,00,000 + 90,000) - ₹1,30,000$$

$$\therefore \text{M/S} = ₹(1,90,000 - 1,30,000) = ₹60,000$$

$$\% \text{ of Margin of Safety} = \frac{\text{M/S}}{\text{AS}} \times 100 = \frac{₹60,000}{₹1,90,000} \times 100$$

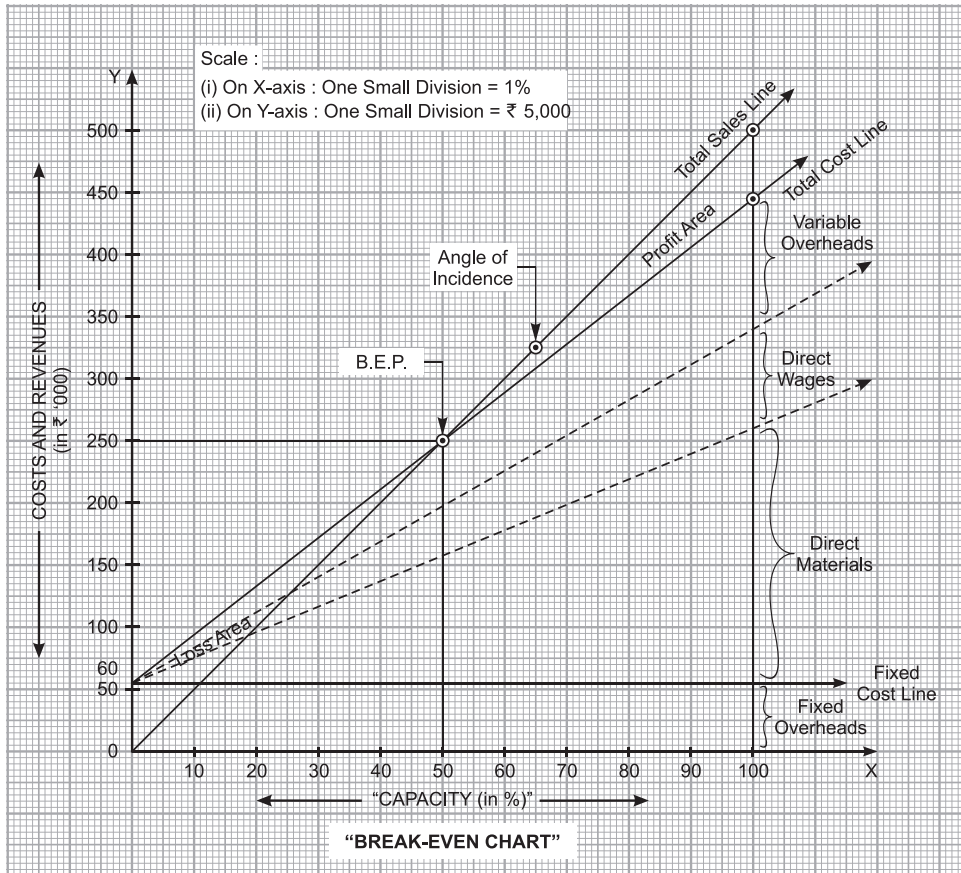
$$= 31.58\%$$

Ques. 51. The following figures relate to one year's working at 100% capacity level in a manufacturing business:

Particulars	Amt. (in ₹)
Fixed Overheads	60,000
Variable Overheads	1,00,000
Direct wages	80,000
Direct Materials	2,00,000
Sales	5,00,000

Represent the above data on a "Break-even chart" and determine from the chart the Break-even point. Verify your result by calculations.

Sol.



Analytical Table

Capacity Level (in %)	Amt. (in ₹)			
	Fixed Cost	Variable Cost	Total Cost	Sales
0	60,000	Nil	60,000	Nil
10	60,000	38,000	98,000	50,000
20	60,000	76,000	1,36,000	1,00,000
30	60,000	1,14,000	1,74,000	1,50,000
40	60,000	1,52,000	2,12,000	2,00,000
50	60,000	1,90,000	2,50,000	2,50,000 B.E.P.
60	60,000	2,28,000	2,88,000	3,00,000
70	60,000	2,66,000	3,26,000	3,50,000
80	60,000	3,04,000	3,64,000	4,00,000
90	60,000	3,42,000	4,02,000	4,50,000
100	60,000	3,80,000	4,40,000	5,00,000

Verification:

Sales = ₹ 5,00,000

Total Variable Cost = (Direct Material + Direct Wages + Variable Overheads)
 = ₹(2,00,000 + 80,000+ 1,00,000) = ₹ 3,80,000

Contribution = S – VC = ₹ (5,00,000 – 3,80,000) = ₹1,20,000

P/V Ratio = $\frac{C}{S} \times 100 = \frac{₹ 1,20,000}{₹ 5,00,00} \times 100 = 24\%$

Break-even Point (in Sales Value) = $\frac{FC}{P/V \text{ Ratio}} = \frac{₹60,000}{24\%} = \frac{₹60,000}{24} \times 100$

∴ B.E.P. = ₹2,50,000

B.E.P. (in %) = $\frac{\text{Sales at B.E.P.}}{\text{Sales at 100\% Capacity}} = \frac{₹ 2,50,000}{₹ 5,00,000} \times 100 = 50\%$

Ques. 52. Philips Radio Company sold 40,000 radios last year at a price of ₹ 2,000 each. The Cost structure per radio is as follows:

Particulars	Amt. (in ₹)
Materials	400
Labour	200
Variable Overheads	<u>100</u>
Marginal Cost	700
Fixed Overheads	<u>800</u>
Total Cost	<u>1,500</u>

Due to Competition, the price has to be reduced to ₹1,700 for the coming year. Assuming that there will be no change in costs, find out how many radios shall be sold to ensure the same amount of total profit as last year.

Sol.

Profit for 40,000 Radios = 40,000 radios × ₹ (2,000 – 1,500)
 = 40,000 radios × ₹500
 = **2,00,00,000**

Contribution per Radio at the Price of ₹1,700 = ₹ (1,700 – 700)
 = ₹1,000

Sales Required at ₹ 1,700 per Radio to earn a Profit of ₹ 2,00,00,000:

Required Sales = $\frac{\text{Fixed Cost} + \text{Profit}}{\text{Contribution Per Unit}}$
 = $\frac{₹(4,000 \text{ Radios} \times ₹ 800) + ₹ 2,00,00,000}{₹ 1,000}$
 = $\frac{₹ (3,20,00,000 + 2,00,00,000)}{₹ 1,000} = \frac{₹ 5,20,00,000}{₹ 1,000}$

Thus, **Required Sales = 52,000 Radios**

Confirmation:

	Amt. (in ₹)
Sales – (52,000 × ₹ 1,700)	8,84,00,000
Less: Variable Cost – (52,000 × ₹700)	<u>(3,64,00,000)</u>
∴ Contribution	5,20,00,000
Less: Fixed Cost – (40,000 × ₹ 800)	<u>(3,20,00,000)</u>
Thus, Profit	<u>2,00,00,000</u>

Ques. 53. X Co. Ltd. manufactures and sells 10,000 units of a product, the selling price of which is ₹50 and profit earned is ₹5 per unit. The analysis of cost of 10,000 units is as under:

Particulars	Amt. (in ₹)
Material Cost	1,50,000
Labour Cost	50,000
Overheads	2,00,000(40% Variable)

You are required to compute:

- Break-even Sales in units and in Rupees
- Sales to earn a profit of ₹1,50,000
- Profit when ₹7,500 units are sold.

Sol. Sales – (10,000 units × ₹50) = ₹ **5,00,000**

Variable Cost = D/M + D/W + Variable Overheads

$$= ₹ \left(1,50,000 + 50,000 + \frac{40}{100} \times 2,00,000 \right)$$

∴ Variable Cost = ₹ (1,50,000 + 50,000 + 80,000) = ₹ **2,80,000**

$$\text{Fixed Cost} = \frac{60}{100} \times ₹ 2,00,000 = ₹ **1,20,000**$$

$$\text{P/V Ratio} = \frac{C}{S} \times 100 = \frac{S-V}{S} \times 100 = \frac{₹(5,00,000 - 2,80,000)}{₹5,00,000} \times 100$$

$$= \frac{₹ 2,20,000}{₹ 5,00,000} \times 100 = 44\%$$

$$\begin{aligned} \text{(i) Break-even Point (in Sales Value)} &= \frac{\text{FC}}{\text{P/V Ratio}} = \frac{₹ 1,20,000}{44\%} \\ &= \frac{₹ 1,20,000}{44} \times 100 = ₹ **2,72,727** \end{aligned}$$

$$\text{Break-even Point (in units)} = \frac{\text{B.E.P. (in Sales Value)}}{\text{SP Per unit}} = \frac{₹ 2,72,727}{₹ 50} = **5,455 units**$$

(ii) Sales to earn a Profit of ₹ 1,50,000:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{FC} + \text{DP}}{\text{P/V Ratio}} = \frac{₹(1,20,000 + 1,50,000)}{44\%} \\ &= \frac{₹ 2,70,000}{44} \times 100 = ₹ **6,13,636** \end{aligned}$$

(iii) Profit when 7,500 units are sold:

	Amt. (in ₹)
∴ Sales – (7,500 units × ₹ 50)	<u>3,75,000</u>
∴ Contribution @ 44% of ₹ 3,75,000	1,65,000
∴ Less: Fixed Cost	<u>(1,20,000)</u>
∴ Profit	<u>45,000</u>

Ques. 54. A Company has annual fixed costs of ₹7,00,000. In 2020, sales amounted to ₹30,00,000 as compared with ₹22,50,000 in 2019 and profit in 2020 was ₹2,10,000 higher than in 2019. You are required to compute:

- Break-even Sales
- Profit or loss on a precast sales volume of ₹40,00,000
- If there is reduction in selling price in 2021 by 10% and the company desires to be earn the same profit as in 2020, what would be the required sales volume?

Sol. P/V Ratio = $\frac{\text{Increase in Profit}}{\text{Increase in Sales}} \times 100$
 = $\frac{₹2,10,000}{₹75,00,000} \times 100 = 28\%$

(i) **Break-even Sales** = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{₹7,00,000}{28\%} = \frac{₹7,00,000}{28} \times 100$
 = ₹ 25,00,000

(ii) **Profit or Loss on a forecast Sales Volume of ₹40,00,000:**

	Amt. (in ₹)
Sales	40,00,000
∴ Contribution @ 28% of ₹ 40,00,000	11,20,000
(-) Fixed Cost	(7,00,000)
∴ Profit	4,20,000

(iii) If present Selling Price is = ₹100
 ∴ Variable Cost is (100 – 28) = ₹72
 ∴ New Selling Price (100 – 10% of 100) = ₹ 90
 Less: Variable Cost = (₹72)
 ∴ New Contribution = ₹ 18
 New P/V Ratio = $\frac{\text{New Contribution}}{\text{New Selling Price}} \times 100$
 = $\frac{₹ 18}{₹90} \times 100$
 = 20%

Profit in 2020:

	Amt. (in ₹)
Sales	30,00,000
Contribution @ 28% of 30,00,000	8,40,000
Less: Fixed Cost	7,00,000
∴ Profit	1,40,000

Required Sales to earn a Desired Profit of ₹ 1,40,000:

Required sales = $\frac{\text{FC} + \text{DP}}{\text{New P/V Ratio}} = \frac{₹(7,00,000 + 1,40,000)}{20\%}$
 = $\frac{₹8,40,000}{20} \times 100$
 = ₹42,00,000

Ques. 55. Y Co. Ltd. has two similar plants and the company wants to merge these two plants. The following information is available:

Particulars	Capacity in Operation (in %)	
	Plant-I (100%) 50 units	Plant-II (60%) 50 units
Sales per unit	₹6,00,000	₹2,40,000
Variable Costs per unit	₹4,40,000	₹1,80,000
Fixed Cost per unit	₹80,000	₹40,000

You are required to calculate:

- Capacity of merged plant to be operated for the purpose of Break-even point.
- What would be the profitability on working at 80% of merged capacity?

Sol. Working Notes:

Statement showing Calculation of Contribution of Merged Plant

Particulars	Amount (in ₹)		
	Plant-I (100%)	Plant-II (100%)	Merged Plant (100%)
Sales – (A)	3,00,00,000	2,00,00,000 (120 lakh × $\frac{100}{60}$)	5,00,00,000
Variable Costs – (B)	2,20,00,000	1,50,00,000 (90 lakh × $\frac{100}{60}$)	3,70,00,000
∴ Contribution [(A)– (B)]	80,00,000	50,00,000	1,30,00,000

Fixed Cost of Merged Plant = ₹(40,00,000 + 20,00,000) = ₹60,00,000

- Calculation of P/V Ratio and Break-even Point of Merged Plant:**

$$P/V \text{ Ratio} = \frac{C}{S} \times 100 = \frac{₹1,30,00,000}{₹5,00,00,000} \times 100 = 26\%$$

$$\text{Break-even Point} = \frac{\text{Fixed Cost}}{P/V \text{ Ratio}} = \frac{₹60,00,000}{26\%} = \frac{₹60,00,000}{26} \times 100 = ₹2,30,76,923$$

- Capacity of Merged Plant at Break-even Point:**

$$\begin{aligned} \text{Break-even Point (in \%)} &= \frac{\text{Sales at B.E.P.}}{\text{Sales at 100\% Capacity}} \times 100 \\ &= \frac{₹2,30,76,923}{₹5,00,00,000} \times 100 = 46.15\% \end{aligned}$$

- Calculation of Profitability at 80% Capacity:**

Sales at 80% Capacity $\left(\frac{₹5,00,00,000}{100} \times 80 \right)$	Amt. (in ₹) = 4,00,00,000
Contribution @26% of 4,00,00,000	= 1,04,00,000
Less: Fixed Cost	= (60,00,000)
∴ Profit	= <u>44,00,000</u>

$$\begin{aligned} \text{Thus, Rate of Profitability} &= \frac{\text{Profit}}{\text{Sales}} \times 100 = \frac{₹44,00,000}{₹4,00,00,000} \times 100 \\ &= 11\% \end{aligned}$$

Ques. 56. From the following data, calculate:

- P/V Ratio
- Profit at Sales of ₹4,00,000
- New Break-even point if selling price is reduced by 20%
- Sales in Rupees to earn a profit of ₹24,000 after reducing selling price by 20%

	Amt. (in ₹)
Fixed Cost	80,000
B.E.P. (in ₹)	2,00,000

Sol. (i) Calculation of P/V Ratio:

$$\text{Break-even Point} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

$$₹2,00,000 = \frac{₹80,000}{\text{P/V Ratio}} \text{ or } \text{P/V Ratio} = \frac{₹80,000}{₹2,00,000} \times 100$$

$$\therefore \text{P/V Ratio} = 40\%$$

(ii) Profit at Sales of ₹4,00,000:	Amount (in ₹)
Sales	= 4,00,000
Contribution @40% of 4,00,000	= 1,60,000
Less: Fixed Cost	= (80,000)
∴ Profit	<u>= 80,000</u>

(iii) New Break-even Point if SP is reduced by 20%:

$$\text{P/V Ratio} = 40\%$$

$$\therefore \text{Variable Cost Ratio} = (100 - 40\%) = 60\%$$

$$\begin{aligned} \text{At a sales of ₹4,00,000, Variable Cost} &= ₹4,00,000 \times \frac{60}{100} \\ &= ₹2,40,000 \end{aligned}$$

$$\text{Revised Sales} = ₹(4,00,000 - 20\% \text{ of } 4,00,000) = ₹3,20,000$$

$$\text{Contribution} = (\text{S} - \text{VC}) = ₹(3,20,000 - 2,40,000) = ₹80,000$$

$$\text{New P/V Ratio} = \frac{\text{C}}{\text{S}} \times 100 = \frac{₹80,000}{₹3,20,000} \times 100 = 25\%$$

$$\begin{aligned} \text{Now, Break-even Point} &= \frac{\text{Fixed Cost}}{\text{New P/V Ratio}} = \frac{₹80,000}{25\%} \\ &= \frac{₹80,000}{25} \times 100 = ₹3,20,000 \end{aligned}$$

(iv) Sales in Rupees to earn a profit of ₹24,000 after reducing Selling Price by 20%:

$$\begin{aligned} \text{Required Sales} &= \frac{\text{Fixed Cost} + \text{DP}}{\text{New P/V Ratio}} = \frac{₹80,000 + 24,000}{25\%} \\ &= \frac{₹1,04,000}{25} \times 100 = ₹4,16,000 \end{aligned}$$

Ques. 57. A Company has fixed expenses of ₹1,80,000 with sales of ₹6,00,000 and a profit of ₹1,20,000 during the first half year. If in the next half year, the company suffered a loss of ₹60,000, calculate:

- (i) P/V Ratio, B.E.P. and Margin of Safety for the first half year.
- (ii) Expected Sales volume for next half year assuming that selling price and fixed expenses remain unchanged.
- (iii) The B.E.P. and Margin of Safety for the Whole year.

Sol. (i) Calculation of P/V Ratio, Break-even Point, and Margin of Safety for the First Half Year:

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \times 100 \\ &= \frac{₹(1,80,000 + 1,20,000)}{₹6,00,000} \times 100 = \frac{₹3,00,000}{₹6,00,000} \times 100 \end{aligned}$$

$$\therefore \text{P/V Ratio} = 50\%$$

$$\begin{aligned}\text{Break-even Point (in Sales Value)} &= \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{₹1,80,000}}{50\%} \\ &= \frac{\text{₹1,80,000}}{50} \times 100 = \text{₹3,60,000}\end{aligned}$$

$$\begin{aligned}\text{Margin of Safety} &= \text{Actual Sales} - \text{Break-even Sales} \\ &= \text{₹(6,00,000} - \text{3,60,000)} = \text{₹2,40,000}\end{aligned}$$

(ii) **Calculation of Expected Sales Volume for the next half year assuming that Selling Price and Fixed Expenses remained unchanged during next half year:**

$$\begin{aligned}\text{Expected Sales Volume} &= \frac{\text{Fixed Cost} - \text{Loss}}{\text{P/V Ratio}} = \frac{\text{₹(1,80,000} - \text{60,000)}}{50\%} \\ &= \frac{\text{₹1,20,000}}{50} \times 100 = \text{₹2,40,000}\end{aligned}$$

(iii) **Calculation of Break-even Point and Margin of Safety for the whole year:**

$$\begin{aligned}\text{Break-even Point (in Sales Value)} &= \frac{\text{Fixed Cost per year}}{\text{P/V Ratio}} = \frac{\text{₹(1,80,000} + \text{1,80,000)}}{50\%} \\ \therefore \text{B.E.P.} &= \frac{\text{₹3,60,000}}{50} \times 100 = \text{₹7,20,000}\end{aligned}$$

$$\begin{aligned}\text{Margin of Safety} &= \text{Actual Sales} - \text{Break-even Sales} \\ &= \text{₹[6,00,000} + \text{₹(1,80,000} + \text{60,000)]} - \text{₹(7,20,000)} \\ &= \text{₹(6,00,000} + \text{2,40,000)} - \text{₹7,20,000} \\ \therefore \text{M/S} &= \text{₹(8,40,000} - \text{7,20,000)} = \text{₹1,20,000}\end{aligned}$$

Ques. 58. (i) From the following details you are required to determine the Break-even point in units and value:

Direct Labour	₹100 per unit
Direct Material	₹40 per unit
Variable Overhead	150% of direct labour
Fixed Overhead	₹84,000
Selling Price	₹500 per unit

(ii) In order to increase in production, the concern installs improved machinery, which results in fixed overheads of ₹32,100, but the variable overheads are reduced by 40%.

Sol. (i) (a) **Break-even Point (in units)** = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

$$= \frac{\text{Fixed Cost}}{(\text{SP} - \text{VC}) \text{ per unit}} = \frac{\text{₹84,000}}{\text{₹500} - \text{₹(100} + \text{40} + \text{150\% of 100)}}$$

$$\therefore \text{Break-even Point (in units)} = \frac{\text{₹84,000}}{\text{₹(500} - \text{290)}} = \frac{\text{₹84,000}}{\text{₹210}} = \text{400 units}$$

(b) **Break-even Point (in Value)** = B.E.P. (in units) × SP per unit

$$= 400 \text{ units} \times \text{₹500} = \text{₹2,00,000}$$

(ii) New Fixed Overheads = ₹(84,000 + 32,100) = ₹**1,16,100**

Variable Overheads = (₹150 – 40% of 150) = ₹150 – 60 = ₹**90**.

∴ Total Variable Cost = ₹(100 + 40 + 90) = ₹**230**

New Contribution per unit = ₹(500 – 230) = ₹**270**

(a) **Break-even Point (in units)** = $\frac{\text{New Fixed Cost}}{\text{New Contribution per unit}}$
 $= \frac{₹1,16,100}{₹270} = \mathbf{430 \text{ units}}$

(b) **Break-even Point (in value)** = B.E.P. (in units) × SP per unit
 $= 430 \text{ units} \times ₹500 = \mathbf{2,15,000}$



6

Relevant Costs and Managerial Decision Making

Ques. 1. A company is producing two products A and B from a joint manufacturing process. The joint costs are ₹ 4,00,000 and it has given a production of 1,00,000 kilograms of product A having a selling price of ₹ 2 per kilogram and 2,00,000 kilograms of product B having selling price of ₹ 3.00 per kilogram.

The company is considering a proposal to process product A into a new product C which sells at ₹ 6 per kilogram. The processing cost would amount to ₹ 3,50,000 for converting 1,00,000 kilogram of product A into product C. Is it profitable to transform product A into product C? Comment upon it.

Sol.

Statement of Cost of Two Alternatives

Particulars	Amt. (in ₹)						
	Alternative I			Alternative II			Difference
	A	B	Total	C	B	Total	
Output (Kgs.)	1,00,000	2,00,000	3,00,000	1,00,000	2,00,000	3,00,000	—
Sales	2,00,000	6,00,000	8,00,000	6,00,000	6,00,000	12,00,000	4,00,000
Joint Cost (on Sales Value)	1,00,000	3,00,000	4,00,000	2,00,000	2,00,000	4,00,000	—
Additional Processing Cost	—	—	—	3,50,000	—	3,50,000	3,50,000
Total Cost	1,00,000	3,00,000	4,00,000	5,50,000	2,00,000	7,50,000	3,50,000
Gross Profit (Sales – Total Cost)	1,00,000	3,00,000	4,00,000	50,000	4,00,000	4,50,000	50,000

Interpretation: It will be profitable to transform product A into product C because there will be an additional profit of ₹ 50,000. It is desirable that the proposal should be accepted by the company.

Ques. 2. From the following information, you are required to:

- Calculate the marginal product cost and contribution per unit.

(b) State which of the alternative sales mixes you would recommend to management and why.

Particulars	Per unit	Per unit
	X	Y
Selling price	₹ 25	₹ 20
Direct materials	8	6
Direct wages	24 hours at 25 paise per hour	16 hours at 25 paise per hour

Fixed overhead – ₹750

Variable overhead – 150% of direct wages.

Alternative sales mix:

- (i) 250 units of X and 250 units of Y
- (ii) Nil units of X and 400 units of Y
- (iii) 400 units of X and 100 units of Y

Sol.

Calculation of Contribution Per Unit

Particulars	Amt. (in ₹)	
	Product X	Product Y
Selling price per unit (A)	25.00	20.00
Less: Variable cost per unit:		
Direct Material	8.00	6.00
Direct Wages	6.00	4.00
Variable Overhead	9.00	6.00
∴ Total Variable Cost per unit (B)	23.00	16.00
Thus, Contribution per unit (A) – (B)	2.00	4.00

Calculation of Total Contribution and Profit under Alternative Sales Mix:

Alternative (i): 250 Units of X and 250 units of Y:

	Amt. (in ₹)
Product X — (250 units × ₹ 2.00)	500
Product Y — (250 units × ₹ 4.00)	<u>1,000</u>
∴ Total Contribution	1,500
Less: Fixed Cost	<u>(750)</u>
∴ Profit	<u>750</u>

Alternative (ii): Nil units of X and 400 units of Y:

	Amt. (in ₹)
Product X — (Nil × ₹2.00)	Nil
Product Y — (400 units × ₹ 4.00)	<u>1,600</u>
∴ Total Contribution	1,600
Less: Fixed Cost	<u>(750)</u>
∴ Profit	<u>850</u>

Alternative (iii): 400 units of X and 100 units of Y:	Amt. (in ₹)
Product X — (400 units × ₹2.00)	800
Product Y — (100 units × ₹4.00)	<u>400</u>
∴ Total Contribution	1,200
Less: Fixed Cost	(750)
∴ Profit	<u>450</u>

Interpretation: Sales Mix under alternative (ii) is most profitable as it gives maximum total contribution and profit.

Ques. 3. A manufacturer with an overall (interchangeable among the products) capacity of one lakh machine hours has been so far producing a standard mix of 15,000 units of product A and 10,000 units of products B and C each. The total expenditure exclusive of fixed charges is found to be ₹2.09 lakhs and the cost ratio among the products approximates 1:1.5:1.75 respectively per unit. When the unit selling prices are ₹6.25 for A, ₹7.50 for B and ₹10.50 for C, he incurs a loss. He desires to change the sales mix as under:

Particulars	Mix I	Mix II	Mix III
A	18,000	15,000	22,000
B	12,000	6,000	8,000
C	7,000	13,000	8,000

As a Cost Accountant which mix do you recommend? Assume that fixed cost is ₹2 per unit.

Sol.

Statement Showing Calculation of Variable Cost Per Unit

Product	Units	Variable Cost Ratio Per Unit	(ii) × (iii)	Ratio	Total Variable Cost	Variable Cost Per Unit [(vi) ÷ (ii)]
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
A	15,000	₹ 1.00	₹ 15,000	$\frac{15,000}{47,500} = \frac{6}{19}$	₹ 66,000	₹ 4.40
B	10,000	1.50	15,000	$\frac{15,000}{47,500} = \frac{6}{19}$	₹ 66,000	₹ 6.60
C	10,000	1.75	17,500	$\frac{17,500}{47,500} = \frac{7}{19}$	₹ 77,000	₹ 7.70
Total	35,000	—	47,500	—	2,09,000	—

Statement of Contribution Per Unit

Particulars	Amt. (in ₹)		
	Product A	Product B	Product C
Selling Price Per Unit	6.25	7.50	10.50
Less: Variable Cost Per Unit	(4.40)	(6.60)	(7.70)
∴ Contribution Per Unit	1.85	0.90	2.80

Calculation of Total Fixed Cost:

	Amt. (in ₹)
Product – A : 15,000 units × ₹ 2.00	30,000

Product – B : 10,000 units × ₹ 2.00	20,000
Product – C : 10,000 units × ₹ 2.00	20,000
∴ Total Fixed Cost	<u>70,000</u>

Statement of Comparative Profitability

Product	Contribution Per Unit (₹)	MIX I		MIX II		MIX III	
		Units	Total Contribution (₹)	Units	Total Contribution (₹)	Units	Total Contribution (₹)
A	1.85	18,000	33,300	15,000	27,750	22,000	40,700
B	0.90	12,000	10,800	6,000	5,400	8,000	7,200
C	2.80	7,000	19,600	13,000	36,400	8,000	22,400
Total	—	37,000	63,700	34,000	69,550	38,000	70,300
Less: Fixed Cost		—	(70,000)	—	(70,000)		(70,000)
Thus, Net Profit/Loss			(6,300)		(450)		300

Conclusion: Mix III is recommended, as it is profitable.

Ques 4. Rama manufacturing company is considering whether to buy a commodity with an annual sales potential of ₹ 2,50,000 and thereafter discontinue the manufacture of that commodity. Manufacturing costs are ₹ 1,75,000 while purchase cost would be ₹ 1,87,500. Selling costs are ₹ 25,000, Administrative costs are ₹ 10,000 and would be ₹ 2,500 less if the commodity would buy.

Capital requirement are ₹ 4,00,000 for making and ₹ 2,40,000 for buying. The manufacturing plant has a life of four years of which three years have lapsed before its renewal, a decision on making or buying has to be made. You are required to advise the management on the basis of above data whether to buy or make the commodity.

Sol. Keeping in view the above information, it would be desirable to take decision on the basis of Profit.

Profit when 'Make'

Particulars	Amt. (in ₹)
Selling Price	2,50,000
Less: Manufacturing Cost	1,75,000
Selling Cost	25,000
Administration Cost	10,000
Profit	40,000
Rate of Return = Profit/Capital × 100 = 40,000/4,00,000 × 100	10%

Profit when 'Purchase' (Buy)

Particulars	Amt. (in ₹)
Selling Price	2,50,000
Less: Purchasing Cost	1,87,500
Selling Cost	25,000
Administration Cost (10,000 – 2,500)	7,500
Profit	30,000
Rate of Return = Profit/Capital × 100 = 30,000/2,40,000 × 100	12.5%

Interpretation: Since rate of return is higher, i.e., 12.5% if the commodity is purchased from market while it is 10% in case it is made. Thus, it would be desirable that the commodity would be bought from the market.

Ques 5. Singh manufacturing company uses tapping machine which originally costs ₹ 48,000 with an assumed life of 10 years and no salvage value. After 5 years of use it has a depreciated book value of ₹ 24,000. A new semi-automatic tapping machine, also with an estimated life of 10 years and salvage value, priced at ₹ 2,40,000 is available. The installation of new machine would cost ₹ 12,000. The old machine is in good repair and can be used for additional 5 years. The management has requested that a cost study be made as an aid in deciding whether it is advisable to purchase the new machine.

Particulars	Amount (in ₹)	
	Old Machine	New Machine
Repairs and Maintenance	1,600	2,000
Supplies	5,000	5,500
Power	8,000	7,500
Taxes	1,200	6,000
Average No. of units completed per hour	100	200
Estimated hours of operation each year	2,400	2,400
Operator's Wage Rate per hour	20	30

Sol.

Statement of Cost

Particulars	Amount (in ₹)	
	Old Machine (24,000 × 100) = 2,40,000	New Machine (24,000 × 200) = 4,80,000
Estimated Operating Cost in one year:		
Repairs and Maintenance	1,600	2,000
Supplies	5,000	5,500
Power	8,000	7,500
Taxes	1,200	6,000
Operator's Wages – (24,000 × 20) ; (24,000 × 30)	4,80,000	7,20,000
Depreciation – (48,000/ 10yrs.); (2,40,000 + 12,000)/10 yrs.	4,800	25,200
Estimated Cost in one year	5,00,600	7,66,200
Estimated Average Cost per unit :		
(5,00,600 ÷ 2,40,000); (7,66,200 ÷ 4,80,000)	2.086	1.596

Interpretation: Thus, New Machine can be installed as it will reduce cost per unit by 0.49 paise approximately (i.e., 2.086 – 1.596).

Ques 6. The following data are available in respect of product 'M' manufactured by Patyal Ltd.:

	Amount (in ₹)
Sales	5,00,000
Direct Materials	2,00,000
Direct Wages	1,00,000
Variable Overhead	50,000
Fixed Overhead	1,00,000

The company now proposes to introduce a new product 'N' so that sales may be increased by ₹ 1,00,000. There will no increase in fixed costs and estimated variable costs of product 'N' are as under:

	Amount (in ₹)
Direct Materials	48,000
Direct Wages	22,000
Overhead	14,000

Advise whether product 'N' will be profitable or not.

Sol.

Statement showing the Calculation of Existing Profitability of Product 'M'

Particulars	Amount (in ₹)
Direct Materials	2,00,000
Direct Wages	1,00,000
Variable Overhead	50,000
Marginal Cost	3,50,000
Sales	5,00,000
Total Contribution	1,50,000
Less: Fixed Costs	1,00,000
Profit	50,000

Statement of Marginal Cost under Proposed Position

Particulars	Amount (in ₹)		
	Product 'M'	Product 'N'	Total
Direct Materials	2,00,000	48,000	2,48,000
Direct Wages	1,00,000	22,000	1,22,000
Variable Overhead	50,000	14,000	64,000
Marginal Cost	3,50,000	84,000	4,34,000
Sales	5,00,000	1,00,000	6,00,000
Contribution	1,50,000	16,000	1,66,000
Less: Fixed Costs	—	—	16,00,000
Profit	—	—	66,000

Interpretation: Assuming that spare capacity cannot be used for any other purpose except producing product 'N', it is advisable to undertake the production of product 'N' which will give a contribution of ₹ 16,000 towards fixed costs and profit.

Ques 7. In a factory producing two different types of products, the limiting factor is the availability of labour. From the following information, show which product is more profitable:

Particulars	Amount (in ₹)	
	Product A Cost Per Unit	Product B Cost Per Unit
Materials	10.00	10.00
Labour :		
12 Hours @ ₹ 0.50	6.00	
6 Hours @ ₹ 0.50		3.00
Overheads :		
Fixed (50% of labour)	3.00	1.50
Variable	3.00	3.00
Total Cost	22.00	17.50
Selling Price	28.00	22.00
Profit	6.00	4.50
Total Production for the month (units)	1,000	1,200
Maximum capacity per month 9,600 hours.		

Sol.

Statement of Profitability

Particulars	Amount (in ₹)	
	Product A	Product B
Materials	10.00	10.00
Labour :	6.00	3.00
Overheads :	3.00	3.00
Marginal Cost per unit	19.00	16.00
Selling Price per unit	28.00	22.00
Contribution per unit	9.00	6.00
No. of Labour Hours per unit (Limiting Factor)	12	6
Contribution per Labour Hour	9.00/12hrs. = 0.75	6.00/6hrs. = 1.00

Interpretation: Product B is more profitable as it gives higher contribution per labour hour (limiting factor).

Ques 8. S Ltd. manufactures and markets single product. The following information is available:

	₹
Materials	8 per unit
Dealer's Margin	2 per unit
Conversion Cost (Variable)	6 per unit
Selling Price	20 per unit
Fixed Cost	2,50,000
Present Sales	80,000 units
Capacity utilization	60%

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales: (i) by reducing sales price by 5%; (ii) by increasing dealer's margin by 25% over the existing rate. Which of the two suggestions would you recommend if the company desires to maintain the present profit? Give reasons.

Sol. Variable Cost per unit = ₹ (8 + 6 + 2) = ₹ 16

Profit = Total Sales – Total Variable Cost – Fixed Cost

$$\begin{aligned} \text{Present Profit} &= (80,000 \text{ units} \times ₹ 20) - (80,000 \text{ units} \times ₹ 16) - ₹ 2,50,000 \\ &= ₹ (16,00,000 - 12,80,000 - 2,50,000) = ₹ 70,000 \end{aligned}$$

Suggestion (i): Reducing Price by 5% for Increasing Sale:

$$\text{New Selling Price} = ₹ 20 \times 95/100 = ₹ 19$$

$$\begin{aligned} \text{Sales for ₹ 70,000 profit} &= \text{Fixed Cost} + \text{Profit} \div \text{Contribution per Unit} = 2,50,000 + 70,000 \div 19 - 16 \\ &= 3,20,000/3 = 1,06,666.66 \text{ or } 1,06,667 \text{ units.} \end{aligned}$$

$$\text{Required Capacity Utilisation} = 60 \times 1,06,667 \div 80,000 = \mathbf{80\%}$$

(Since 60% capacity is 80,000 units, maximum capacity is 80,000 × 100/60 = 1,33,333.33 or 1,33,333 units).

Suggestion (ii): Increasing Dealer's Margin by 25% for Increasing Sale:

$$\text{New Dealer's Margin} = ₹ 2 \times 125/100 = ₹ 2.50$$

$$\text{New Variable Cost} = ₹ (8 + 6 + 2.50) = ₹ 16.50$$

$$\begin{aligned} \text{Sales for ₹ 70,000 profit} &= F + P / S - V = 2,50,000 + 70,000/20 - 16.50 \\ &= 3,20,000/3.50 = 91,429 \text{ units.} \end{aligned}$$

$$\text{Required Capacity Utilisation} = 91,429 \div (80,000 \times 100/60) \times 100 = \mathbf{68.57\%}$$

Interpretation: Second suggestion is superior to the first suggestion because by increasing dealer's margin by 25%, the company is able to earn the same old profit of ₹ 70,000. At 68.57% capacity utilization whereas implementation of first suggestion will lead to same profit at much higher capacity utilization of 80%.

Ques 9. From the following data, which product would you recommend to be manufactured in a factory, time being the key factor?

Particulars	Per unit of Product A	Per unit of Product B
Direct material	₹24	₹14
Direct labour (₹1 per hour)	2	3
Variable overhead (₹2 per hour)	4	6

Selling price	100	110
Standard time to produce	2 hours	3 hours

Sol.

Marginal Cost Statement

Particulars		A (₹)		B (₹)
Sales		₹100		₹110
Less: Marginal Cost:				
Direct Material	24		14	
Direct Labour	2		3	
Variable overhead	<u>4</u>	<u>30</u>	6	<u>23</u>
Contribution		70		87
P/V ratio		70%		79%
Contribution per hour		₹70 ÷ 2 = ₹35		₹87 ÷ 3 = ₹29

Conclusion: Product A is more profitable with its higher contribution per hour than product B when labour (time) is the key factor. However, when key factor is not considered, product B is more profitable with higher contribution per unit and P/V ratio than product A.

Ques. 10. Honey Computers Ltd. decides to effect a 10% reduction in the price of its products because it is felt that such a step may lead to greater volume of sales. It is anticipated that there are no prospects of a change in total costs and variable cost per unit. The directors wish to maintain net profits at the present level.

The following information has been obtained from its books:

Sales	:	10,000 units	₹ 4,00,000
Variable Cost	:	₹ 30 per unit	
Fixed Cost	:		₹ 80,000

How does the management proceed to implement this decision?

Sol.

Marginal Cost Statement

Particulars	Amount (in ₹)	
	Per Unit	Total
Sales	40.00	4,00,000
Less: Variable Cost	30.00	3,00,000
Contribution	10.00	1,00,000
Less: Fixed Cost	—	80,000
Profit	—	20,000

$$P/V \text{ Ratio} = \text{Contribution}/\text{Sales} \times 100$$

$$= ₹ 10/₹40 \times 100 = 25\%$$

$$B.E.P. = \text{Fixed Cost} \div P/V \text{ Ratio} = ₹ 80,000 \div 25\%$$

$$= ₹ 3,20,000$$

Effect of Change of 10% reduction in Selling Price:

$$\text{Selling Price} = ₹ 40.00$$

Less: 10%	= ₹ 4.00
Selling Price after reduction	= ₹ 36.00
Less: Variable Cost	= ₹ 30.00
Contribution	<u>₹ 6.00</u>
P/V Ratio	= Contribution/Sales × 100
	= ₹ 6/₹ 36 × 100 = 16.67%
B.E.P.	= Fixed Cost ÷ P/V Ratio = ₹ 80,000 ÷ 16.67%
	= ₹ 4,79,904

Sales to earn Present Level of Profit of ₹20,000:

Required Sales = Fixed Cost + Desired Profit ÷ P/V Ratio
= ₹ (80,000 + 20,000) ÷ 16.67%
= ₹ 5,99,880

Interpretation: The management decided to implement this decision because the break-even sales will be increased to ₹ 4,79,904. If the company wants to maintain the present level of profit, i.e., ₹ 20,000, it should take steps to increase the sales amounting to ₹ 5,99,880.

Ques. 11. Green Ltd. produces a product and has budgeted the production of 1,00,000 units during the next year. The cost estimates for the year are as follows:

Particulars	Amount (in ₹)
Direct Material	2,00,000
Direct Labour (minimum)	6,00,000
Variable Overhead	2,00,000
Fixed Overhead	4,00,000
	<u>14,00,000</u>

The company has received orders for 80,000 units during the coming period at the generally accepted market price of ₹ 18 per unit. It appears unlikely that orders will be received for the remaining 20,000 units at a selling price of ₹ 18 per unit, but a customer is prepared to purchase them at a price of ₹ 12 per unit. Should the company accept the offer?

Sol. In this case, the fixed overhead and direct labour cost will remain the same irrespective of whether or not the order is accepted. These costs are irrelevant in the short run.

However, direct materials and variable overhead will be proportionately reduced if only 80,000 units are produced. These are relevant costs. The relevant costs and relevant revenues if the order is accepted may be compared as follows:

Particulars	Amount (in ₹)
Incremental Revenues – (20,000 units @ ₹ 12)	2,40,000
Less: Relevant Costs:	
Direct Materials – (20,000 × ₹ 2)	40,000
Variable Overhead – (20,000 × ₹ 2)	<u>40,000</u>
Thus, Excess of Relevant Revenues over Relevant Costs	<u>1,60,000</u>

Profit Statement

Particulars	Amount (in ₹)	
	Offer not Accepted (80,000 units)	Offer Accepted (80,000 + 20,000)units
Sales @ ₹ 18 × 80,000 and ₹ 18 × 80,000 + ₹ 12 × 20,000 (A)	14,40,000	16,80,000
Direct Materials @ ₹2	1,60,000	2,00,000
Variable Overheads @ ₹ 2 (B)	1,60,000	2,00,000
	3,20,000	4,00,000
Contribution [(A) – (B)]	11,20,000	12,80,000
Fixed Overheads	(4,00,000)	(4,00,000)
Direct Labour (minimum)	(6,00,000)	(6,00,000)
Thus, Profit	1,20,000	2,80,000

Conclusion: As the profit will be higher, i.e., ₹ 2,80,000 if the offer for 20,000 units is accepted. Thus, the company should accept the offer.

Ques. 12. Peter England Ltd. is the manufacturer of ready-made shirts and sells its output directly to the retailers It has capacity of manufacturing 50,000 shirts per annum. During first quarter of a year, monthly production and sales volume is expected to be 3,500 shirts @ ₹ 400 per shirt. At this capacity level, the costs and revenues per month are expected as follows:

	₹
Sales - (3,500 × ₹ 400)	14,00,000
Materials – (3,500 × ₹ 80)	2,80,000
Labour- (all permanent)	4,20,000
Variable Overheads – (3,500 × ₹ 20)	70,000
Fixed Overheads	2,80,000
Distribution Cost	<u>1,05,000</u>
Profit – (3,500 × ₹ 70)	<u>2,45,000</u>

It has received an enquiry from ABC Ltd. for the purchase of 300 shirts per month for the next 3 months @ ₹ 200 per shirt. However, there would be no distribution cost, as ABC Ltd. would collect the supply from the manufacturer. The name of ABC Ltd., to be inserted on every shirt, will cost ₹ 10 to Peter England. Critically evaluate, whether the order be accepted or not.

Sol. In this case, the decision regarding the special order be evaluated on the basis of relevant costs per month as follows:

Particulars			Difference
	Offer not Accepted	Offer Accepted	
Units Sold (per month)	3,500	3,800	300
Sales – (₹ 400 and ₹ 200)	14,00,000	14,60,000	60,000
Less:			
Materials @ ₹ 80 per unit	(2,80,000)	(3,04,000)	(24,000)
Labour – (Fixed)	(4,20,000)	(4,20,000)	—
Variable Overheads @ ₹ 20 per unit	(70,000)	(76,000)	(6,000)
Fixed Overheads	(2,80,000)	(2,80,000)	—
Cost Distribution Cost	(1,05,000)	(1,05,000)	—
Name Insertion Cost @ ₹ 10 per unit	—	(3,000)	(3,000)
Thus, Profit per month	2,45,000	2,72,000	27,000

Conclusion: In the above case, the labour is given as permanent (fixed) status, so it is an irrelevant cost. The analysis shows that Peter England Ltd. should accept the offer and its profit would increase by ₹ 27,000 per month, for three months.



