

5

Standard Costing

LEARNING OBJECTIVES :

After studying this unit you will be able to understand:

- The meaning of standard costing and its definition
- How a standard costing system operates
- How to calculate material, labour, overhead, sales variances and reconcile actual profit with budgeted profit
- Distinguish between standard variable costing and standard absorption costing
- How to prepare a set of accounts for standard costing system.

5.1 Relevant Terms*

Standard

“Benchmark measurement of resource usage or revenue or profit generation, set in defined conditions. Standards can be set on a number of bases:

- (a) on an ex ante estimate of expected performance;*
- (b) on an ex post estimate of attainable performance;*
- (c) on a prior period level of performance by the same organisation;*
- (d) on the level of performance achieved by comparable organisations; or*
- (e) on the level of performance required to meet organisational objectives.*

Standards may also be set at attainable levels that assume efficient levels of operation, but that include allowance for normal loss, waste and machine down time, or at ideal levels that make no allowance for the above losses, and are only attainable under the most favourable conditions. The effect of different levels on staff motivation will be an important influence on the type of standards that are used.”

Cost

“As a noun – The amount of cash or cash equivalent paid or the fair value of other consideration given to acquire an asset at the time of its acquisition or construction”

“As a verb – To ascertain the cost of a specified thing or activity. The word cost can rarely stand alone and should be qualified as to its nature and limitations.”

Standard Cost Card/Standard Product Specification

“Document or digital record detailing for each individual product, the standard inputs required for production as well as the standard selling price. Inputs are normally divided into labour, material and overhead categories, and both price and quantity information is shown for each.”

Standard Direct Labour Cost

“Planned cost of direct labour. Standard Direct Labour Cost equals to Standard Direct Labour Time for One Unit of Product multiply by Standard Labour Rate. There are separate calculations for different processes and/or grades of labour.”

Standard ex ante

“Before the event. An ex ante budget or standard is set before a period of activity commences”.

Standard, ex post

“After the event. An ex post budget, or standard, is set after the end of a period of activity, when it can represent the optimum achievable level of performance in the conditions which were experienced. Thus the budget can be flexed, and standards can reflect factors such as unanticipated changes in technology and in price levels. This approach may be used in conjunction with sophisticated cost and revenue modelling to determine how far both the plan and the achieved results differed from the performance that would have been expected in the circumstances which were experienced.”

Standard Hour or Minute

“Amount of work achievable, at standard efficiency levels, in an hour or minute.”

Standard Performance – Labour

“Level of efficiency which appropriately trained, motivated and resourced employees can achieve in the long-run.”

Standard Costing

“Control technique that reports variances by comparing actual costs to pre-set standards so facilitating action through management by exception.”

Variance

“Difference between a planned, budgeted or standard cost and the actual cost incurred. The same comparisons may be made for revenues.”

Administrative Cost Variance

“Measurement of the extent of any over- or underspend on administrative costs.”

Variance Analysis

“Evaluation of performance by means of variances, whose timely reporting should maximise the opportunity for managerial action.”

Budget Variance

"Difference, for each cost or revenue element in a budget, between the budgeted amount and the actual cost or revenue. Where flexible budgeting is employed, it is the difference between the flexed budget and the actual value."

Joint Variance

"A variance which is caused by both the prices and quantities of inputs differing from the specifications in the original standard."

Operational Variance

"Classification of variances in which non-standard performance is defined as being that which differs from an ex post standard. Operational variances can relate to any element of the standard product specification."

Planning Variance

"Classification of variances caused by ex ante budget allowances being changed to an ex post basis. Also known as a revision variance."

Direct Material Total Variance

"Measurement of the difference between the standard material cost of the output produced and the actual material cost incurred."

Where the quantities of material purchased and used are different, the total variance should be calculated as the sum of the usage and price variances."

Direct Material Price Variance

"Difference between the actual price paid for purchased materials and their standard cost."

The material price variance may also be calculated at the time of material withdrawal from stores. In this case, the stock accounts are maintained at actual cost, price variances being extracted at the time of material usage rather than of purchase. The latter method is not usually recommended because one of the advantages of a standard costing system is the valuation of all stock at standard costs."

Direct Material Usage Variance

"Measures efficiency in the use of material, by comparing standard material usage for actual production with actual material used, the difference is valued at standard cost."

The direct material usage variance may be divided into mix and yield variances if several materials are mixed in standard proportions."

Direct Material Mix Variance

"Subdivision of the material usage variance. If different materials can be substituted the mix variance measures the cost of any variation from the standard mix of materials."

Direct Material Yield Variance

"Subdivision of the material usage variance. Measures the effect on cost of any difference between the actual usage of material and that justified by the output produced."

Direct Labour Total Variance

“Indicates the difference between the standard direct labour cost of the output which has been produced and the actual direct labour cost incurred.”

Direct Labour Rate Variance

“Indicates the actual cost of any change from the standard labour rate of remuneration.”

Direct Labour Efficiency Variance

“Standard labour cost of any change from the standard level of labour efficiency.”

Direct Labour Idle Time Variance

“This variance occurs when the hours paid exceed the hours worked and there is an extra cost caused by this idle time. Its computation increases the accuracy of the labour efficiency variance.”

Direct Labour Mix Variance

“Subdivision of the direct labour efficiency variance. If grades of labour can be substituted the mix variance measures the cost of any variation from the standard mix of grades.”

Direct Labour Yield Variance

“Subdivision of the direct labour efficiency variance. Measures the effect on cost of any difference between the actual usage of labour and that justified by the output produced.”

Fixed Production Overhead Total Variance

“The difference between the fixed production overhead absorbed by actual production and the actual fixed production overhead incurred.”

Fixed Production Overhead Volume Variance

“A measure of the over- or under-absorption of overhead cost caused by actual production volume differing from that budgeted.”

Fixed Overhead Capacity/Efficiency Variance

“Little used subdivision of the fixed production overhead volume variance.”

Fixed Production Overhead Expenditure Variance

“The difference between the fixed production overhead which should have been incurred in the period, and that which was incurred.”

Variable Production Overhead Total Variance

“Measures the difference between variable overhead that should be used for actual output and variable production overhead actually used.

The variable production overhead efficiency and rate variances are subdivisions of this variance.”

Variable Production Overhead Efficiency Variance

“Standard variable overhead cost of any change from the standard level of efficiency. This is directly analogous to the calculation of direct labour efficiency variance and implicitly assumes that variable overhead is recovered on a direct labour hour base. However, the formula can equally be used if variable overhead is recovered on a machine or process hour base.”

Variable Production Overhead Expenditure Variance

“Indicates the actual cost of any change from the standard rate per hour. Hours refer to either labour or machine hours depending on the recovery base chosen for variable production overhead.”

Sales Mix Contribution/Profit Margin Variance

“Subdivision of the sales volume contribution/profit margin variance. The change in the contribution/profit margin caused by a change in the mix of the products or services sold.”

Sales Price Variance

“Change in revenue caused by the actual selling price differing from that budgeted.”

Sales Quantity Contribution/Profit Variance

“Subdivision of the sales volume contribution/ profit variance. It is relevant if there are multiple products and the actual sales mix differs from the budgeted sales mix. In these situations this variance, together with the sales mix contribution/profit variance, will comprise the sales volume contribution/profit variance (for all products).”

Sales Volume Contribution/Profit Variance

“Measure of the effect on contribution/profit of not achieving the budgeted volume of sales.”

Sales Volume Revenue Variance

“Change in sales revenue caused by sales volume differing from that budgeted. This variance is logical but little used because it cannot be combined with contribution/profit variances in reconciling budget with actual contribution/profit. In principle, if several products are considered, the sales mix revenue variance and total sales volume revenue variance can be calculated.”

Market Size Variance

“A subdivision of the sales volume contribution or margin variance, applicable when the actual market size of a product or product group is known. It indicates the change in contribution or margin caused by a change in the size of the market.”

Market Share Variance

“A subdivision of the sales volume contribution or margin variance, applicable when the actual market size of a product or product group is known. It indicates the change in contribution or margin caused by a change in market share.”

Marketing Cost Variance

"Where marketing cost contains both fixed and variable components, separate variances should be calculated."

Total Profit Variance

"Difference between the actual profit and the profit in the budget. The total profit variance is the sum of all the subsidiary variances."

* Source CIMA's Official Terminology

5.2 Classification and Type of Variances

Cost variance is the difference between standard cost and the actual cost incurred. .

Variance analysis is the analysis of the cost variances into its component parts with appropriate justification of such variances, so that we can approach for corrective measures.

5.2.1 Classification of Variances: Variances can be established under material, labour & overheads. There are three distinct groups of variances that arise in standard costing which are

- **Variances of Efficiency:** Variances due to the effective or ineffective use of materials quantities, labour hours, once actual quantities are compared with the predetermined standards.
- **Variances of Price Rates:** Variances arising due to change in unit material prices, standard labour hour rates and standard allowances for indirect costs.
- **Variances Due to Volume:** Variance due to the effect of difference between actual activity and the level of activity assumed when the standard was set.

5.2.2 Why Standard Costing: Standard Costing main purpose is to

- Investigate the reasons
- Identify the problems
- Take corrective action.

Variances are broadly of two types, controllable and uncontrollable. Controllable variances are those which can be controlled by the departmental heads whereas uncontrollable variances are those which are beyond control.

For example, price variance is normally regarded as uncontrollable if the price increase is due to market fluctuations. It becomes controllable if the production controller has failed to place orders in time and urgent purchase was made at extra cost. In the former case, no responsibility is attached to any one whereas the departmental head has responsibility for the loss in the latter case. Since all price variances are uncontrollable and are of significant nature and are persistent, the standard may need revision.

The possible reasons for each type of variances and the suggested course of action are given below. This list is only illustrative and not exhaustive.

Type of Variance	Reasons of Variance	Suggestive Course of Action
Material		
Material Price	<ul style="list-style-type: none"> • Change in Basic Price • Fail to purchase the anticipated standard quantities at appropriate price 	<ul style="list-style-type: none"> • Departmental head should take necessary action to purchase at right point of time • Cash discount or interest rate for payment of purchase should be consider at the time of such payment • Price check on the purchase of standard quality materials
Material Usage	<ul style="list-style-type: none"> • Use of sub-standard material • Ineffective use of materials • Pilferage • Non standardised mix 	<ul style="list-style-type: none"> • Regular Inspection of quality of materials • Proper training of operators • Ensure best utilisation of resources
Labour		
Labour Efficiency	<ul style="list-style-type: none"> • Change in design and quality standard • Poor working conditions • Improper scheduling 	<ul style="list-style-type: none"> • Proper planning • Proper training • Healthy working environment • Timelines for achieving set targets
Labour Rate	<ul style="list-style-type: none"> • Improper placement of labour • Increments / high labour wages • Overtime 	<ul style="list-style-type: none"> • Time scheduling for work performance • Proper job allocation according to capabilities of workers
Overheads		
Manufacturing	<ul style="list-style-type: none"> • Improper planning 	<ul style="list-style-type: none"> • Efficient planning for

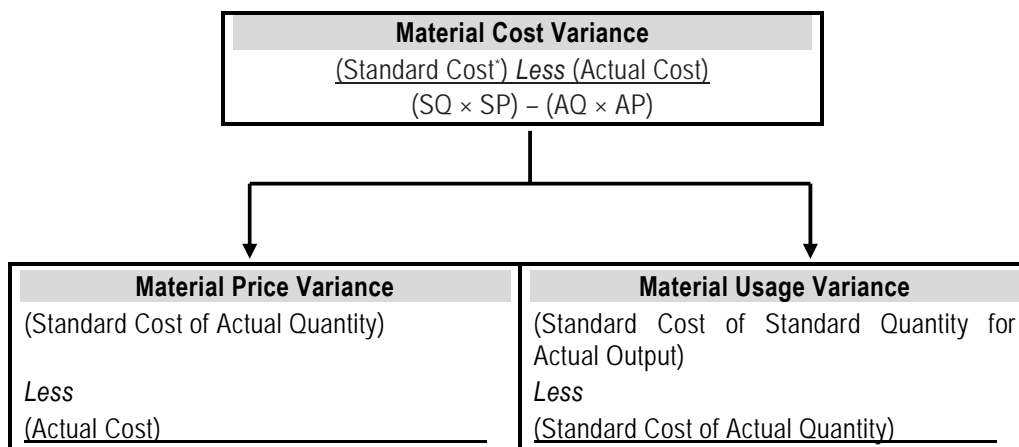
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Type of Variance	Reasons of Variance	Suggestive Course of Action
	<ul style="list-style-type: none"> Under or over absorption of fixed overheads Reduction of sales Breakdowns Power failure Labour trouble 	better capacity utilization <ul style="list-style-type: none"> Check on expenditure
Selling and Distribution	<ul style="list-style-type: none"> Increase in delivery cost Increase in stock holding period Overtime 	<ul style="list-style-type: none"> Sales quotas Sale targets
Administrative	<ul style="list-style-type: none"> Over expenditure 	<ul style="list-style-type: none"> Comparison of budgets with actuals Introduction of operating costing Introduction of cost ratios

5.3 Computation of Variances

Let us now proceed to study with illustrations and the method of computation of major variances. In all the problems illustrated in the following pages, 'F' means favourable variance and 'A' means adverse variance.

5.3.1 Direct Material Variances : Direct material total variance (also known as material cost variance) for actual output can basically be divided into two types, namely (a) price variance and (b) usage variance. The method of calculating these variances is as under:



$(AQ \times SP) - (AQ \times AP)$ Or $AQ \times (SP - AP)$	$(SQ \times SP) - (AQ \times SP)$ Or $SP \times (SQ - AQ)$
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Material Mix Variance	Material Yield Variance
(Standard Cost of Actual Quantity in Standard Proportion)	(Standard Cost of Standard Quantity for Actual Output)
Less	Less
(Standard Cost of Actual Quantity)	(Standard Cost of Actual Quantity in Standard Proportion)
<hr/>	<hr/>
$(RAQ \times SP) - (AQ \times SP)$	$(SQ \times SP) - (RAQ \times SP)$
Or	Or
$SP \times (RAQ - AQ)$	$SP \times (SQ - RAQ)$
Alternative Formula	Alternative Formula
Total Actual Quantity (units) \times [Average Standard Price <i>per unit</i> of Standard Mix <u>Less</u> Average Standard Price <i>per unit</i> of Actual Mix]	Average Standard Price <i>per unit</i> of Standard Mix \times [Total Standard Quantity (units) <u>Less</u> Total Actual Quantity (units)]

Note:

- SQ = Standard Quantity = Expected Consumption for Actual Output
AQ = Actual Quantity of Material Consumed
RAQ = Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion
SP = Standard Price per Unit
AP = Actual Price per Unit
(*) = Standard Cost refers to 'Standard Cost of Standard Quantity for Actual Output'

Material Purchase Price Variance (MPPV)

(Standard Cost of Actual Quantity)
Less
(Actual Cost)

 $(PQ \times SP) - (PQ \times AP)$

Note:

- PQ = Purchase Quantity
SP = Standard Price
AP = Actual Price

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Illustration 1

The standard quantity of material required is 4 kgs. per unit of actual output. The relevant figures are as under:

Material	A	B	C	D
Standard mix %	30%	40%	20%	10%
Price per kg. (₹)	1.25	1.50	3.50	3.00
Actual qty. used (Kg.)	1,180	1,580	830	440
Actual price per kg. (₹)	1.30	1.80	3.40	3.00
Actual output: 1,000 units				

Calculate price variance, mix variance, sub-usage variance and total material cost variance.

Solution

Basic Calculations:

Statement showing computation of Standard Cost/Actual Cost/Revised Actual Quantity

Material	Standard Cost of 1,000 Units			Actual Cost of 1,000 Units			Revised Actual Quantity [RAQ] (Kg.)
	Quantity	Price	Amount	Quantity	Price	Amount	
	[SQ] (Kg.)	[SP] (₹)	[SQ × SP] (₹)	[AQ] (Kg.)	[AP] (₹)	[AQ × AP] (₹)	
A	1,200	1.25	1,500	1,180	1.30	1,534	1,209
B	1,600	1.50	2,400	1,580	1.80	2,844	1,612
C	800	3.50	2,800	830	3.40	2,822	806
D	400	3.00	1,200	440	3.00	1,320	403
	4,000		7,900	4,030		8,520	4,030

Note:

- SQ = Standard Quantity = Expected Consumption for Actual Output
- AQ = Actual Quantity of Material Consumed
- RAQ = Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion
- SP = Standard Price per unit
- AP = Actual Price per unit

Computation of Variances:**Statement showing Variances (₹)**

	Material A	Material B	Material C	Material D	Total
Material Cost Variance = SQ × SP – AQ × AP	= 1,200 × 1.25 – 1,180 × 1.30 = 1,500 – 1,534 = 34 (A)	= 1,600 × 1.50 – 1,580 × 1.80 = 2,400 – 2,844 = 444 (A)	= 800 × 3.50 – 830 × 3.40 = 2,800 – 2,822 = 22 (A)	= 400 × 3.00 – 440 × 3.00 = 1,200 – 1,320 = 120 (A)	620 (A)
Material Price Variance = AQ × (SP – AP)	= 1,180 × (1.25 – 1.30) = 59 (A)	= 1,580 × (1.50 × 1.80) = 474 (A)	= 830 × (3.50 – 3.40) = 83 (F)	= 440 × (3.00 – 3.00) = 0	450 (A)
Material Usage Variance = SP × (SQ – AQ)	= 1.25 × (1,200 – 1,180) = 25 (F)	= 1.50 × (1,600 – 1,580) = 30 (F)	= 3.50 × (800 – 830) = 105 (A)	= 3.00 × (400 – 440) = 120 (A)	170 (A)
Material Mix Variance = SP × (RAQ – AQ)	= 1.25 × (1,209 – 1,180) = 36.25 (F)	= 1.50 (1,612 – 1,580) = 48 (F)	= 3.50 × (806 – 830) = 84 (A)	= 3.00 × (403 – 440) = 111 (A)	110.75 (A)
Material Yield Variance = SP × (SQ – RAQ)	= 1.25 × (1,200 – 1,209) = 11.25 (A)	= 1.50 × (1,600 – 1,612) = 18 (A)	= 3.50 × (800 – 806) = 21 (A)	= 3.00 × (400 – 403) = 9 (A)	59.25 (A)

Illustration 2

The standard set for a chemical mixture of a firm is as under:

Material	Standard Mix %	Standard Price Per Kg. (₹)
A	40	20
B	60	30

The standard loss in production is 10 %. During a period, the actual consumption and price paid for a good output of 182 kg. are as under:

Material	Quantity in Kg.	Actual Price Per Kg (₹)
A	90	18
B	110	34

Calculate the variances.

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Solution

Basic Calculations:

Take the good output of 182 Kg. The standard quantity of material required for 182 Kg. of output is

$$\frac{182}{90} \times 100 = 202.22 \text{ Kg.}$$

Statement showing computation of Standard Cost/Actual Cost/ Revised Actual Quantity

Material	Standard Cost			Actual Cost			Revised Actual Quantity [RAQ] (Kg.)
	Quantity	Rate	Amount	Quantity	Rate	Amount	
	[SQ] (Kg.)	[SP] (₹)	[SQ × SP] (₹)	[AQ] (Kg.)	[AP] (₹)	[AQ × AP] (₹)	
A (40% of 202.22 Kg.)	80.89	20	1,617.80	90	18	1,620	80
B (60% of 202.22 Kg.)	121.33	30	3,639.90	110	34	3,740	120
	202.22		5,257.70	200		5,360	200

Note :

- SQ = Standard Quantity = Expected Consumption for Actual Output
- AQ = Actual Quantity of Material Consumed
- RAQ = Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion
- SP = Standard Price Per Unit
- AP = Actual Price Per Unit

Computation of Variances:

Material Price Variance = AQ × (SP – AP)

$$A = 90 \text{ Kg.} \times (\text{₹ } 20 - \text{₹ } 18) = \text{₹ } 180 \text{ (F)}$$

$$B = 110 \text{ Kg.} \times (\text{₹ } 30 - \text{₹ } 34) = \text{₹ } 440 \text{ (A)}$$

$$\begin{aligned} \text{Total} &= \text{₹ } 180 \text{ (F)} + \text{₹ } 440 \text{ (A)} \\ &= \text{₹ } 260 \text{ (A)} \end{aligned}$$

Material Usage Variance = SP × (SQ – AQ)

$$A = \text{₹ } 20 \times (80.89 \text{ Kg.} - 90 \text{ Kg.}) = \text{₹ } 182.20 \text{ (A)}$$

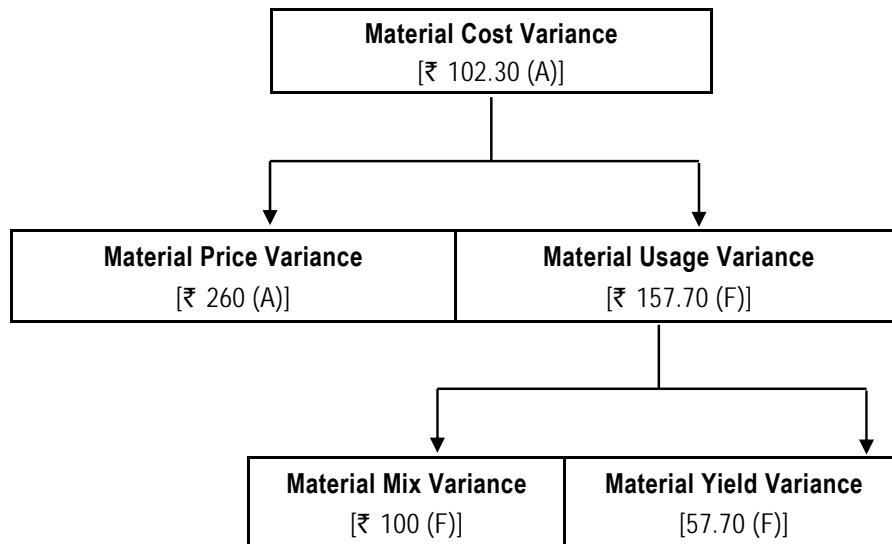
$$B = \text{₹ } 30 \times (121.33 \text{ Kg.} - 110 \text{ Kg.}) = \text{₹ } 339.90 \text{ (F)}$$

$$\begin{aligned} \text{Total} &= \text{₹ } 182.20 \text{ (A)} + \text{₹ } 339.90 \text{ (F)} \\ &= \text{₹ } 157.70 \text{ (F)} \end{aligned}$$

$$\begin{aligned}
 \text{Material Mix Variance} &= SP \times (RAQ - AQ) \\
 A &= ₹ 20 \times (80 \text{ Kg} - 90 \text{ Kg}) = ₹ 200 \text{ (A)} \\
 B &= ₹ 30 \times (120 \text{ Kg.} - 110 \text{ Kg.}) = ₹ 300 \text{ (F)} \\
 \text{Total} &= ₹ 200 \text{ (A)} + ₹ 300 \text{ (F)} \\
 &= ₹ 100 \text{ (F)}
 \end{aligned}$$

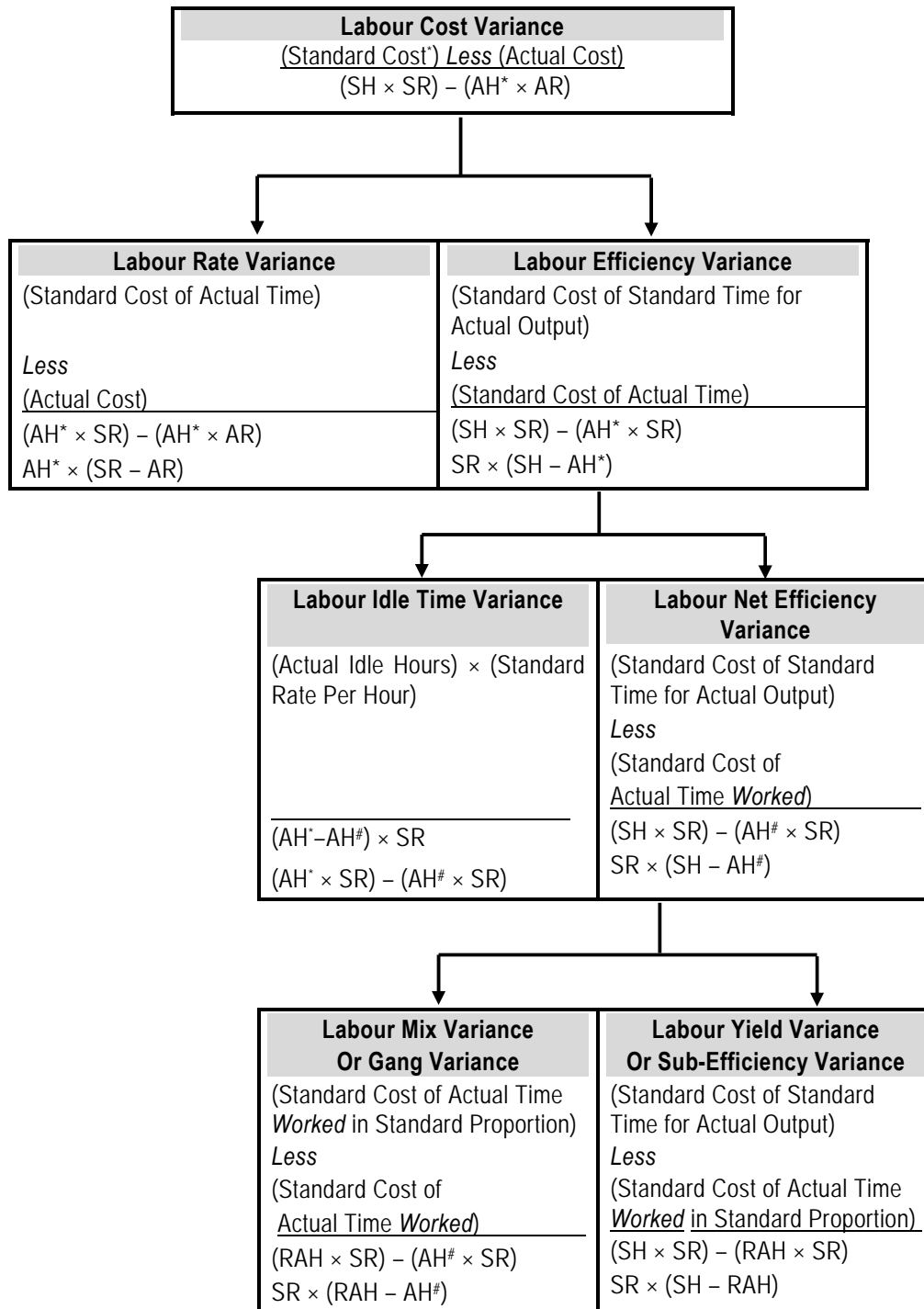
$$\begin{aligned}
 \text{Material Yield Variance} &= SP \times (SQ - RAQ) \\
 A &= ₹ 20 \times (80.89 \text{ Kg.} - ₹ 80 \text{ Kg}) = ₹ 17.80 \text{ (F)} \\
 B &= ₹ 30 \times (121.33 \text{ Kg.} - 120 \text{ Kg.}) = ₹ 39.90 \text{ (F)} \\
 \text{Total} &= ₹ 17.80 \text{ (F)} + ₹ 39.90 \text{ (F)} \\
 &= ₹ 57.70 \text{ (F)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Material Cost Variance} &= SQ \times SP - AQ \times AP \\
 A &= ₹ 80.89 \text{ Kg.} \times ₹ 20 - 90 \text{ Kg.} \times ₹ 18 = ₹ 2.20 \text{ (A)} \\
 B &= ₹ 121.33 \text{ Kg.} \times 30 \text{ Kg.} - 110 \text{ Kg.} \times ₹ 34 = ₹ 100.10 \text{ (A)} \\
 \text{Total} &= ₹ 2.20 \text{ (A)} + ₹ 100.10 \text{ (A)} \\
 &= ₹ 102.30 \text{ (A)}
 \end{aligned}$$



5.3.2. Direct Labour Variances: The two basic variances that can be calculated in respect of direct labour total variance (also known as labour cost variance) are (a) rate variance and (b) efficiency variance. The formula's for calculating labour variances are as under:

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Alternate Formula Total Actual Time Worked (hours) × [Average Standard Rate <i>per hour</i> of Standard Gang Less Average Standard Rate <i>per hour</i> of Actual Gang [@]] ^{@ on the basis of hours worked}	Alternate Formula Average Standard Rate <i>per</i> <i>hour</i> of Standard Gang × [Total Standard Time (hours) Less Total Actual Time Worked (hours)]
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Note:

- SH = Standard Hours = Expected time (Time allowed) for Actual Output
AH* = Actual Hours *paid for*
AH# = Actual Hours *worked*
RAH = Revised Actual Hours = Actual Hours (worked) rewritten in Standard Proportion
SR = Standard Rate per Labour Hour
AR = Actual Rate per Labour Hour Paid
(*) = Standard Cost refers to 'Standard Cost of Standard Time for Actual Output'
In the absence of idle time
Actual Hours Worked = Actual Hours Paid

Remark: For better understanding of idle time concept, efficiency variance is segregated between net efficiency variance and idle time variance.

Illustration 3

Given the following data, compute the variances.

	Skilled	Semi-Skilled	Unskilled
Number of workers in standard gang	16	6	3
Standard rate per hour (₹)	3	2	1
Actual number of workers in the gang	14	9	2
Actual rate of pay per hour (₹)	4	3	2

In a 40- hour week, the gang as a whole produced 900 standard hours.

Solution

Basic Calculations:

In a 40 hour week, the standard gang should have produced 1,000 std. hours as shown below

Skilled	16 No. of workers × 40 hrs.	640
Semi – Skilled	6 No. of workers × 40 hrs.	240
Unskilled	3 No. of workers × 40 hrs.	120
		1,000 hours

However, the actual output is 900 standard hours. Hence to find out the total labour cost variance, the standard cost (or cost charged to production) is to be computed with reference to 900 standard hours. This is done in the following statement:

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Statement showing the Standard Cost, Actual Cost and Standard Cost of Actual Time for Actual Output, i.e. 900

Gang	Standard Cost			Actual Cost			Std Cost of Actual Time		
	Hours	Rate	Amt	Hours	Rate	Amt	Hours	Rate	Amt
Skilled	576	3	1,728	560	4	2,240	560	3	1,680
Semi-Skilled	216	2	432	360	3	1,080	360	2	720
Unskilled	108	1	108	80	2	160	80	1	80
Total	900	2.52	2,268	1000	3.48	3,480	1,000	2.48	2,480

Computation of Variances:

Cost Variance = Std. Labour Cost – Actual Labour Cost
= ₹ 2,268 – ₹ 3,480 = ₹ 1,212 (A)

Rate Variance = Actual Time x (Std. Rate – Actual Rate)
= (Standard Cost of Actual Time – Actual Cost)
= ₹ 2,480 – ₹ 3,480 = ₹ 1,000 (A)

Efficiency variance = Std. Rate x (Std. Time – Actual Time)
= Standard Cost – Std. Cost of Actual Time
= ₹ 2,268 – ₹ 2,480 = ₹ 212 (A)

Gang Variance = Total Actual Time x (Std. Rate of Std. Gang– Std. Rate of Actual Gang)
= 1,000 x (₹ 2.52 – ₹ 2.48) = ₹ 40(F)

Sub-Efficiency Variance = Std. Rate of Std. Gang x (Total Std. Time – Total Actual Time)
= ₹ 2.52 x (900 Hours – 1,000 Hours) = ₹ 252 (A)

Illustration 4

A firm gives you the following data:

Standard time per unit 2.5 hours
Actual hours (paid) 2,000 hours
Standard rate of pay ₹ 2 per hour
25 % of the actual hours (paid) have been lost as idle time.
Actual output 1,000 units
Actual wages (paid) ₹ 4,500
Calculate the idle time variance.

Solution

Basic Calculations:

Standard Cost	₹ 5,000
(1,000 units × 2.5 hours × ₹ 2)	
Actual wages paid	₹ 4,500
Actual wage rate per hour (₹ 4,500 ÷ 2,000 hours)	₹ 2.25

Std. wage rate per hour	₹ 2.00
Abnormal idle time (25% of 2,000 hours)	500 hrs

Computation of Variances:

Rate Variance	= Actual Time x (Std. Rate – Actual Rate)
	= 2,000 Hours x (₹ 2 – ₹ 2.25) = ₹ 500 (A)
Net Efficiency Variance	= Std. Rate x (Std. Time – Actual time*)
	= ₹ 2 x (2,500 hrs. – 1,500 hrs.) = ₹ 2,000 (F)
Idle time Variance	= Idle Time × Std. Rate
	= 500 hrs. × ₹ 2 = ₹ 1,000 (A)
Total Variance	= Std. Labour Cost – Actual Labour Cost
	= ₹ 5,000 – ₹ 4,500 = ₹ 500 (F)

*Actual time less idle time.

5.3.3 Overhead Variances: Overhead variances arise due to the difference between actual overheads and absorbed overheads.

The actual overheads can be known only at the end of the accounting period, when the expense accounts are finalised. The absorbed overheads are the overheads charged to each unit of production on the basis of a pre-determined overhead rate. This pre-determined rate is also known as standard overhead recovery rate, standard overhead absorption rate or standard burden rate. To calculate the standard overhead recovery rate, we have to first make an estimate of the likely overhead expenses for each department for the next year. The estimate of budget of the overheads is to be divided into fixed and variable elements. An estimate of the level of normal capacity utilisation is then made either in terms of production or machine hours or direct labour hours.

The estimated overheads are divided by the estimated capacity level to calculate the pre-determined overhead absorption rate as shown below:

$$\text{Standard Fixed Overhead Rate} = \frac{\text{Budgeted Fixed Overheads}}{\text{Normal Volume}}$$

$$\text{Standard Variable Overhead Rate} = \frac{\text{Budgeted Variable Overheads}}{\text{Normal Volume}}$$

Overhead variances can be classified in the following two major categories:

- a) Fixed Overhead Variances
- b) Variable Overhead Variances

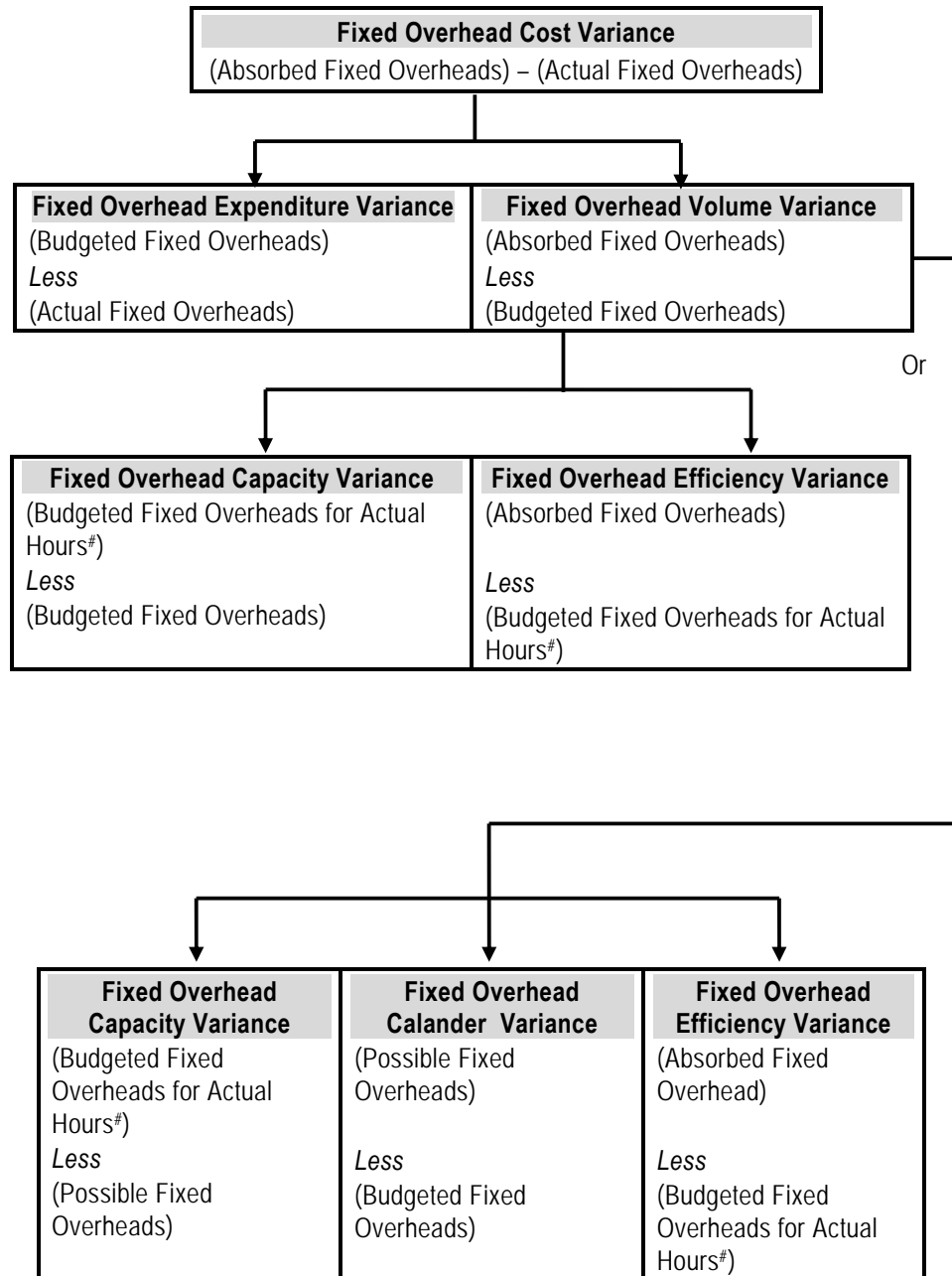
(a) Fixed Overhead Variances:

Fixed overhead total variance (also known as fixed overhead cost variance) as may be broadly classified into:

Expenditure Variance: It represents the difference between the fixed overheads as per budget and the actual fixed overheads incurred.

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Volume Variance: This variance represents the unabsorbed portion of the fixed costs because of underutilization of capacity. In case a firm exceeds capacity, this variance is favourable in nature. This can be divided into capacity variance and efficiency variance.



Actual Hours (Worked)

Note:**Standard Fixed Overheads for Production (Absorbed)**

- = Standard Fixed Overhead Rate Per Unit × Actual Production in Units
- = Standard Fixed Overhead Rate Per Hour × Standard Hours for Actual Production

Budgeted Fixed Overheads

- = It represents the amount of fixed overhead which should be spent according to the budget or standard during the period

Actual Fixed Overheads Incurred**Budgeted Fixed Overheads for Actual Hours**

- = Standard Fixed Overhead Rate per Hour × Actual Hours

Possible Fixed Overheads

- = Expected Fixed Overhead for Actual Days Worked
- = $\frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Days}} \times \text{Actual Days}$

Fixed Overhead Efficiency Variance

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads for Actual Hours)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Actual Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Actual Hours)

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Fixed Overhead Capacity Variance

(Budgeted Fixed Overheads for Actual Hours) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Hour × Actual Hours) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Actual Hours – Budgeted Hours)

Fixed Overhead Volume Variance - I

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Unit × Actual Output) – (Standard Fixed Overhead Rate per Unit × Budgeted Output)

Or

Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)

Fixed Overhead Volume Variance- II

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours per Unit × Actual Output – Standard Hours per Unit × Budgeted Output)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours per Unit) × (Actual Output – Budgeted Output)

Or

Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)

Illustration 5

You are given the following data:

	Budgeted	Actual
Fixed overhead for July	₹ 10,000	₹ 10,200
Units of production in July	5,000	5,200
Standard time for one unit	4 hours	
Actual hours worked		20,100 hours

Calculate all variances relating to fixed overheads

Solution

Basic Calculations:

$$\begin{aligned}
 1. \text{ Absorbed Fixed Overheads} &= \text{Standard Rate per Hour} \times \text{Standard Hours for Actual Output} \\
 &= ₹ 0.50^{\#} \times (4 \text{ Hours} \times 5,200 \text{ Units}) \\
 &= ₹ 10,400
 \end{aligned}$$

OR

$$\begin{aligned}
 &= \text{Standard Rate per unit}^{\textcircled{a}} \times \text{Actual Output} \\
 &= ₹ 2 \times 5,200 \text{ Units} \\
 &= ₹ 10,400
 \end{aligned}$$

$$\begin{aligned}
 \# \text{ Standard Rate per Hour} &= ₹ 10,000 \text{ (Budgeted Fixed Overheads)} / \\
 &\quad [5,000 \text{ units (Budgeted Output)} \times 4 \text{ hours (Budgeted Hours)}] \\
 &= ₹ 0.50
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{a} \text{ Standard Rate per Unit} &= ₹ 10,000 \text{ (Budgeted Fixed Overheads)} / 5,000 \text{ units} \\
 &\quad \text{(Budgeted Output)} \\
 &= ₹ 2
 \end{aligned}$$

$$2. \text{ Budgeted Fixed Overheads} = ₹ 10,000$$

$$3. \text{ Actual Fixed Overheads} = ₹ 10,200$$

$$\begin{aligned}
 4. \text{ Budgeted Fixed Overheads for Actual Hours} &= ₹ 0.50 \times 20,100 \text{ Hrs} \\
 &= ₹ 10,050
 \end{aligned}$$

Computation of Variances:

$$\begin{aligned}
 \text{Fixed Overhead Cost Variance} &= \text{Absorbed Fixed Overheads} - \text{Actual Fixed Overheads} \\
 &= ₹ 10,400 - ₹ 10,200 \\
 &= ₹ 200 \text{ (F)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Fixed Overhead Expenditure Variance} &= \text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads}
 \end{aligned}$$

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	= ₹ 10,000 – ₹ 10,200
	= ₹ 200 (A)
Fixed Overhead Volume Variance	= Absorbed Fixed Overheads – Budgeted Fixed Overheads
	= ₹ 10,400 – ₹ 10,000
	= ₹ 400 (F)
Fixed Overhead Capacity Variance	= Budgeted Fixed Overheads for Actual Hours – Budgeted Fixed Overheads
	= ₹ 10,050 – ₹ 10,000
	= ₹ 50 (F)
Fixed Overhead Efficiency Variance	= Absorbed Fixed Overheads – Budgeted Fixed Overheads for Actual Hours
	= ₹ 10,400 – ₹ 10,050
	= ₹ 350 (F)

Calender Variance: Calender Variance arises due to the fact that the estimated fixed overheads are the same for each month or period irrespective of the actual number of working days. It is that portion of the volume variance which is due to the difference between the number of working days in the budget period and the number of actual working days in the period to which the budget is applied. The number of working days in the budget period are arrived at simply by dividing the number of annual days by twelve.

Illustration 6

Assuming the expenses to be fixed, calculate from the following data:

(a) Efficiency variance, (b) Volume variance, (c) Calendar variance and (d) Expense variance

	Budget	Actual
No. of working days per month	20	22
Man hours per day	8,000	8,400
Output per man hour in units	1.0	1.2
Standard overhead rate per man hour	₹ 2	
Actual fixed expenses per month		₹ 3,25,000

Solution

Basic Calculations:

1. Actual Output: 8,400 Hours × 22 Days × 1.2 Units per Hour = 2,21,760 Units
2. Standard Output per Man Hour: 1
3. Standard Hours Produced or Std. Hrs. for Actual Production: 2,21,760 Units × 1 Hr. = 2,21,760 Hrs.
4. Budgeted Hrs.: 8,000 Hours × 20 Days = 1,60,000 Hours

5. Possible Hours: 8,000 Hours x 22 Days = 1,76,000 Hours
6. Actual Hours Worked: 8,400 Hours x 22 Days = 1,84,800 Hours
7. Overheads as per Budget: 8,000 Hours x 20 Days x ₹ 2 per Hour = ₹ 3,20,000

Computation of Variances:

Efficiency variance	= Std. Fixed Overhead Rate per Hour x (Std. Hrs. for Actual Production – Actual Hrs.)
	= ₹ 2 x (2,21,760 Hours – 1,84,800 Hours) = ₹ 73,920 (F)
Capacity variance	= Standard Fixed Overhead Rate per Hour x (Actual Hours – Possible Hours)
	= ₹ 2 x (1,84,800 Hours – 1,76,000 hours) = ₹ 17,600 (F)
Calendar variance	= Standard Fixed Overhead Rate per Hour x (Possible Hours – Budgeted Hours)
	= ₹ 2 x (1,76,000 Hours – 1,60,000 Hours) = ₹ 32,000 (F)
Volume variance	= Standard Fixed Overhead Rate per Hour x (Standard Hours for Actual Output – Budgeted Hours)
	= ₹ 2 x (2,21,760 Hours – 1,60,000 Hours) = ₹ 1,23,520 (F)
Expenses variance	= Budgeted Expenses – Actual Expenses
	= ₹ 3,20,000 – ₹ 3,25,000 = ₹ 5,000 (A)
Total variance	= Absorbed Overheads – Actual Overheads
	= ₹ 2,21,760 x ₹ 2 – ₹ 3,25,000
	= ₹ 4,43,520 – ₹ 3,25,000 = ₹ 1,18,520 (F)

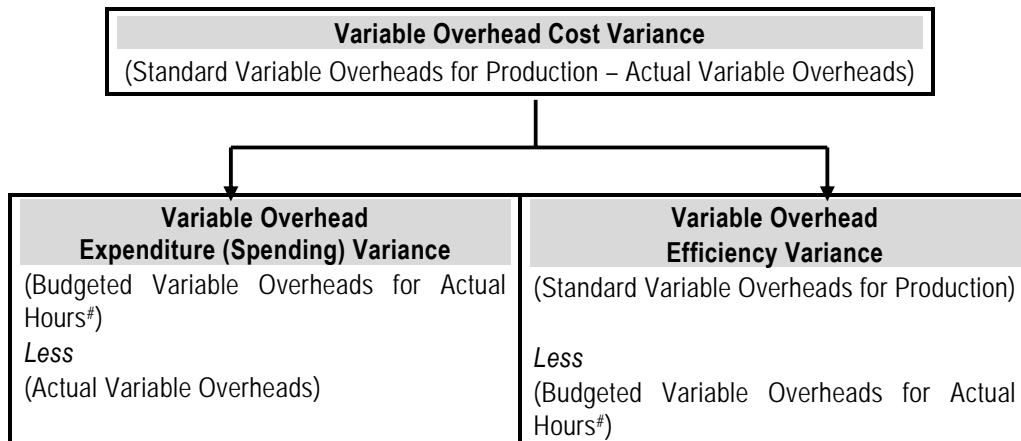
(b) Variable Overhead Variances:

These variances arise due to the difference between the standard variable overheads for actual output and the actual variable overheads. The variable overhead total variance (also known as variable overhead cost variance) can be analysed further as:-

Variable Overhead Expenditure Variance: It is that part of variable overhead variance which arises due to the difference between the budgeted variable overhead and the actual variable overhead incurred.

Variable Overhead Efficiency Variance: It is that part of variable overhead variance which arises due to the difference between standard hours required for actual output and the actual hours worked. It can be computed by multiplying the difference of standard and actual hours by the standard variable overhead rate per hour. If standard hours exceed the actual hours worked, the variance will be favourable and vice versa.

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Actual Hours (Worked)

Note:

Standard Variable Overheads for Production/Charged to Production

- = Standard/Budgeted Variable Overhead per Unit × Actual Production in Units
- = Standard Variable Overhead Rate per Hour × Standard Hours for Actual Production

Actual Overheads Incurred

Budgeted Variable Overheads for Actual Hours

- = Standard Variable Overhead Rate per Hour × Actual Hours

Variable Overhead Efficiency Variance
$(\text{Standard Variable Overheads for Production}) - (\text{Budgeted Overheads for Actual Hours})$
Or
$(\text{Standard Variable Overhead Rate per Hour} \times \text{Standard Hours for Actual Output}) - (\text{Standard Variable Overhead Rate per Hour} \times \text{Actual Hours})$
Or
$\text{Standard Variable Overhead Rate per Hour} \times (\text{Standard Hours for Actual Output} - \text{Actual hours})$

Variable Overhead Expenditure Variance

$$\begin{aligned} & (\text{Budgeted Variable Overheads for Actual Hours}) - (\text{Actual Variable Overheads}) \\ & \text{Or} \\ & (\text{Standard Rate per Hour} \times \text{Actual Hours}) - (\text{Actual Rate per Hour} \times \text{Actual Hours}) \\ & \text{Or} \\ & \text{Actual Hours} \times (\text{Standard Rate per Hour} - \text{Actual Rate per Hour}) \end{aligned}$$

Illustration 7

XYZ Company has established the following standards for variable factory overhead.

Standard hours per unit :	6
Variable overhead per hour :	₹ 2
The actual data for the month are as follows:	
Actual variable overheads incurred	₹ 2,00,000
Actual output (units)	20,000
Actual hours worked	1,12,000
Calculate variable overhead variances viz	

Solution

Basic Calculations:

- Standard Variable Overheads for Production = Standard Rate per Hour × Standard Hours for Actual Output
= ₹ 2 × [6 Hours × 20,000 Units]
= ₹ 2,40,000
- Actual Variable Overheads = ₹ 2,00,000
- Budgeted Variable Overheads for Actual Hours = Standard Rate per Hour × Actual Hours
= ₹ 2 × 1,12,000 hours
= ₹ 2,24,000

Computation of Variances:

$$\begin{aligned} \text{Variable Overhead Cost Variance} &= \text{Standard Variable Overheads for Production} - \text{Actual Variable Overheads} \\ &= ₹ 2,40,000 - ₹ 2,00,000 \\ &= ₹ 40,000 \text{ (F)} \\ \text{Variable Overhead Expenditure Variance} &= \text{Budgeted Variable Overheads for Actual Hours} - \text{Actual Variable Overheads} \\ &= ₹ 2,24,000 - ₹ 2,00,000 \\ &= ₹ 24,000 \text{ (F)} \end{aligned}$$

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$$\begin{aligned}
 \text{Variable Overhead Efficiency Variance} &= \text{Standard Variable Overheads for Production} - \text{Budgeted Variable Overheads for Actual Hours} \\
 &= ₹ 2,40,000 - ₹ 2,24,000 \\
 &= ₹ 16,000 \text{ (F)}
 \end{aligned}$$

Illustration 8

The overhead expense budget for a cost centre is as under:

Indirect material	₹ 0.40 per hour
Indirect labour	₹ 0.60 per hour
Maintenance	₹ 0.40 per hour
Power	₹ 0.30 per hour
Sundries	₹ 0.30 per hour
Total variable expenses	₹ 2.00 per hour
Fixed overhead budgeted	₹ 240

Budgeted output = 9,600 units or 120 standard hours.

At the end of a period the actual rates given by the accounts department are as under:

Power ₹ 0.32; maintenance ₹ 0.45; indirect labour ₹ 0.60; indirect material ₹ 0.50 and sundry expenses ₹ 0.29 per hour; total variable expenses were ₹ 2.16 per hour. The actual output is 12,160 units for which the actual hours worked are 156. The fixed expenses amounted to ₹ 250. Compute the variances.

Solution

Basic Calculations:

Expenses	Overhead Expenses Schedule			
	Budget: 120 Std. Hours		Actual: 156 Hours	
	Rate per hour ₹	Expenses ₹	Rate per hour ₹	Expenses ₹
Indirect material	0.40	48	0.50	78
Indirect labour	0.60	72	0.60	94
Maintenance	0.40	48	0.45	70
Power	0.30	36	0.32	50
Sundries	0.30	36	0.29	45
Total Variable Overheads	2.00	240	2.16	337
Fixed overheads	2.00	240		250
Total overheads		480		587

Actual output = 12,160 units.

Hence standard hours produced or std. hours for actual production

$$= \frac{120 \text{ std. hours}}{9,600 \text{ units}} \times 12,160 \text{ actual output} = 152 \text{ hours}$$

Computation of Variances: Fixed Overheads

Working Notes:

1. Absorbed Fixed Overhead = Standard Rate per Hour × Standard Hours for Actual Output

$$= ₹ 2 \times \left(\frac{120 \text{ Hours}}{9,600 \text{ Units}} \times 12,160 \text{ Units} \right)$$

$$= ₹ 2 \times 152 \text{ Hours}$$

$$= ₹ 304$$
2. Budgeted Fixed Overhead = ₹ 240
3. Actual Fixed Overhead = ₹ 250
4. Budgeted Fixed Overheads for Actual Hours = Standard Rate per Hour × Actual Hours

$$= ₹ 2 \times 156 \text{ Hours}$$

$$= ₹ 312$$

Computation of Variances:

Fixed Overhead Cost Variance	= Absorbed Fixed Overheads – Actual Fixed Overheads
	= ₹ 304 – ₹ 250
	= ₹ 54 (F)
Fixed Overhead Expenditure Variance	= Budgeted Fixed Overheads – Actual Fixed Overheads
	= ₹ 240 – ₹ 250
	= ₹ 10 (A)
Fixed Overhead Volume Variance	= Absorbed Fixed Overheads – Budgeted Fixed Overheads
	= ₹ 304 – ₹ 240
	= ₹ 64 (F)
Fixed Overhead Capacity Variance	= Budgeted Fixed Overheads for Actual Hours – Budgeted Fixed Overheads
	= ₹ 312 – ₹ 240
	= ₹ 72 (F)
Fixed Overhead Efficiency Variance	= Absorbed Fixed Overheads – Budgeted Fixed Overheads for Actual Hours
	= ₹ 304 – ₹ 312
	= ₹ 8 (A)

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Computation of Variances: Variable Overhead

Working Notes:

1. Standard Variable Overheads for Production = Standard Rate per Hour × Standard Hours for Actual Output
= ₹ 2 × $\left(\frac{120 \text{ Hours}}{9,600 \text{ Units}} \times 12,160 \text{ Units} \right)$
= ₹ 2 × 152 Hours
= ₹ 304
2. Actual Variable Overheads = ₹ 337
3. Budgeted Variable Overheads for actual hours = Standard Rate per Hour × Actual Hours
= ₹ 2 × 156 Hrs.
= ₹ 312

Computation of Variances:

- | | |
|--|---|
| Variable Overhead Cost Variance | = Standard Variable Overheads for Production – Actual Variable Overheads |
| | = ₹ 304 – ₹ 337 |
| | = ₹ 33 (A) |
| Variable Overhead Expenditure Variance | = Budgeted Variable Overheads for Actual Hours – Actual Variable Overheads |
| | = ₹ 312 – ₹ 337 |
| | = ₹ 25 (A) |
| Variable Overhead Efficiency Variance | = Standard Variable Overheads for Production – Budgeted Variable Overheads for Actual Hours |
| | = ₹ 304 – ₹ 312 |
| | = ₹ 8 (A) |

 Now Students should try to attempt Illustration No.15, 17 and 18

5.3.4 Sales Variances

The sales variances can be computed in two ways. They are:

- (a) Sales Turnover or Value Method.
- (b) Profit or Sales Margin Method.

(a) Sales Turnover or Sales Value Method: In the sales turnover method, the variances are computed on the basis of sales value. This method will give the sales manager an idea of the effect of various factors affecting sales such as prices, quantity and sales mix on the overall sales value.

Sales Value Variance: It is the difference between the *Actual Sales and Budgeted Sales*. The variance can be bifurcated into sales price variance and sales volume variance.

Sales Price Variance: It is difference between the *Actual Sales* and *Standard Sales*.

Sales Volume Variances: It is difference between the *Standard Sales* and *Budgeted Sales*.

As in the case of materials, the sales volume variance can be bifurcated into

- Sales Mix Variance and
- Sales Quantity Variance.

The former shows the difference in sales value due to the fact that the actual sales mix is different from what was expected as the budgeted mix. The latter shows the effect of total quantity being larger or smaller than what was budgeted.

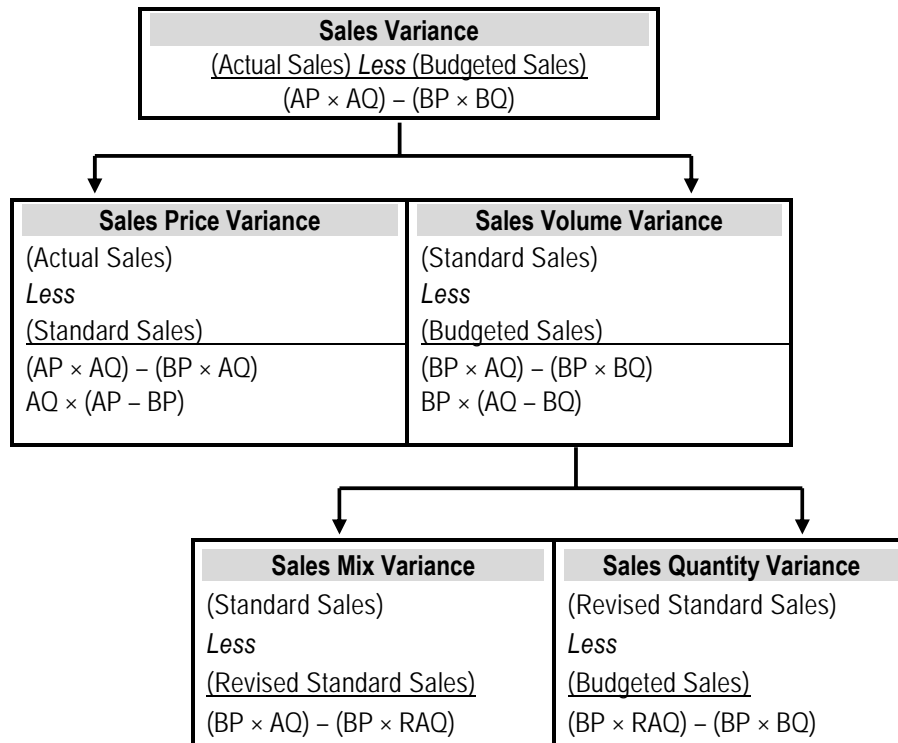
For calculating the sales mix and quantity variances, we have to calculate the *average budgeted price per unit of budgeted mix* and the *average budgeted price per unit of actual mix*.

The sales mix variance can then be calculated as below:

Total Actual Sales Quantity x (Average Budgeted Price per Unit of Actual Mix – Average Budgeted Price per unit of Budgeted Mix)

The sales quantity variance can then be calculated as below:

Average Budgeted Price per unit of Budgeted Mix x (Total Actual Qty. – Total Budgeted Qty.)



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Or $BP \times (AQ - RAQ)$	Or $BP \times (RAQ - BQ)$
Alternative Formula Total Actual Quantity (units) \times [Average Budgeted Price <i>per unit</i> of Actual Mix <u>Less</u> Average Budgeted Price <i>per unit</i> of Budgeted Mix]	Alternative Formula Average Budgeted Price <i>per unit</i> of Budgeted Mix \times [Total Actual Quantity (units) <u>Less</u> Total Budgeted Qty (units)]

Note:

- BQ = Budgeted Sales Quantity
AQ = Actual Sales Quantity
RAQ = Revised Actual Sales Quantity
= Actual Quantity Sold Rewritten in Budgeted Proportion
BP = Budgeted Selling Price per Unit
AP = Actual Selling Price per Unit

Illustration 9

Compute the sales turnover variances from the following figures: -

Product	Budget		Actual	
	Quantity (Units)	Price (₹)	Quantity (Units)	Price (₹)
A	2,000	2.50	2,400	3.00
B	1,500	5.00	1,400	4.50
C	1,000	7.50	1,200	7.00
D	500	10.00	400	10.50

Solution**Basic Calculations:**

Product	Budgeted Price	Actual Price	Budgeted Quantity	Actual Quantity	Budgeted Sales	Standard Sales	Actual Sales	Revised Actual Quantity
	[BP] (₹)	[AP] (₹)	[BQ] (Units)	[AQ] (Units)	[BP×BQ] (₹)	[BP×AQ] (₹)	[AP×AQ] (₹)	[RAQ] (Units)
A	2.50	3.00	2,000	2,400	5,000	6,000	7,200	2,160
B	5.00	4.50	1,500	1,400	7,500	7,000	6,300	1,620
C	7.50	7.00	1,000	1,200	7,500	9,000	8,400	1,080
D	10.00	10.50	500	400	5,000	4,000	4,200	540
			5,000	5,400	25,000	26,000	26,100	5,400

Note:

- BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 RAQ = Revised Actual Sales Quantity
 = Actual Quantity Sold Rewritten in Budgeted Proportion
 BP = Budgeted Selling Price per Unit
 AP = Actual Selling Price per Unit

Computation of Variances:**Statement Showing Sales Variance (₹)**

	Product (A)	Product (B)	Product (C)	Product (D)	Total
Sales Variance = AP × AQ – BP × BQ	= 3.00 × 2,400 – 2.50 × 2,000 = 2,200 (F)	= 4.50 × 1,400 – 5.00 × 1,500 = 1,200 (A)	= 7.00 × 1,200 – 7.50 × 1,000 = 900 (F)	= 10.50 × 400 – 10.00 × 500 = 800 (A)	1,100 (F)
Sales Price Variance = AQ × (AP – BP)	= 2,400 × (3 – 2.50) = 1,200 (F)	= 1,400 × (4.50 – 5) = 700 (A)	= 1,200 × (7.00 – 7.50) = 600 (A)	= 400 × (10.50 – 10.00) = 200 (F)	100 (F)
Sales Volume Variance = BP × (AQ – BQ)	= 2.50 × (2,400 – 2,000) = 1,000 (F)	= 5.00 × (1,400 – 1,500) = 500 (A)	= 7.50 × (1,200 – 1,000) = 1,500 (F)	= 10.00 × (400 – 500) = 1,000 (A)	1,000 (F)
Sales Mix Variance = BP × (AQ – RAQ)	= 2.50 × (2,400 – 2,160) = 600 (F)	= 5.00 × (1,400 – 1,620) = 1,100 (A)	= 7.50 × (1,200 – 1,080) = 900 (F)	10.00 × (400 – 540) = 1,400 (A)	1,000 (A)

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Sales Quantity Variance = BP × (RAQ – BQ)	= 2.50 × (2,160 – 2,000) = 400 (F)	= 5.00 × (1,620 – 1,500) = 600 (F)	= 7.50 × (1,080 – 1,000) = 600 (F)	= 10.00 × (540 – 500) = 400 (F)	2,000 (F)
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(b) Sales Margin Method: The purpose of measuring the variances under this method is to identify the effect of changes in sale quantities and selling prices on the profits of the company. The quantity and mix variances should be analysed in conjunction with each other because the sales manager is responsible for both of these variances. Where a company is engaged in the manufacture and sale of multiple products, the variances between budgeted sales and actual sales may arise due to the following reasons:

- Changes in unit price and cost.
- Changes in physical volume of each product sold. This is quantity variance.
- Changes in the physical volume of the more profitable or less profitable products.

There are five distinct variables that can cause actual performance to differ from budgeted performance. They are:

- Direct substitution of products.
- Actual quantity of the constituents of sales being different from the budgeted quantity.
- Actual total quantity being different from the budgeted total quantity.
- Difference between actual and budgeted unit cost.
- Difference between actual and budgeted unit sale price.

The sales management should consider particularly the interaction of more than one variable in making decisions. For example, decrease in selling price coupled with a favourable product quantity variance may help to assess the price elasticity of demand.

The formulae for the calculation of *Sales Margin Variances* are as under:

Total Sales Margin Variance: It is the difference between the *Actual Margin* and the *Budgeted Margin*.

Sales Margin Price Variance: This variance arises because of the difference between the budgeted price of the quantity actually sold and the actual price thereof.

Sales Margin Price Variance equals to Actual Quantity x (Actual Margin per Unit – Budgeted Margin per Unit).

Sales Margin Volume Variance:

This variance arises because of the difference between the actual and budgeted quantities of each product both evaluated at budgeted margin.

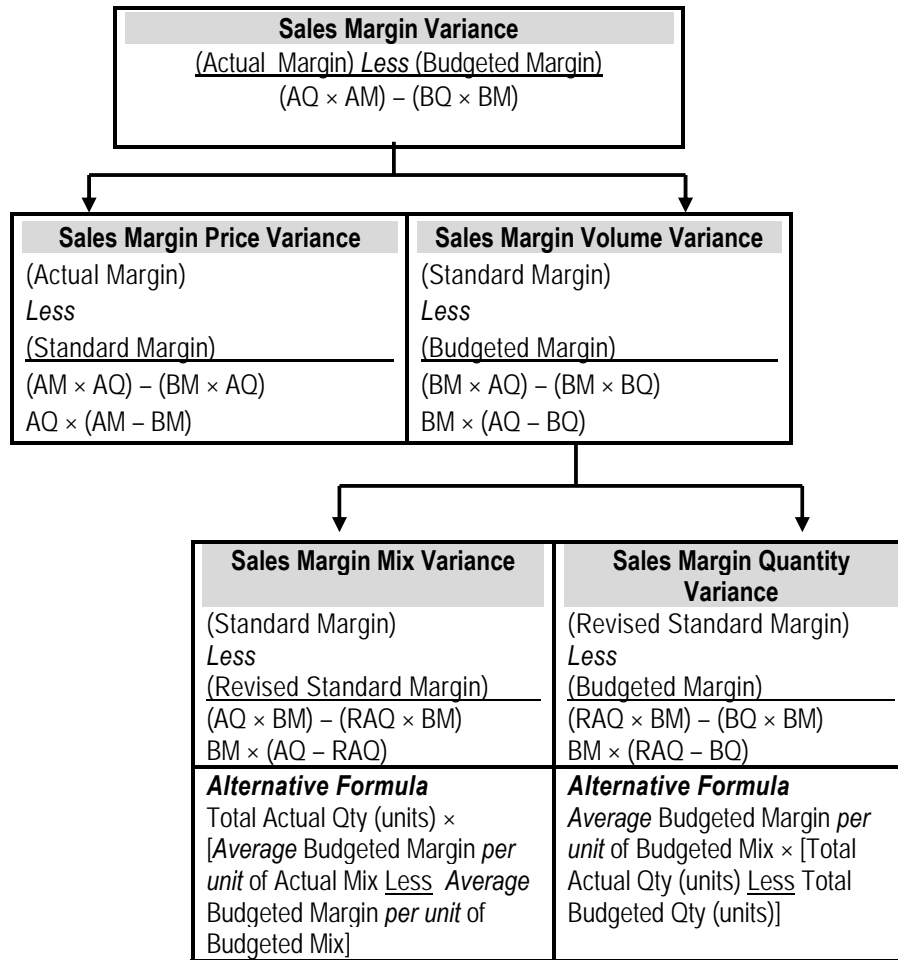
Sales Margin Volume Variance equals to Budgeted Margin per Unit x (Actual Units – Budgeted Units)

This can be further sub-divided into the following two variances:

Sales Margin Quantity Variance: This variance arises because of the difference between the actual total quantity and the budgeted total quantity and is ascertained by multiplying this difference by average budgeted margin per unit of budgeted mix.

Sales Margin Mix Variance: This variance arises because of the change in the quantities of actual sales mix from budgeted sale mix and can be computed as below:

Sales Margin Mix Variance equals to Total Actual Quantity × (Average Budgeted Margin per Unit of Actual Mix – Average Budgeted Margin per Unit of Budgeted Mix).



Note:

- BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 RAQ = Revised Actual Sales Quantity
 = Actual Quantity Sold Rewritten in Budgeted Proportion

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BM	=	Budgeted Margin
	=	Budgeted price per Unit – Standard Cost per Unit
AM	=	Actual Margin
	=	Actual Sales Price per Unit – Standard Cost per Unit

☛ **Sales Price Variance** is equal to **Sales Margin Price Variance**. This is because, for the actual quantity sold, standard cost remaining constant, change in selling price will have equal impact on turnover and profit.

☛ **Sales Margin Volume Variance is equal to**
= Sales Volume Variance × Budgeted Net Profit Ratio

$$\begin{aligned}
 \text{Sales Volume Variance} \times \text{Budgeted Net Profit Ratio} &= \text{Budgeted Price} \times (\text{Actual Qty.} - \text{Budgeted Qty.}) \times \text{Budgeted Net Profit Ratio} \\
 &= \text{Budgeted Price} \times \left(\frac{\text{Budgeted Margin}}{\text{Budgeted Price}} \right) \times (\text{Actual Qty.} - \text{Budgeted Qty.}) \\
 &= \text{Budgeted Margin} \times (\text{Actual Qty.} - \text{Budgeted Qty.}) \\
 &= \text{Sales Margin Volume Variance}
 \end{aligned}$$

☛ **In Marginal Costing approach, PV ratio should be used instead of NP ratio.**

Illustration 10

Compute the sales margin variances from the following data:

Products	Budgeted Quantity (units)	Actual Quantity (units)	Budgeted Sale Price (₹)	Actual sale Price (₹)	Standard Cost per Unit (₹)
A	1,200	2,000	5.00	4.50	3.00
B	800	1,000	2.50	2.00	1.50

Solution

Basic Calculations:

The margin for each product may be calculated as under:

Products	Budgeted Price (₹)	Actual Price (₹)	Std. Cost (₹)	Budgeted Margin (₹)	Actual Margin (₹)
A	5.00	4.50	3.00	2.00	1.50
B	2.50	2.00	1.50	1.00	0.50

For computing the various sales margin variances the following calculations be made:

Products	Margin		Quantity		Budgeted Margin	Standard Margin	Actual Margin	Revised Actual Quantity
	Budget	Actual	Budget	Actual				
	[BM] (₹)	[AM] (₹)	[BQ]	[AQ]	[BM×BQ] (₹)	[BM×AQ] (₹)	[AM×AQ] (₹)	[RAQ]
A	2.00	1.50	1,200	2,000	2,400	4,000	3,000	1,800
B	1.00	0.50	800	1,000	800	1,000	500	1,200
Total			2,000	3,000	3,200	5,000	3,500	3,000

Note:

BQ = Budgeted Sales Quantity

AQ = Actual Sales Quantity

RAQ = Actual Quantity Sold Rewritten in Budgeted Proportion

BM = Budgeted Margin

AM = Actual Margin

Computation of Variances:

Sales Margin Variance = Actual Margin – Budgeted Margin

= AQ × AM – BQ × BM

For Product A = ₹ 3,000 – ₹ 2,400

= ₹ 600 (F)

For Product B = ₹ 500 – ₹ 800

= ₹ 300 (A)

Total (A+ B) = ₹ 600 (F) + ₹ 300 (A)

= ₹ 300 (F)

Sales Margin Price Variance = Actual Margin – Standard Margin

= AQ × AM – AQ × BM

Or

AQ × (AM – BM)

For Product A = ₹ 3,000 – ₹ 4,000

= ₹ 1,000 (A)

For Product B = ₹ 500 – ₹ 1,000

= ₹ 500 (A)

Total (A + B) = ₹ 1,000 (A) + ₹ 500 (A)

= ₹ 1,500 (A)

Sales Margin Volume Variance = Standard Margin – Budgeted Margin


= AQ × BM – BQ × BM

Or

BM × (AQ – BQ)

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For Product A	= ₹ 4,000 – ₹ 2,400
	= ₹ 1,600 (F)
For Product B	= ₹ 1,000 – ₹ 800
	= ₹ 200 (F)
Total (A + B)	= ₹ 1,600 (F) + ₹ 200 (F)
	= ₹ 1,800 (F)
Sales Margin Mix Variance	= Standard Margin – Revised Standard Margin
	= AQ × BM – RAQ × BM
	Or
	BM × (AQ – RAQ)
For Product A	= ₹ 2 × (2,000 Units – 1,800 Units)
	= ₹ 400 (F)
For Product B	= ₹ 1 × (1,000 Units – 1,200 Units)
	= ₹ 200 (A)
Total (A + B)	= ₹ 400 (F) + ₹ 200 (A)
	= ₹ 200 (F)
Sales Margin Quantity Variance	= Revised Standard Margin – Budgeted Margin
	= RAQ × BM – BQ × BM
	Or
	BM × (RAQ – BQ)
Product A	= ₹ 2 × (1,800 Units – 1,200 Units)
	= ₹ 1,200 (F)
Product B	= ₹ 1 × (1,200 Units – 800 Units)
	= ₹ 400 (F)
Total (A + B)	= ₹ 1,200 (F) + ₹ 400 (F)
	= ₹ 1,600 (F)

 Now Students should try to attempt Illustration No.16

Market Size Variance

Budgeted Market Share % × (Actual Industry Sales Volume in Units – Budgeted Industry Sales Volume in Units) × (Budgeted Average Contribution Margin per Unit)

Market Share Variance

(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Volume in Units) × (Budgeted Average Contribution Margin per unit)

Illustration 11

Super computers manufactures and sells three related PC models :

1. PC — Sold mostly to college students
2. Portable PC— Smaller version of PC positioned as home computer
3. Super PC — Sold mostly to business executives

Budgeted and actual data for 2012 is as follows:

Budgeted for 2012

	Selling price per unit ₹	Variable cost per unit ₹	Contribution margin per unit ₹	Sales volume in units
P C	24,000	14,000	10,000	7,000
Portable PC	16,000	10,000	6,000	1,000
Super PC	1,00,000	60,000	40,000	2,000
Total:				10,000

Actual for 2012

	Selling price per unit (₹)	Variable cost per unit (₹)	Contribution margin per unit (₹)	Sales volume in units
P C	22,000	10,000	12,000	8,250
Portable PC	13,000	8,000	5,000	1,650
Super PC	70,000	50,000	20,000	1,100
Total :				11,000

Super computers derived its total unit sales budget for 2012 from the internal management estimate of a 20% market share and an industry sales forecast by computer manufacturers association of 50,000 units. At the end of the year the association reported actual industry sales of 68,750 units.

Required:

- (i) Compute the individual product and total sales volume variance.
- (ii) Compute total sales quantity variance.
- (iii) Compute the market size and market share variances.

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Solution

Basic Calculations:

1. Statement of budgeted average contribution margin per unit for the year 2012

Products/ Different PC Models	Budgeted Contribution Margin per Unit (₹)	Budgeted Sales Volume (Units)	Total Budgeted Contribution Margin (₹)
PC	10,000	7,000	7,00,00,000
Portable PC	6,000	1,000	60,00,000
Super PC	40,000	2,000	8,00,00,000
Total		10,000	15,60,00,000

$$\begin{aligned}\text{Budgeted Average Contribution Margin per Unit} &= \frac{\text{₹15,60,00,000}}{10,000 \text{ Units}} \\ &= \text{₹ } 15,600\end{aligned}$$

2. Actual Market Share Percentage

$$\begin{aligned}&= \frac{\text{Actual Sales of 3 Models}}{\text{Actual Industry Sales}} \times 100 \\ &= \frac{11,000 \text{ Units}}{68,750 \text{ Units}} \times 100 \\ &= 16\%\end{aligned}$$

3. Actual Sales Mix Percentage of Product

$$= \frac{\text{Actual Sale of Product}}{\text{Total Actual Sale of 3 Models}} \times 100$$

$$\begin{aligned}\text{PC} &= \frac{8,250 \text{ Units}}{11,000 \text{ Units}} \times 100 = 75\%\end{aligned}$$

$$\begin{aligned}\text{Portable PC} &= \frac{1,650 \text{ Units}}{11,000 \text{ Units}} \times 100 = 15\%\end{aligned}$$

$$\begin{aligned}\text{Super PC} &= \frac{1,100 \text{ Units}}{11,000 \text{ Units}} \times 100 = 10\%\end{aligned}$$

Computation of Variances:

(i) Computation of Individual Product and Total Sales Volume Variance

$$\text{Sales Volume Variance} = \left[\frac{\text{Actual Industry Sales in Units}}{\text{Budgeted Industry Sales in Units}} - 1 \right] \times \text{Budgeted Contribution Margin per Unit}$$

Individual Product Sales Volume Variance:

PC :

$$= (8,250 \text{ Units} - 7,000 \text{ Units}) \times ₹ 10,000 = ₹ 1,25,00,000 \quad (F)$$

Portable PC :

$$= (1,650 \text{ Units} - 1,000 \text{ Units}) \times ₹ 6,000 = ₹ 39,00,000 \quad (F)$$

Super PC:

$$= (1,100 \text{ Units} - 2,000 \text{ Units}) \times ₹ 40,000 = ₹ \underline{3,60,00,000} \quad (A)$$

$$\text{Total Sales Volume Variance} = ₹ \underline{1,96,00,000} \quad (A)$$

(ii) Computation of Total Sales Quantity Variance

Total Sales Quantity Variance:

$$= \left[\frac{\text{Total Actual Sales Units} - \text{Total Budgeted Sales Units}}{\text{Sales Units}} \right] \times \frac{\text{Budgeted Average Contribution}}{\text{Margin per Unit}}$$

$$= (11,000 \text{ Units} - 10,000 \text{ Units}) \times ₹ 15,600 = ₹ 1,56,00,000 \quad (F)$$

(iii) Computation of the Market Size and Market Share Variances

Market size variance:

$$\begin{aligned} &= \text{Budgeted Market Share Percentage} \times \left[\frac{\text{Actual Industry Sales in Units} - \text{Budgeted Industry Sales in Units}}{\text{Sales in Units}} \right] \times \frac{\text{Budgeted Average Contribution}}{\text{Margin per Unit}} \\ &= 0.20 \times (68,750 \text{ Units} - 50,000 \text{ Units}) \times ₹ 15,600 \\ &= ₹ 5,85,00,000 \quad (F) \end{aligned}$$

Market Share Variance:

$$\begin{aligned} &= \left[\frac{\text{Actual market Share Percentage} - \text{Budgeted Market Shares Percentage}}{\text{Share Percentage}} \right] \times \left[\frac{\text{Actual Industry Sale Volume in Units}}{\text{Sales in Units}} \right] \times \left[\frac{\text{Budgeted Average Contribution}}{\text{Margin per Unit}} \right] \\ &= (0.16 - 0.20) \times 68,750 \text{ Units} \times ₹ 15,600 \\ &= ₹ 4,29,00,000 \quad (A) \end{aligned}$$

Note: Sales variances can also be calculated by using sales value approach.

5.4 Reporting of Variances

Computation of variances and their reporting is not the final step towards the control of various elements of cost. It infact demands an analysis of variances from the side of the executives, to ascertain the correct reasons for their occurrence. After knowing the exact reasons, it becomes their responsibility to take necessary steps so as to stop the re-occurrence of adverse variances in future. To enhance the utility of such a reporting system it is necessary that such

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a system of reporting should not only be prompt but should also facilitate the concerned managerial level to take necessary steps. Variance reports should be prepared after keeping in view its ultimate use and its periodicity. Such reports should highlight the essential cost deviations and possibilities for their improvements. In fact the variance reports should give due regard to the following points :-

- (i) The concerned executives should be informed about what the cost performance should have been.
- (ii) How close the actual cost performance is with reference to standard cost performance.
- (iii) The analysis and causes of variances.
- (iv) Reporting should be based on the principle of management by exception.
- (v) The magnitude of variances should also be stated.

Preparation of Original Budget, Standard Product Cost Sheet and the Reconciliation of Budgeted Profit and Actual Profit: Generally, under variance analysis we compute various variances from the actual and the standard/budgeted data. Sometimes all or a few variances and actual data are made available and from that we are required to prepare standard product cost sheet, original budget and to reconcile the budgeted profit with the actual profit. Some important concept are given below:

🔑 Reconciliation Statement (Absorption Costing)			
Budgeted Profit		Actual Profit	
Budgeted Profit			<input type="checkbox"/>
(Budgeted Quantity × Budgeted Margin)			
Effect of Variances			
Material Cost Variance			
Material Price Variance		<input type="checkbox"/>	
Material Usage Variance			
Material Mix Variance	<input type="checkbox"/>		
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Labour Cost Variance			
Labour Rate Variance		<input type="checkbox"/>	
Labour Efficiency Variance			
Labour Mix Variance	<input type="checkbox"/>		
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable Overhead Cost Variances			
Variable Overhead Expenditure Variance		<input type="checkbox"/>	
Variable Overhead Efficiency Variance		<input type="checkbox"/>	<input type="checkbox"/>

Fixed Overhead Cost Variances				
Fixed Overhead Expenditure Variance			<input type="checkbox"/>	
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	<input type="checkbox"/>			
Fixed Overhead Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sales Margin Variance				
Sales Margin Price Variance			<input type="checkbox"/>	
Sales Margin Volume Variance				
Sales Margin Mix Variance	<input type="checkbox"/>			
Sales Margin Quantity Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actual Profit				<input type="checkbox"/>

Reconciliation Statement (Marginal Costing)				
Budgeted Profit → Actual Profit				
Budgeted Profit				<input type="checkbox"/>
(Budgeted Quantity × Budgeted Margin)				
Effect of Variances				
Material Cost Variance				
Material Price Variance			<input type="checkbox"/>	
Material Usage Variance				
Material Mix Variance	<input type="checkbox"/>			
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Labour Cost Variance				
Labour Rate Variance			<input type="checkbox"/>	
Labour Efficiency Variance				
Labour Mix Variance	<input type="checkbox"/>			
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Variable Overhead Cost Variances				
Variable Overhead Expenditure Variance			<input type="checkbox"/>	
Variable Overhead Efficiency Variance			<input type="checkbox"/>	<input type="checkbox"/>
Fixed Overhead Cost Variances				
Fixed Overhead Expenditure Variance			<input type="checkbox"/>	
Fixed Overhead Volume Variance [@]				
Fixed Overhead Capacity Variance	NA			
Fixed Overhead Efficiency Variance	NA	NA	<input type="checkbox"/>	

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Sales Margin Variance

Sales Margin Price Variance [#]					<input type="checkbox"/>
Sales Margin Volume Variance [*]					
Sales Margin Mix Variance ^{**}	<input type="checkbox"/>				
Sales Margin Quantity Variance ^{***}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Actual Profit					<input type="checkbox"/>

@ Relation between Sales Margin Volume Variance (Absorption Costing) & Sales Margin Volume Variance (Marginal Costing):

Sales Margin Volume Variance (Absorption Costing) = Budgeted Margin Per Unit x (Actual Quantity-Budgeted Quantity)

Or

Sales Margin Volume Variance (Absorption Costing) = [Standard (or Budgeted) Contribution Per Unit- Standard Fixed Overheads Per Unit] x (Actual Quantity-Budgeted Quantity)

Or

Sales Margin Volume Variance (Absorption Costing) = [Standard Contribution Per Unit x (Actual Quantity- Budgeted Quantity)]- [Standard Fixed Overheads Per Unit x (Actual Quantity-Budgeted Quantity)]

Or

Sales Margin Volume Variance (Absorption Costing) = Sales Margin Volume Variance (Marginal Costing) - Fixed Overhead Volume Variance

Or

Sales Margin Volume Variance (Marginal Costing) = Sales Margin Volume Variance (Absorption Costing) + Fixed Overhead Volume Variance

^{*} Sales Margin Volume Variance (Marginal Costing) = [Standard Contribution Per Unit x (Actual Quantity-Budgeted Quantity)]

^{**} Sales Margin Mix Variance (Marginal Costing) = [Standard Contribution Per Unit x (Actual Quantity-Revised Actual Quantity)]

^{***} Sales Margin Quantity Variance (Marginal Costing) = [Standard Contribution Per Unit x (Revised Actual Quantity-Budgeted Quantity)]

Sales Price Variance is equal to Sales Margin Price Variance This is because, for the actual quantity sold, standard cost remaining constant, change in selling price will have equal impact on turnover and profit.

Sales Margin Volume Variance (Absorption Costing) = Sales Volume Variance x Budgeted Net Profit Ratio

Sales Margin Volume Variance (Marginal Costing) = Sales Volume Variance x Budgeted PV Ratio

Reconciliation Statement (Absorption Costing)

Standard Profit \longrightarrow Actual Profit

Standard Profit				<input type="checkbox"/>
(Actual Quantity × Budgeted Margin)				
Effect of Variances				
Material Cost Variance				
Material Price Variance		<input type="checkbox"/>		
Material Usage Variance				
Material Mix Variance	<input type="checkbox"/>			
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Labour Cost Variance				
Labour Rate Variance		<input type="checkbox"/>		
Labour Efficiency Variance				
Labour Mix Variance	<input type="checkbox"/>			
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Variable Overhead Cost Variances				
Variable Overhead Expenditure Variance		<input type="checkbox"/>		
Variable Overhead Efficiency Variance		<input type="checkbox"/>	<input type="checkbox"/>	
Fixed Overhead Cost Variances				
Fixed Overhead Expenditure Variance		<input type="checkbox"/>		
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	<input type="checkbox"/>			
Fixed Overhead Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sales Margin Variance				
Sales Margin Price Variance		<input type="checkbox"/>		
Sales Margin Volume Variance				
Sales Margin Mix Variance	NA			
Sales Margin Quantity Variance	NA	NA	<input type="checkbox"/>	<input type="checkbox"/>
Actual Profit				<input type="checkbox"/>

Illustration 12

New Jumbo Enterprises manufactures one product, and the entire product is sold as soon as it is produced. There are no opening or closing stocks and work in progress is negligible. The company operates a standard costing system and analysis of variances is made every month. The standard cost card for the product is as follows:

		₹
Direct material	0.5 kgs at ₹ 4 per kg.	2.00
Direct Wages	2 hrs. at ₹ 2 per hour	4.00
Variable overheads	2 hrs at ₹ 0.30 per hour	0.60
Fixed overheads	2 hours at ₹ 3.70 per hour	7.40
Standard cost		14.00
Standard profit		6.00

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Standard selling price

20.00

Budgeted output for April 2012 was 5,100 units.

Actual results for April 2012 were as follows:

Production of 4,850 units was sold for ₹ 95,600.

Materials consumed in production amounted to 2,300 kgs. At a total cost of ₹ 9,800.

Labour hours paid for amounted to 8,500 hours at a cost of ₹ 16,800.

Actual operating hours amounted to 8,000 hours.

Variable overheads amounted to ₹ 2,600.

Fixed overheads amounted to ₹ 42,300

You are required to

- Calculate Material, Labour, Variable Overhead, Fixed Overhead, Sales Value & Sales Margin Variances.
- Prepare an operating statement for the month ended 30th April 2012.
- Prepare an reconciliation Statement between 'Budgeted Profit & Actual Profit' under 'Absorption Costing Method'
- Prepare an reconciliation Statement between 'Budgeted Profit & Actual Profit' under 'Marginal Costing Method'
- Prepare an reconciliation Statement between 'Standard Profit & Actual Profit' under 'Absorption Costing Method'

Solution

(a) Calculation of Variances:

1. Material Variances

[SP × SQ]	[AQ × AP]	[AQ × SP]
(4,850 × 0.50) Kg. × ₹ 4 = ₹ 9,700	2,300 Kg. × ₹ 4.26 = ₹ 9,800	2,300 Kg. × ₹ 4 = ₹ 9,200

* ₹ 9,800 / 2,300Kg.

Note:

SQ = Standard Quantity = Expected Consumption for Actual Output

AQ = Actual Quantity of Material Consumed

SP = Standard Price per Unit

AP = Actual Price per Unit

$$\begin{aligned}\text{Material Cost Variance} &= \text{Standard Cost} - \text{Actual Cost} \\ &= \text{SQ} \times \text{SP} - \text{AQ} \times \text{AP}\end{aligned}$$

$$\begin{aligned}
 &= ₹ 9,700 - ₹ 9,800 \\
 &= ₹ 100 (A) \\
 \text{Material Price Variance} &= \text{Standard Cost of Actual Quantity} - \text{Actual Cost} \\
 &= AQ \times SP - AQ \times AP \\
 &= ₹ 9,200 - ₹ 9,800 \\
 &= ₹ 600 (A) \\
 \text{Material Usage Variance} &= \text{Standard Cost of Standard Quantity for Actual Output} - \\
 &= \text{Standard Cost of Actual Quantity} \\
 &= SQ \times SP - AQ \times SP \\
 &= ₹ 9,700 - ₹ 9,200 \\
 &= ₹ 500 (F)
 \end{aligned}$$

2. Labour Variances

[SH × SR]	[AH × AR]	[AH × SR]
(4,850 × 2) hrs. × ₹ 2 = ₹ 19,400	8,500 hrs. × ₹ 1.976* = ₹ 16,800	8,500 hrs. × ₹ 2 = ₹ 17,000

* ₹ 16,800/8,500 hrs.

Note:

SH = Standard Hours = Expected Time Allowed for Actual Output
 AH = Actual Hours *paid for*
 SR = Standard Rate per Labour Hour
 AR = Actual Rate per Labour Hour Paid

$$\begin{aligned}
 \text{Labour Cost Variance} &= \text{Standard Wages} - \text{Actual Wages} \\
 &= SH \times SR - AH \times AR \\
 &= ₹ 19,400 - ₹ 16,800 = ₹ 2,600 (F) \\
 \text{Labour Rate Variance} &= \text{Standard Cost of Actual Time} - \text{Actual Cost} \\
 &= SR \times AH - AR \times AH \\
 &= ₹ 17,000 - ₹ 16,800 = ₹ 200 (F) \\
 \text{Labour Efficiency Variance} &= \text{Standard Cost of Standard Time for Actual Output} - \\
 &= \text{Standard Cost of Actual time} \\
 &= SH \times SR - AH \times SR \\
 &= ₹ 19,400 - ₹ 17,000 = ₹ 2,400 (F) \\
 \text{Labour Idle Time Variance} &= \text{Actual Idle Hrs.} \times \text{Standard Rate per Hour} \\
 &= 500 \text{ Hrs.} \times ₹ 2 = ₹ 1,000
 \end{aligned}$$

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Labour Efficiency Variance = Labour Net Efficiency Variance + Labour Idle Time Variance

Labour Net Efficiency Variance = ₹ 2,400 (F) – ₹ 1,000 (A) = ₹ 3,400 (F)

3. Fixed Overhead Variance

Absorbed Fixed Overheads [SR@ × AO]	Budgeted Fixed Overheads [BO × SR@]	Actual Fixed Overheads [AO × AR]	Budgeted Overheads for Actual Hours [SR# × AH]
₹ 7.40 × 4,850 Units = ₹ 35,890	5,100 Units × ₹ 7.40 = ₹ 37,740	4,850 Units × ₹ 8.722* = ₹ 42,300	₹ 3.70 × 8,000 Hrs = ₹ 29,600

*₹ 42,300 / 4,850 Units

Note:

SR@ = Standard Fixed Overhead Rate per Unit
 AO = Actual Output
 BO = Budgeted Output
 AR = Actual Fixed Overhead Rate per Unit
 SR# = Standard Fixed Overhead Rate per Hour
 AH = Actual Hours

Fixed Overhead Cost Variance = Absorbed Fixed Overheads – Actual Fixed Overheads
 = ₹ 35,890 – ₹ 42,300 = ₹ 6,410 (A)

Fixed Overhead Expenditure Variance = Budgeted Fixed Overheads – Actual Fixed Overheads
 = ₹ 37,740 – ₹ 42,300 = ₹ 4,560 (A)

Fixed Overhead Capacity Variance = Budgeted Fixed Overheads for Actual Hours – Budgeted Fixed Overheads
 = ₹ 29,600 – ₹ 37,740 = ₹ 8,140 (A)

Fixed Overhead Efficiency Variance = Absorbed Fixed Overheads – Budgeted Fixed Overheads for Actual hours
 = ₹ 35,890 – ₹ 29,600 = ₹ 6,290 (F)

Fixed Overhead Volume Variance = Absorbed Fixed Overheads – Budgeted Fixed Overheads
 = ₹ 35,890 – ₹ 37,740 = ₹ 1,850 (A)

4. Variable Overhead Variance

Standard Variable Overheads [SR@ × AO]	Actual Variable Overheads [AO × AR]	Budgeted Variable Overheads for Actual Hours [SR# × AH]
₹ 0.60 × 4,850 Units = ₹ 2,910	4,850 Units × ₹ 0.536 = ₹ 2,600	₹ 0.30 × 8,000 Hours = ₹ 2,400

*₹ 2,600/4,850 Units

Note:

- SR@ = Standard Variable Overhead Rate per Unit
 AO = Actual Output
 AR = Actual Variable Overhead Rate per Unit
 SR# = Standard Variable Overhead Rate per Hour
 AH = Actual Hours

Variable Overhead Cost Variance	= Standard Variable Overheads – Actual Variable Overheads = ₹ 2,910 – ₹ 2,600 = ₹ 310 (F)
Variable Overhead Expenditure Variance	= Budgeted Variable Overheads for Actual Hours – Actual Variable Overheads = ₹ 2,400 – 2,600 = ₹ 200 (A)
Variable Overhead Efficiency Variance	= Standard Variable Overheads – Budgeted Variable Overheads for Actual hours = ₹ 2,910 – ₹ 2,400 = 510 (F)

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5. Sales Value Variances

BQ × BP	AQ × AP	AQ × BP
5,100 Units × ₹ 20 = ₹ 1,02,000	4,850 units × ₹ 19.71 = ₹ 95,600	4,850 × ₹ 20 = ₹ 97,000

* ₹ 95,600/ 4,850 units

Note:

BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 BP = Budgeted Selling Price per Unit
 AP = Actual Selling Price per Unit

Sales Variance = Actual Sales – Budgeted Sales
 = AP × AQ – BP × BQ
 = ₹ 95,600 – ₹ 1,02,000
 = ₹ 6,400 (A)

Sale Price Variance = Actual Sales – Standard Sales
 = AP × AQ – BP × AQ
 = ₹ 95,600 – ₹ 97,000
 = ₹ 1,400 (A)

Sales Volume Variance = Standard Sales – Budgeted Sales
 = BP × AQ – BP × BQ
 = ₹ 97,000 – ₹ 1,02,000
 = ₹ 5,000 (A)

6. Sales Margin Variances

BQ × BM	AQ × AM	AQ × BM
5,100 Units × ₹ 6 = ₹ 30,600	4,850 units × $\left[\frac{\text{₹ 95,600}}{4,850 \text{ units}} - \text{₹ 14} \right]$ = ₹ 27,700	4,850 units × ₹ 6 = ₹ 29,100

Note:

BM = Budgeted Margin
 = (Budgeted Price per Unit – Standard Cost per Unit)

AM = Actual Margin
 = (Actual Sales Price per Unit – Standard Cost per Unit)

BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity

$$\begin{aligned}
 \text{Sales Margin Variance} &= \text{Actual Margin} - \text{Budgeted Margin} \\
 &= \text{AQ} \times \text{AM} - \text{BQ} \times \text{BM} \\
 &= ₹ 27,700 - ₹ 30,600 \\
 &= ₹ 2,900 \text{ (A)} \\
 \text{Sales Margin Price Variance} &= \text{Actual Margin} - \text{Standard Margin} \\
 &= \text{AM} \times \text{AQ} - \text{BM} \times \text{AQ} \\
 &= ₹ 27,700 - ₹ 29,100 \\
 &= ₹ 1,400 \text{ (A)} \\
 \text{Sales Margin Volume Variance} &= \text{Standard Margin} - \text{Budgeted Margin} \\
 &= \text{BM} \times \text{AQ} - \text{BM} \times \text{BQ} \\
 &= ₹ 29,100 - ₹ 30,600 \\
 &= ₹ 1,500 \text{ (A)} \\
 &\text{OR} \\
 \text{Sales Margin Volume Variance} &= [\text{Sales Volume Variance} \times \text{Budgeted Net Profit Ratio}] \\
 &= ₹ 5,000 \text{ (A)} \times \left[\frac{₹ 6}{₹ 20} \times 100 \right] = ₹ 1,500 \text{ (A)}
 \end{aligned}$$

(b) Operating Statement for the month ended 30th April 2012:

Operating Statement	₹	₹
Sales		95,600
Less: Cost of Materials	9,800	
Labour	16,800	
Variable Overhead	2,600	
Fixed Overhead	42,300	71,500
Net Profit		24,100

(c) Reconciliation Statement between 'Budgeted Profit & Actual Profit' under 'Absorption Costing' method

Reconciliation Statement (Absorption Costing)

Budgeted Profit \longrightarrow **Actual Profit**

	₹	₹	₹	₹
Budgeted Profit				30,600
(Budgeted Quantity x Budgeted Margin)				
Effect of Variances				
Material Cost Variances:				
Material Price Variance		(600)		

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Material Usage Variance		500	(100)	
Labour Cost Variances:				
Labour Rate Variance		200		
Labour Efficiency Variance (Net)		3,400		
Labour Idle Time Variance		(1,000)	2,600	
Variable Overhead Cost Variances:				
Variable Overhead Expenditure Variance		(200)		
Variable Overhead Efficiency Variance		510	310	
Fixed Overhead Cost Variances:				
Fixed Variable Overhead Expenditure Variance		(4,560)		
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	(8,140)			
Fixed Overhead Efficiency Variance	6,290	(1,850)	(6,410)	
Sales Margin Variance:				
Sales Margin Price Variance		(1,400)		
Sales Margin Volume Variance		(1,500)	(2,900)	(6,500)
Actual Profit				24,100

Adverse shown by (–) symbol

🔑 Overheads can also be affected by Idle time. It is usually assume that overhead expenditure s incurred in active hours only.

(d) Reconciliation between 'Budgeted Profit & Actual Profit' under 'Marginal Costing' Method**Reconciliation Statement (Marginal Costing)****Budgeted Profit** → **Actual Profit**

	₹	₹	₹	₹
Budgeted Profit (Budgeted Quantity x Budgeted Margin)				30,600
Effect of Variances				
Material Cost Variances:				
Material Price Variance		(600)		
Material Usage Variance		500	(100)	
Labour Cost Variances:				
Labour Rate Variance		200		
Labour Efficiency Variance (Net)		3,400		
Labour Idle Time Variance		(1,000)	2,600	
Variable Overhead Cost Variances:				
Variable Overhead Expenditure Variance		(200)		
Variable Overhead Efficiency Variance		510	310	
Fixed Overhead Cost Variances:				
Fixed Variable Overhead Expenditure Variance		(4,560)		
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	NA			
Fixed Overhead Efficiency Variance	NA	NA	(4,560)	
Sales Margin Variance:				
Sales Margin Price Variance		(1,400)		
Sales Margin Volume Variance*		(3,350)	(4,750)	(6,500)
Actual Profit				24,100

Adverse shown by (–) symbol

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☛ Calculation of Sales Margin Volume Variance

* Sales Margin Volume Variance (Marginal Costing)	=	Budgeted Contribution per Unit × (Actual Quantity – Budgeted Quantity)
	=	₹ 13.40 × (4,850 Units – 5,100 Units)
	=	3,350 (A)
	Or	
* Sales Margin Volume Variance (Marginal Costing)	=	Sales Margin Volume Variance (Absorption Costing) + Fixed Overhead Volume Variance
	=	₹ 1,500(A) + ₹ 1,850 (A)
	=	3,350 (A)
	Or	
* Sales Margin Volume Variance (Marginal Costing)	=	Sales Volume Variance × Budgeted PV Ratio
	=	₹ 5,000 (A) × (₹ 13.40/20.00 × 100) %
	=	3,350 (A)

(e) Reconciliation between 'Standard Profit & Actual Profit' under 'Absorption Costing' method

Reconciliation Statement (Absorption Costing)

Standard Profit → Actual Profit

	₹	₹	₹	₹
Standard Profit (Actual Quantity x Budgeted Margin)				29,100
Effect of Variances				
Material Cost Variances:				
Material Price Variance		(600)		
Material Usage Variance		500	(100)	
Labour Cost Variances:				
Labour Rate Variance		200		
Labour Efficiency Variance (Net)		3,400		
Labour Idle Time Variance		(1,000)	2,600	
Variable Overhead Cost Variances:				
Variable Overhead Expenditure Variance		(200)		
Variable Overhead Efficiency Variance		510	310	

Fixed Overhead Cost Variances:				
Fixed Variable Overhead Expenditure Variance		(4,560)		
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	(8,140)			
Fixed Overhead Efficiency Variance	6,290	(1,850)	(6,410)	
Sales Margin Variance:				
Sales Margin Price Variance		(1,400)		
Sales Margin Volume Variance		NA	(1,400)	(5,000)
Actual Profit				24,100

Adverse shown by (–) symbol

 Now Students should try to attempt Illustration No.25

5.5 Accounting Procedure For Standard Cost

The standard cost operations can be recorded in the books of account. Two important accounting procedures for standard costs are:

Partial Plan: This system uses current standards in which the inventory will be valued at current standard cost figure. Under this method the work-in-progress account is charged at the actual cost of production for the month and is credited with the standard cost of the month's production of finished product. The closing balance of work-in-progress is also shown at standard cost. The balance after making the credit entries represent the variance from standard for the month. The analysis of the variance is done after the end of the month. This method is simple in operation because variances are analysed after the end of month but may present difficulties if the firm makes a variety of products. The following illustration will explain the operation of the recording of standard cost under this method.

Single Plan: The main purpose of standard costing is cost control. To achieve this purpose, the variances should be analysed according to their causes. Analysis should be timely so that much time is not lost in taking corrective action wherever needed. In the partial plan, we have seen that the variances are analysed at the end of period. The single plan system envisages the posting of all items in the debit side of the work-in-progress account at the standard cost leaving the credit side to represent the standard cost of finished production and work-in-progress. This system enables the ascertainment of variances as and when the transaction is posted to work-in-progress account. In other words, the analysis of variances is done from the original documents like invoices, labour sheets, etc., and this method of analysis is known as

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analysis at source. Since, the single plan system contemplates the analysis of variances at source, the installation of this system requires more planning so that effective documentation at each stage is introduced for proper recording and analysis of variance. Thus for example, the issue of bill of materials to the stores enables the storekeeper to calculate the standard value of materials. If any material is requisitioned beyond the standard, he can mark the same for material usage variance account. In the production department, as and when the finished output is recorded, the standard waste and actual waste can be compared and necessary entries can be made by the shop supervisors for posting the excessive usage to appropriate variance accounts.

Illustration 13

XYZ & Co. manufactures product 'Gamma'. It uses a standard costing system in which material price variance and labour rate variance are segregated at the point of purchase of material and the incurrence of labour cost respectively.

The standard cost card for product 'Gamma' shows the following details:-

	Per unit (₹)
Material – 1 Kg. at 6 per Kg.	6
Labour – 2.5 Hrs. at ₹ 4 per Hr.	10
Overhead – 2.5 Hrs. at ₹ 2 per Hr.	5
Standard cost	21

Overhead rate is ₹ 2 per hour, the budgeted overhead being Rs. 2,000 for 1,000 budgeted hours.

Other information for the month of Nov'2012 is as follows:-

Materials:

Opening stock	400 Kgs. at ₹ 6.00 per Kg.
Purchase	500 Kgs. at ₹ 7.00 per Kg.
Issued to production	450 Kgs.
Direct labour:	925 Hours at ₹ 4.40 per Hour.
Overhead:	₹ 2,100

During this month, 360 units are completed and in respect of 40 units, it is estimated that they are complete as to materials, but half complete as to labour and overhead. 300 units are sold at ₹ 30 per unit during the month. Prepare:-

- Cost Control Accounts
- Variance Accounts
- Trial Balance at the end of the month.

Also prepare the Cost Control Accounts, Variance Accounts and Trial Balance if the Company had implemented the 'Partial Plan' of accounting for variance.

Solution

Single Plan

(a) Cost Control Accounts

Raw Material Control A/c

	(₹)		(₹)
To Balance b/d (400 Kg. at ₹ 6)	2,400	By Work – in – Progress Control A/c (Issued 400 Kg. at ₹ 6)	2,400
To GL Adjustment A/c (500 Kg. at ₹ 6)	3,000	By Material Usage Variance A/c (50 Kg. @ ₹ 6)	300
		By Balance c/d (450 Kg. at ₹ 6)	2,700
	5,400		5,400

Wages Control A/c

	(₹)		(₹)
To GL Adjustment A/c (925 hours at ₹ 4)	3,700	By Work – in – Progress Control A/c (950 hours at ₹ 4)	3,800
To Efficiency Variance A/c (25 hours at ₹ 4)	100		
	3,800		3,800

Overhead Control A/c

	(₹)		(₹)
To GL Adjustment A/c	2,100	By Work – in – Progress Control A/c	1,900
To Overhead Efficiency Variance A/c	50	By Overhead Expenditure Variance A/c	100
		By Overhead Capacity Variance A/c	150
	2,150		2,150

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Work-in-Progress Control A/c

	(₹)		(₹)
To Raw Material Control A/c (400 units at ₹ 6)	2,400	By FG Control A/c (360 units at ₹ 21)	7,560
To Wage Control A/c (380 units at ₹ 10)	3,800	By Balance c/d (40 units)	540
To Overhead Control A/c (380 units at ₹ 5)	1,900		
	8,100		8,100

***Work-in-Progress Control A/c (Closing Balance) ₹ 540**

[Material: 40 units x ₹ 6 = 240, Labour: 20 units x ₹ 10 = 200, Overhead 20 units x ₹ 5]

Finished Goods (FG) Control A/c

	(₹)		(₹)
To Work-in-Progress Control A/c (360 units at ₹ 21)	7,560	By Costing P & L A/c (300 units at ₹ 21)	6,300
		By Balance c/d (60 units at ₹ 21)	1,260
	7,560		7,560

Costing P & L A/c

	(₹)		(₹)
To Finished Goods Control A/c	6,300	By GL Adjustment A/c (Sales)	9,000
To Material Purchase Price Variance A/c	500	By Labour Efficiency Variance A/c	100
To Material Usage Variance A/c	300	By Overhead Efficiency Variance A/c	50
To Labour Rate Variance A/c	370		
To Overhead Expenditure Variance A/c	100		
To Overhead Capacity Variance A/c	150		
To GL Adjustment A/c (Profit)	1,430		
	9,150		9,150

General Ledger (GL) Adjustment A/c

	(₹)		(₹)
To Costing P & L A/c	9,000	By Balance b/d	2,400
To Balance c/d	4,500	By Material Control A/c	3,000
		By Material Purchase Price Variance A/c	500
		By Wages Control A/c	3,700
		By Labour Rate Variance A/c	370
		By Overhead Control A/c	2,100
		By Costing P & L A/c (Profit)	1,430
	13,500		13,500

(b) Variance Accounts:

Material Purchase Price Variance A/c

	(₹)		(₹)
To GL Adjustment A/c	500	By Costing P & L A/c	500
	500		500

Material Usage Variance A/c

	(₹)		(₹)
To Raw Material Control A/c	300	By Costing P & L A/c	300
	300		300

Labour Rate Variance A/c

	(₹)		(₹)
To GL Adjustment A/c	370	By Costing P & L A/c	370
	370		370

Labour Efficiency Variance A/c

	(₹)		(₹)
To Costing P & L A/c	100	By Wages Control A/c	100
	100		100

Overhead Expenditure Variance A/c

	(₹)		(₹)
To Overhead Control A/c	100	By Costing P & L A/c	100
	100		100

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Overhead Capacity Variance A/c

	(₹)		(₹)
To Overhead Control A/c	150	By Costing P & L A/c	150
	150		150

Overhead Efficiency Variance A/c

	(₹)		(₹)
To Costing P & L A/c	50	By Overhead Control A/c	50
	50		50

(c) Trial Balance at the end of the Month

	Dr. (₹)	Cr. (₹)
GL Adjustment A/c	--	4,500
Raw Material Control	2,700	--
Work-in-Progress Control	540	--
Finished Goods Control	1,260	--
	4,500	4,500

Partial Plan

(a) Cost Control Accounts

Raw Material Control A/c

	(₹)		(₹)
To Balance b/d (400 Kg. at ₹ 6)	2,400	By Work-in-Progress Control A/c	2,750
To GL Adjustment A/c (500 Kg. at ₹ 7)	3,500	By Balance c/d (450 Kg. at ₹ 7)	3,150
	5,900		5,900

Wages Control A/c

	(₹)		(₹)
To GL Adjustment A/c	4,070	By Work-in-Progress Control A/c	4,070
	4,070		4,070

Overhead Control A/c

	(₹)		(₹)
To GL Adjustment A/c	2,100	By Work-in-Progress Control A/c	2,100
	2,100		2,100

Work-in-Progress Control A/c

	(₹)		(₹)
To Raw Material Control A/c	2,750	By FG Control A/c (360 units at ₹ 21)	7,560
To Wage Control A/c	4,070	By Material Price Variance A/c	50
To Overhead Control A/c	2,100	By Material Usage Variance A/c	300
To Labour Efficiency Variance A/c	100	By Overhead Capacity Variance A/c	150
To Overhead Efficiency Variance A/c	50	By Overhead Expenditure Variance A/c	100
		By Labour Rate Variance A/c	370
		By Balance c/d (40 units)*	540
	9,070		9,070

***Work-in-Progress Control A/c (Closing Balance) ₹ 540**

[Material: 40 units x ₹ 6 = 240, Labour: 20 units x ₹ 10 = 200, Overhead 20 units x ₹ 5]

Finished Goods (FG) Control A/c

	(₹)		(₹)
To Work-in-Progress Control A/c (360 units at ₹ 21)	7,560	By Costing P&L A/c	6,300
		By Balance c/d (60 units at ₹ 21)	1,260
	7,560		7,560

Costing P & L A/c

	(₹)		(₹)
To FG Control A/c	6,300	By GL Adjustment A/c (Sales)	9,000
To Material Price Variance A/c	50	By Labour Efficiency Variance A/c	100
To Material usage Variance A/c	300	By Overhead Efficiency Variance A/c	50
To Labour Rate Variance A/c	370		
To Overhead Expenditure Variance A/c	100		
To Overhead Capacity Variance A/c	150		
To GL Adjustment A/c (Profit)	1,880		
	9,150		9,150

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General Ledger (GL) Adjustment A/c

	(₹)		(₹)
To Costing P & L A/c	9,000	By Balance b/d	2,400
To Balance c/d	4,950	By Material Control A/c	3,500
		By Wages Control A/c	4,070
		By Overhead Control A/c	2,100
		By Costing P & L A/c (Profit)	1,880
	13,950		13,950

(b) Variance Accounts:

Material Price Variance A/c

	(₹)		(₹)
To Work-in-Progress Control A/c	50	By Costing P & L A/c	50
	50		50

Material Usage Variance A/c

	(₹)		(₹)
To Work-in-Progress Control A/c	300	By Costing P & L A/c	300
	300		300

Labour Rate Variance A/c

	(₹)		(₹)
To Work-in-Progress Control A/c	370	By Costing P & L A/c	370
	370		370

Labour Efficiency Variance A/c

	(₹)		(₹)
To Costing P & L A/c	100	By Work-in-Progress Control A/c	100
	100		100

Overhead Expenditure Variance A/c

	(₹)		(₹)
To Work-in-Progress Control A/c	100	By Costing P & L A/c	100
	100		100

Overhead Capacity Variance A/c

	(₹)		(₹)
To Work-in-Progress Control A/c	150	By Costing P & L A/c	150
	150		150

Overhead Efficiency Variance A/c

	(₹)		(₹)
To Costing P & L A/c	50	By Work-in-Progress Control A/c	50
	50		50

(c) Trial Balance at the end of the Month

	Dr. (₹)	Cr. (₹)
GL Adjustment	--	4,950
Raw Material Control	3,150	--
Work-in-Progress Control	540	--
Finished Goods Control	1,260	--
	4,950	4,950

Working Notes:**(1) Equivalent Production:**

As regards Material (360 + 40) = 400 Units

As regards Labour and

Overhead (360 + $\frac{1}{2}$ X 40) = 380 Units

(2) Material Variances:

SQ x SP	AQ x AP	AQ x SP
400 Units x ₹ 6	400 Units x ₹ 6 + 50 Units x ₹ 7	450 Units x ₹ 6
= ₹ 2,400	= ₹ 2,750	= ₹ 2,700

Material Price Variance = SP x AQ – AP x AQ
= ₹ 2,700 – ₹ 2,750 = ₹ 50 (A)

Material Usage Variance = SQ x SP – AQ x SP
= ₹ 2,400 – ₹ 2,700 = ₹ 300 (A)

Material Purchase Price Variance = (SP– AP) x PQ
= (₹ 6 – ₹ 7) x 500 Units = ₹ 500(A)

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(3) Labour Variances:

SH x SR	AH x AR	AH x SR
(380 x 2.5) hrs x ₹ 4 = ₹ 3,800	925 hrs x ₹ 4.40 = ₹ 4,070	925 hrs x ₹ 4 = ₹ 3,700

$$\begin{aligned}\text{Labour Rate Variance} &= \text{SR} \times \text{AH} - \text{AR} \times \text{AH} \\ &= ₹ 3,700 - ₹ 4,070 = ₹ 370 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Labour Efficiency Variance} &= \text{SH} \times \text{SR} - \text{AH} \times \text{SR} \\ &= ₹ 3,800 - ₹ 3,700 = ₹ 100 \text{ (F)}\end{aligned}$$

(4) Overhead Variances:

Absorbed Overheads	Budgeted Overheads	Actual Overheads	Budgeted Overheads for Actual Hours
380 Units x ₹ 5 ₹ 1,900	₹ 2,000 (Given)	₹ 2,100 (Given)	₹ 925 hrs x Rs. 2 = ₹ 1,850

$$\begin{aligned}\text{Fixed Overhead Expenditure Variance} &= \text{Budgeted Overheads} - \text{Actual Overheads} \\ &= ₹ 2,000 - ₹ 2,100 = ₹ 100 \text{ (A)} \\ \text{Fixed Overhead Volume Variance} &= \text{Absorbed Overheads} - \text{Budgeted Overheads} \\ &= ₹ 1,900 - ₹ 2,000 \\ &= ₹ 100 \text{ (A)} \\ \text{Fixed Overhead Capacity Variance} &= \text{Budgeted Overheads for Actual Hours} - \text{Budgeted Overheads} \\ &= ₹ 1,850 - ₹ 2,000 = ₹ 150 \text{ (A)} \\ \text{Fixed Overhead Efficiency Variance} &= \text{Absorbed Overheads} - \text{Budgeted Overheads for Actual Hours} \\ &= ₹ 1,900 - ₹ 1,850 = ₹ 50 \text{ (F)}\end{aligned}$$

Illustration 14

A company following standard costing system has the following information for the quarter ending 30th June, 2012:

Material purchased	12,000 pieces at ₹ 1.32	₹ 15,840.00
Materials consumed	11,400 pieces at ₹ 1.32	₹ 15,048.00
Actual wages paid	2,970 hours at ₹ 4.20	₹ 12,474.00
Actual factory expenses incurred	₹ 20,400 (Budgeted ₹ 19,800)	
Units produced:	1,080 units and sold at ₹ 72 per unit	

The standard rates and prices are as under:

Direct materials ₹ 1.20 per unit
Standard input 12 pieces per unit
Direct labour rate ₹ 3.60 per hour

Standard requirement 3.00 hours per unit

Overheads ₹ 7.20 per labour hour

You are required to:

- Calculate Material, Labour and Overhead Variances.
- Prepare Material Control Account and Work in Progress Control Account if the company had adopted the Partial Plan for accounting of variances. Also give Journal Entries for the same.

Solution

(A) Calculation of Variances:

The cost sheet for 1,080 units will appear as under:

Cost	Std. Qty.	Std. Rate (₹)	Std. Cost (₹)
Direct Material	12,960	1.20	15,552
Direct Labour	3,240	3.60	11,664
Overheads	3,240	7.20	<u>23,328</u>
			<u>50,544</u>

Material Variances

Material Price Variance:

$$= 11,400 \text{ pcs.} \times (\text{₹ } 1.20 - \text{₹ } 1.32) = \text{₹ } 1,368 \text{ (A)}$$

Material Usage Variance:

$$= \text{₹ } 1.20 \times (12,960 \text{ pcs.} - 11,400 \text{ pcs.})$$

$$= \text{₹ } 1,872 \text{ (F)}$$

Labour Variances

Labour Rate Variance:

$$= 2,970 \text{ hrs.} \times (\text{₹ } 3.60 - \text{₹ } 4.20) = \text{₹ } 1,782 \text{ (A)}$$

Labour Efficiency Variance:

$$= \text{₹ } 3.60 \times (3,240 \text{ hrs.} - 2,970 \text{ hrs.}) = \text{₹ } 972 \text{ (F)}$$

Overhead Variances:

(a) Charged to Production as per Cost Sheet (Absorbed):	₹ 23,328
(b) Actual Hours × Std. Rate (2,970 hrs. × ₹ 7.20):	₹ 21,384
(c) Overheads as per Budget	₹ 19,800
(d) Actual Overheads	₹ 20,400
Efficiency Variance: (a) – (b)	₹ 1,944 (F)
Capacity Variance: (b) – (c)	₹ 1,584 (F)

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Expense Variance: (c) – (d) ₹ 600 (A)

Total Variance: (a) – (d) ₹ 2,928 (F)

(B) Ledger Accounts:

Material Control A/c

Dr.	(₹)		Cr.
			(₹)
To Opening balance	—	By Work-in-Progress Control A/c	15,048
To General Ledger Adjustment A/c	15,840	By Balance c/d	792
	15,840		15,840

Work-in-Progress Control A/c

Dr.	(₹)		Cr.
			(₹)
To Opening balance	—	By Finished Stock Control A/c	50,544.00
To Material Control A/c	15,048.00	By Material Price Variance A/c	1,368.00
To Wages Control A/c	12,474.00	By Labour Rate Variance A/c	1,782.00
To Overheads Control A/c	20,400.00	By Overhead Exp Variance A/c	600.00
To Material Usage Variance A/c	1,872.00		
To Labour Efficiency Variance A/c	972.00		
To Overhead Efficiency Variance A/c	1,944.00		
To Overhead Capacity Variance A/c	1,584.00		
	54,294.00		54,294.00

Note: Assumed that there is no closing balance of work-in progress.

(C) Journal Entries:

	(₹)	(₹)
(i) Material Control A/c Dr. To General Ledger Adjustment A/c (Being the purchase value of 12,000 pieces of materials at ₹ 1.32 each)	15,840	15,840
(ii) Work-in-Progress A/c Dr. To Material Control A/c (Being the cost of 11,400 pieces of materials actually issued to production at the actual price of ₹ 1.32 each)	15,048	15,048
(iii) Work-in-Progress A/c Dr. To Wages Control A/c Being the actual amount of direct wages paid for 2,970 hours at ₹ 4.20 per hour)	12,474	12,474

(iv)	Work-in-Progress A/c	Dr	20,400	
	To Overhead Expense Control A/c			20,400
	(Being the actual overhead expenses incurred)			
(v)	Finished Stock Control A/c	Dr.	50,544	
	To Work-in-Progress A/c			50,544
	(Being the standard cost of production transferred to finished goods account)			
(vi)	Material Price Variance A/c	Dr.	1,368	
	Labour Rate Variance A/c	Dr.	1,782	
	Overhead Expense Variance A/c	Dr.	600	
	Work-in-Progress A/c	Dr.	2,622	
	To Material Usage Variance A/c			1,872
	To Labour Efficiency Variance A/c			972
	To Overhead Efficiency Variance A/c			1,944
	To Overhead Capacity Variance A/c			1,584
	(Being variance charged)			

5.6 Miscellaneous Illustrations:

☛ Note: In some solutions alternate formulas are given with the basic formulas for the better understanding of students.

Computation of All Variances

Illustration 15

The Standard Cost Card of producing one unit of Item 'Q' is as under:

			₹
Direct material —	A —	12 Kg. @ ₹ 10/-	120
	B —	5 Kg. @ ₹ 6/-	30
Direct wages —		5 Hrs. @ ₹ 3/-	15
Fixed production overheads			35
Total standard cost			200

Fixed Production overhead is absorbed on expected annual output of 13,200 units. Actual result for the month of September, 2012 are as under:

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Actual production : 1,000 units

		₹
Direct material A	11,000 Kg.	1,21,000
B	5,200 Kg.	28,600
Direct wages	5,500 Hrs.	17,500
Fixed Overheads		39,000

You are required to calculate all variances.

Solution

Basic Calculations:

Statement showing Standard and Actual Costs of Material for 1,000 Units of Output and Standard Cost of Actual Input (Standard Proportion)

Material	Standard Cost			Actual Cost			Standard Cost of Actual Input in Std. Proportion		
	Qty. [SQ]	Price [SP]	Amount [SQ × SP]	Qty. [AQ]	Price [AP]	Amount [AQ × AP]	Qty. [RAQ]	Price [SP]	Amount [RAQ × SP]
	(Kg.)	(₹)	(₹)	(Kg.)	(₹)	(₹)	(Kg.)	(₹)	(₹)
A	12,000	10	1,20,000	11,000	11	1,21,000	11,435	10	1,14,350
B	5,000	6	30,000	5,200	5.50	28,600	4,765	6	28,590
	17,000		1,50,000	16,200		1,49,600	16,200		1,42,940

Note :

SQ = Standard Quantity = Expected Consumption for Actual Output

AQ = Actual Quantity of Material Consumed

RAQ = Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion

SP = Standard Price Per Unit

AP = Actual Price Per Unit

Statement showing Standard and Actual Labour Cost of 1,000 Units Produced

Standard Cost			Actual Cost		
Hours [SH]	Rate [SR] (₹)	Amount [SH x SR] (₹)	Hours [AH]	Rate [AR] (₹)	Amount [AH x AR] (₹)
5,000	3	15,000	5,500	3.1818	17,500

Note :

SH = Standard Hours = Expected time (Time allowed) for Actual Output

AH = Actual Hours paid for

SR = Standard Rate per Labour Hour

AR = Actual Rate per Labour Hour Paid

Statement showing Overheads

Absorbed Overheads [SR** x AO]	Budgeted Overheads [SR* x BH]	Actual Overheads [AR x AH]	Budgeted Overheads for Actual Hours [SR* x AH]
₹35 × 1,000 Units = ₹35,000	₹7* × (1,100 Units × 5 Hrs.) = ₹38,500	₹39,000 (Given)	₹7* × 5,500 Hrs. = ₹ 38,500

$$* \quad \text{Standard Rate per hour} = \left(\frac{₹ 35}{5 \text{ Hours}} = ₹ 7/\text{hr.} \right)$$

** Standard Rate per Unit (Given)

Computation of Variances:**Material Cost Variance** = Standard Cost – Actual Cost

$$= SQ \times SP - AQ \times AP$$

$$(A) = ₹ 1,20,000 - ₹ 1,21,000$$

$$= ₹ 1,000 (A)$$

$$(B) = ₹ 30,000 - ₹ 28,600$$

$$= ₹ 1,400 (F)$$

$$\text{Total} = ₹ 1,000 (A) + ₹ 1,400 (F)$$

$$= ₹ 400 (F)$$

Material Price Variance = Standard Cost of Actual Quantity – Actual Cost

$$= AQ \times SP - AQ \times AP$$

Or

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$$= AQ \times (SP - AP)$$

$$(A) = 11,000 \text{ Kgs.} \times (\text{₹ } 10 - \text{₹ } 11)$$

$$= \text{₹ } 11,000 (A)$$

$$(B) = 5,200 \text{ Kgs.} \times (\text{₹ } 6 - \text{₹ } 5.50)$$

$$= \text{₹ } 2,600 (F)$$

$$\text{Total} = \text{₹ } 11,000 (A) + \text{₹ } 2,600 (F)$$

$$= \text{₹ } 8,400 (A)$$

Material Usage Variance = Standard Cost of Standard Quantity for Actual Output –
Standard Cost of Actual Quantity

$$= SQ \times SP - AQ \times SP$$

Or

$$= SP \times (SQ - AQ)$$

$$(A) = \text{₹ } 10 \times (12,000 \text{ Kgs.} - 11,000 \text{ Kgs.})$$

$$= \text{₹ } 10,000 (F)$$

$$(B) = \text{₹ } 6 \times (5,000 \text{ Kgs.} - 5,200 \text{ Kgs.})$$

$$= \text{₹ } 1,200 (A)$$

$$\text{Total} = \text{₹ } 10,000 (F) + \text{₹ } 1,200 (A)$$

$$= \text{₹ } 8,800 (F)$$

Material Mix Variance = Standard Cost of Actual Quantity in Standard Proportion –
Standard Cost of Actual Quantity

$$= RAQ \times SP - AQ \times SP$$

$$(A) = 11,435 \text{ Kgs.} \times \text{₹ } 10 - 11,000 \text{ Kgs.} \times \text{₹ } 10$$

$$= \text{₹ } 4,350 (F)$$

$$(B) = 4,765 \text{ Kgs.} \times \text{₹ } 6 - 5,200 \text{ Kgs.} \times \text{₹ } 6 = \text{₹ } 2,610 (A)$$

$$\text{Total} = \text{₹ } 1,740 (F)$$

Material Yield Variance = Standard Cost of Standard Quantity for Actual Output –
Standard Cost of Actual Quantity in Standard Proportion

$$= SQ \times SP - RAQ \times SP$$

Or

$$= SP \times (SQ - RAQ)$$

$$(A) = \text{₹ } 10 \times (12,000 - 11,435) = \text{₹ } 5,650 (F)$$

$$(B) = \text{₹ } 6 \times (5,000 - 4,765) = \text{₹ } 1,410 (F)$$

$$\text{Total} = \text{₹ } 5,650 (F) + \text{₹ } 1,410 (F) = \text{₹ } 7,060 (F)$$

Labour Cost Variance = Standard Cost – Actual Cost

$$= SH \times SR - AH \times AR$$

$$= 5,000 \text{ hrs.} \times \text{₹ } 3 - 5,500 \text{ hrs.} \times \text{₹ } 3.818....$$

$$= \text{₹ } 2,500 (A)$$

Labour Rate Variance	= Standard Cost of Actual Time –Actual Cost = $AH \times SR - AH \times AR$ Or $AH \times (SR - AR)$ = 5,500 hrs. \times ₹ 3 – 5,500 hrs. \times ₹ 3.1818..... = ₹ 1,000 (A)
Labour Efficiency Variance	= Standard Cost of Standard Time for Actual Output –Standard Cost of Actual Time $SH \times SR - AH \times SR$ Or $SR \times (SH - AH)$ = 5,000 hrs \times ₹ 3 – 5,500 hrs. \times ₹ 3 = ₹ 1,500 (A)
Fixed Overhead Cost Variance	= Absorbed Fixed Overheads –Actual Fixed Overheads = $SR^{**} \times AO - AR \times AH$ = ₹ 35 \times 1,000 units – ₹ 39,000 = ₹ 4,000 (A)
<i>** Standard Rate per Unit</i>	
Fixed Overhead Expenditure Variance	= Budgeted Fixed Overheads –Actual Fixed Overheads = $BH \times SR^* - AR \times AH$ = ₹ 7 \times (1,100 Units \times 5 hrs.) – ₹ 39,000 = ₹ 500 (A)
<i>* Standard Rate per Hour</i>	
Fixed Overhead Volume Variance	= Absorbed Fixed Overheads –Budgeted Fixed Overheads = $SR^{**} \times AO - SR^* \times BH$ = ₹ 35 \times 1,000 Units – ₹ 7 \times (1,100 units \times 5 hrs.) = ₹ 3,500 (A)
<i>** Standard Rate per Unit *Standard Rate per Hour</i>	
Fixed Overhead Capacity Variance	= Budgeted Fixed Overheads for Actual Hours –Budgeted Fixed Overheads = $SR^* \times AH - SR^* \times BH$ = ₹ 7 \times 5,500 hrs. – ₹ 7 \times (1,100 units \times 5 hrs.) = NIL
<i>*Standard Rate per Hour</i>	

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Fixed Overhead Efficiency Variance

$$= \text{Absorbed Fixed Overheads} - \text{Budgeted Fixed Overheads for Actual Hours}$$

$$= \text{SR}^{**} \times \text{AO} - \text{SR}^* \times \text{AH}$$

$$= ₹ 35 \times 1,000 \text{ units} - ₹ 7 \times 5,500 \text{ hrs.}$$

$$= ₹ 3,500 \text{ (A)}$$

** Standard Rate per Unit

* Standard Rate per Hour

Illustration 16

HK Corporation produces three products A, B and C. The master budget called for the sale of 10,000 units of A at ₹ 12, 6,000 units of B at ₹ 15 and 8,000 units of C at ₹ 9. In addition, the standard variable cost for each product was ₹ 7 for A, ₹ 9 for B and ₹ 6 for C. Infact, the firm actually produced and sold 11,000 units of A at ₹ 11.50, 5,000 units of B at ₹ 15.10 and 9,000 units of C at ₹ 8.55.

The firm uses two input to produce each of the products X and Y. The standard price of material X is ₹ 2 and for a unit of material Y is ₹ 1. The materials budgeted to be used for each product were:

Products	Materials	
	X (units)	Y (units)
A	2	3
B	4	1
C	1	4

The firm actually used 54,000 units of X at a cost of ₹ 1,09,620 and 72,000 units of Y at a cost of ₹ 73,000.

Required:

Determine the mix, quantity and rate variances for sales as well as the yield, mix and price variance for materials.

Solution

Basic Calculations Sales Variances (Sales Value Method):

Product	Budgeted Sales			Actual Sales			Standard Sales	Revised Actual Quantity [RAQ] (Units)
	Qty. [BQ] (Units)	Rate [BP] (₹)	Amount [BQ × BP] (₹)	Qty. [AQ] (Units)	Rate [AP] (₹)	Amount [AQ × AP] (₹)	Actual Quantity × Budgeted price [AQ × BP] (₹)	
A	10,000	12	1,20,000	11,000	11.50	1,26,500	1,32,000	10,417
B	6,000	15	90,000	5,000	15.10	75,500	75,000	6,250
C	8,000	9	72,000	9,000	8.55	76,950	81,000	8,333
	24,000		2,82,000	25,000		2,78,950	2,88,000	25,000

Note:

BQ	=	Budgeted Sales Quantity
AQ	=	Actual Sales Quantity
RAQ	=	Revised Actual Sales Quantity
	=	Actual Quantity Sold Rewritten in Budgeted Proportion
BP	=	Budgeted Selling Price per Unit
AP	=	Actual Selling Price

Computation of Sales Variances (Sales Value Method):

Sales Value Variance	=	Actual Sales – Budgeted Sales
	=	AP × AQ – BP × BQ
For Product A	=	₹ 1,26,500 – ₹ 1,20,000 = ₹ 6,500 (F)
For Product B	=	₹ 75,500 – ₹ 90,000 = ₹ 14,500 (A)
For Product C	=	₹ 76,950 – ₹ 72,000 = ₹ 4,950 (F)
Total	=	₹ 6,500 (F) + ₹ 14,500 (A) + ₹ 4,950 (F)
	=	₹ 3,050 (A)

Sales Price Variance	=	Actual Sales – Standard Sales
	=	AP × AQ – BP × AQ
	Or	
	=	AQ × (AP – BP)
For Product A	=	11,000 Units × (₹ 11.50 – ₹ 12.00) = ₹ 5,500 (A)
For Product B	=	5,000 Units × (₹ 15.10 – ₹ 15.00) = ₹ 500 (F)
For Product C	=	9,000 Units × (₹ 8.55 – ₹ 9.00) = ₹ 4,050 (A)
Total	=	₹ 5,500 (A) + ₹ 500 (F) + ₹ 4,050 (A)
	=	₹ 9,050 (A)

Sales Volume Variance	=	Standard Sales – Budgeted Sales
	=	BP × AQ – BP × BQ
	Or	
	=	BP × (AQ – BQ)
For Product A	=	₹ 12 × (11,000 Units – 10,000 Units) = ₹ 12,000 (F)
For Product B	=	₹ 15 × (5,000 Units – 6,000 Units) = ₹ 15,000 (A)
For Product C	=	₹ 9 × (9,000 Units – 8,000 Units) = ₹ 9,000 (F)
Total	=	₹ 12,000 (F) + ₹ 15,000 (A) + ₹ 9,000 (F)
	=	₹ 6,000 (F)

Sales Mix Variance	=	Standard Sales – Revised Standard Sales
	=	BP × AQ – BP × RAQ
	Or	
	=	BP × (AQ – RAQ)
For Product A	=	₹ 12 × (11,000 Units – 10,417* Units) = 6,996 (F)
For Product B	=	₹ 15 × (5,000 Units – 6,250 Units) = 18,750 (A)
For Product C	=	₹ 9 × (9,000 Units – 8,333* Units) = 6,003 (F)

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$$\begin{aligned}\text{Total} &= ₹ 6,996 (F) + ₹ 18,750 (A) + ₹ 6,003 (F) \\ &= ₹ 5,751 (A) \# \end{aligned}$$

OR

$$\begin{aligned}\text{Sales Mix Variance} &= \text{Total Actual Qty (units)} \times (\text{Average Budgeted Price per unit of Actual Mix} - \text{Average Budgeted Price per unit of Budgeted Mix}) \\ &= 25,000 \text{ Units} \times \left[\left(\frac{₹ 2,88,000}{25,000 \text{ Units}} \right) - \left(\frac{₹ 2,82,000}{24,000 \text{ Units}} \right) \right] \\ &= 5,750 (A) \# \end{aligned}$$

Note: ₹ 1 difference is due to * marked figures, rounded nearest to one.

$$\begin{aligned}\text{Sales Quantity Variance} &= \text{Revised Standard Sales} - \text{Budgeted Sales} \\ &= \text{BP} \times \text{RAQ} - \text{BP} \times \text{BQ} \\ \text{Or} \\ &= \text{BP} \times (\text{RAQ} - \text{BQ}) \\ \text{For Product A} &= ₹ 12 \times (10,417^* \text{ Units} - 10,000 \text{ Units}) = 5,004 (F) \\ \text{For Product B} &= ₹ 15 \times (6,250 \text{ Units} - 6,000 \text{ Units}) = 3,750 (F) \\ \text{For Product C} &= ₹ 9 \times (8,333^* \text{ Units} - 8,000 \text{ Units}) = 2,997 (F) \\ \text{Total} &= ₹ 5,004 (F) + ₹ 3,750 (F) + ₹ 2,997 (F) \\ &= ₹ 11,751 (F) \# \end{aligned}$$

OR

$$\begin{aligned}\text{Sales Quantity Variance} &= \text{Average Budgeted Price per unit of Budgeted Mix} \times [\text{Total Actual Qty (units)} - \text{Total Budgeted Qty (units)}] \\ &= \left(\frac{₹ 2,82,000}{24,000 \text{ Units}} \right) \times (25,000 \text{ Units} - 24,000 \text{ Units}) \\ &= ₹ 11.75 \times (1,000 \text{ Units}) \\ &= ₹ 11,750 (F) \# \end{aligned}$$

Note: ₹ 1 difference is due to * marked figure we have rounded nearest to one.

Basic Calculations Sales Variances (Sales Margin Method):

Product	Budgeted Margin			Actual Margin			Actual Quantity × Budgeted Margin [AQ×BM] (₹)	Revised Actual Quantity [RAQ] (Units)
	Qty.	Rate	Amount	Qty.	Rate	Amount		
	[BQ] (Units)	[BM] (₹)	[BQ × BM] (₹)	[AQ] (Units)	[AM] (₹)	[AQ×AM] (₹)		
A	10,000	5	50,000	11,000	4.50	49,500	55,000	10,417
B	6,000	6	36,000	5,000	6.10	30,500	30,000	6,250
C	8,000	3	24,000	9,000	2.55	22,950	27,000	8,333
	24,000		1,10,000	25,000		1,02,950	1,12,000	25,000

Note:

BQ	=	Budgeted Sales Quantity
AQ	=	Actual Sales Quantity
RAQ	=	Actual Quantity Sold Rewritten in Budgeted Proportion
BM	=	Budgeted Margin
AM	=	Actual Margin

Computation of Sales Variances (Sales Margin Method):

Sales Margin Variance = Actual Margin – Budgeted Margin

= $AQ \times AM - BQ \times BM$

For Product A = ₹ 49,500 – ₹ 50,000 = ₹ 500 (A)

For Product B = ₹ 30,500 – ₹ 36,000 = ₹ 5,500 (A)

For Product C = ₹ 22,950 – ₹ 24,000 = ₹ 1,050 (A)

Total = ₹ 500 (A) + ₹ 5,500 (A) + ₹ 1,050 (A)

= ₹ 7,050 (A)

Sales Margin Price Variance = Actual Margin – Standard Margin

= $AQ \times AM - AQ \times BM$

For Product A = 11,000 Units × (₹ 4.50 – ₹ 5.00) = 5,500 (A)

For Product B = 5,000 Units × (₹ 6.10 – ₹ 6.00) = ₹ 500 (F)

For Product C = 9,000 Units × (₹ 2.55 – 3.00) = 4,050 (A)

Total = ₹ 5,500 (A) + ₹ 500 (F) + ₹ 4,050 (A)

= ₹ 9,050 (A)

Sales Margin Volume Variance = Standard Margin – Budgeted Margin

= $AQ \times BM - BQ \times BM$

Or

= $BM \times (AQ - BQ)$

For Product A = ₹ 5.00 × (11,000 Units – 10,000 Units) = ₹ 5,000 (F)

For Product B = ₹ 6.00 × (5,000 Units – 6,000 Units) = ₹ 6,000 (A)

For Product C = ₹ 3.00 × (9,000 Units – 8,000 Units) = ₹ 3,000 (F)

Total = ₹ 5,000 (F) + ₹ 6,000 (A) + ₹ 3,000 (F)

= ₹ 2,000 (F)

Sales Margin Mix Variance = Standard Margin – Revised Standard Margin

= $AQ \times BM - RAQ \times BM$

Or

= $BM \times (AQ - RAQ)$

For Product A = ₹ 5.00 × (11,000 Units – 10,417* Units) = ₹ 2,915 (F)

For Product B = ₹ 6.00 × (5,000 Units – 6,250 Units) = ₹ 7,500 (A)

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For Product C = ₹ 3.00 × (9,000 Units – 8,333* Units) = ₹ 2001 (F)

Total = ₹ 2,915 (F) + ₹ 7,500 (A) + ₹ 2,001 (F)

= ₹ 2,584# (A)

Or

Sales Margin Mix Variance = Total Actual Quantity (units) × (Average Budgeted Margin per unit of Actual Mix – Average Budgeted Margin per unit of Budgeted Mix)

= 25,000 Units × $\left(\frac{₹ 1,12,000}{25,000 \text{ units}} - \frac{₹ 1,10,000}{24,000 \text{ units}} \right)$ = ₹ 2,583# (A)

Note: # ₹ 1 difference is due to * marked figures, rounded nearest to one.

Sales Margin Quantity = Revised Standard Margin – Budgeted Margin

Variance = RAQ × BM – BQ × BM

Or

= BM × (RAQ – BQ)

For Product A = ₹ 5 × (10,417* Units – 10,000 Units) = ₹ 2,085 (F)

For Product B = ₹ 6 × (6,250 Units – 6,000 Units) = ₹ 1,500 (F)

For Product C = ₹ 3 × (8,333* Units – 8,000 Units) = ₹ 999 (F)

Total = ₹ 2,085 (F) + ₹ 1,500 (F) + ₹ 999 (F)

= 4,584# (F)

Or

Sales Margin Quantity = Average Budgeted Margin per unit of Budgeted Mix ×
Variance [Total Actual Quantity (units) – Total Budgeted Quantity (units)]

= $\left(\frac{₹ 1,10,000}{24,000 \text{ units}} \right) \times (25,000 \text{ Units} - 24,000 \text{ Units})$

= ₹ 4,583# (F)

Note: # ₹ 1 difference is due to * marked figures, rounded nearest to one.

Basic Calculations: Material Variance

Material	Standard Cost			Actual Cost			Actual Quantity × Standard Price [AQ×SP] (₹)	Revised Actual Quantity [RAQ] (Units)
	Qty.	Price	Amount	Qty.	Amount	Price		
	[SQ] (Units)	[SP] (₹)	[SQ × SP] (₹)	[AQ] (Units)	[AQ×AP] (₹)	[AP] (₹)		
X	51,000	2	1,02,000	54,000	1,09,620	2.03	1,08,000	51,408
Y	74,000**	1	74,000	72,000	73,000	1.013	72,000	74,592
	1,25,000		1,76,000	1,26,000	1,82,620		1,80,000	1,26,000

* $(11,000 \times 2 + 5,000 \times 4 + 9,000 \times 1 = 51,000)$

** $(11,000 \times 3 + 5,000 \times 1 + 9,000 \times 4 = 74,000)$

Note:

SQ = Standard Quantity = Expected Consumption for Actual Output
 AQ = Actual Quantity of Material Consumed
 RAQ = Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion
 SP = Standard Price per unit
 AP = Actual Price per unit

Computation of Material Variances:

Material Cost Variance = Standard Cost – Actual Cost
 = $SQ \times SP - AQ \times AP$
 For Material 'X' = ₹ 1,02,000 – ₹ 1,09,620
 = ₹ 7,620 (A)
 For Material 'Y' = ₹ 74,000 – ₹ 73,000
 = ₹ 1,000 (F)
 Total = ₹ 7,620 (A) + ₹ 1,000 (F)
 = ₹ 6,620 (A)

Material Price Variance = Standard Cost of Actual Quantity – Actual Cost
 = $AQ \times SP - AQ \times AP$
 Or
 $AQ \times (SP - AP)$
 For Material 'X' = 54,000 Units \times (₹ 2.00 – ₹ 2.03) = ₹ 1,620 (A)
 For Material 'Y' = 72,000 Units \times (₹ 1.00 – ₹ 1.0139) = ₹ 1,000 (A)
 Total = ₹ 1,620 (A) + ₹ 1,000 (A) = ₹ 2,620 (A)

Material Usage Variance = Standard Cost of Standard Quantity for Actual Output –
 Standard Cost of Actual Quantity
 = $SQ \times SP - AQ \times SP$
 Or
 $SP \times (SQ - AQ)$
 For Material 'X' = ₹ 2 \times (51,000 Units – 54,000 Units) = ₹ 6,000 (A)
 For Material 'Y' = ₹ 1 \times (74,000 Units – 72,000 Units) = ₹ 2,000 (F)
 Total = ₹ 6,000 (A) + ₹ 2,000 (F) = ₹ 4,000 (A)

Material Mix Variance = Standard Cost of Actual Quantity in Standard Proportion –
 Standard Cost of Actual Quantity
 $RAQ \times SP - AQ \times SP$

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	Or
	= SP × (RAQ – AQ)
For Material 'X'	= ₹ 2 × (51,408 Units – 54,000 Units) = ₹ 5,184 (A)
For Material 'Y'	= ₹ 1 × (74,592 Units – 72,000 Units) = ₹ 2,592 (F)
Total	= ₹ 5,184 (A) + ₹ 2,592 (F) = ₹ 2,592 (A)
	Or
Material Mix Variance	= Total Actual Quantity (units) × (Average Standard Price <i>per unit</i> of Standard Mix – Average Standard Price <i>per unit</i> of Actual Mix)
	= 1,26,000 Units × $\left(\frac{₹ 1,76,000}{1,25,000 \text{ units}} - \frac{₹ 1,80,000}{1,26,000 \text{ units}} \right)$
	= ₹ 2,592 (A)
Material Yield Variance	= Standard Cost of Standard Quantity for Actual Output – Standard Cost of Actual Quantity in Standard Proportion
	SQ × SP – RAQ × SP
	Or
	SP × (SQ – RAQ)
For Material 'X'	= ₹ 2 × (51,000 Units – 51,408 Units) = ₹ 816 (A)
For Material 'Y'	= ₹ 1 × (74,000 Units – 74,592 Units) = ₹ 592 (A)
Total	= ₹ 816 (A) + ₹ 592 (A)
	= ₹ 1,408 (A)
	Or
Material Yield Variance	= Average Standard Price <i>per unit</i> of Standard Mix × [Total Standard Quantity (units) – Total Actual Quantity (units)]
	= $\left(\frac{₹ 1,76,000}{1,25,000 \text{ Units}} \right) \times (1,25,000 \text{ Units} - 1,26,000 \text{ Units})$
	= ₹ 1,408 (A)

Equivalent Concept – Variance Analysis

Illustration 17

GFE Associates undertake to prepare Property Tax returns. They use the weighted average method and actual costs for financial reporting purpose. However, for internal reporting, they use a standard cost system. The standards, on equivalent performance, have been established as follows:

Labour per return	10 hrs. @ ₹30 per hour
Overhead per return	10 hrs. @ ₹15 per hour

For June 2012 performance, budgeted overhead is ₹108,000 for the standard labour hours allowed.

The following additional information pertains to the month of June 2012:

June 1	Returns in process (25% complete)	180 Nos.
	Returns started in Jun	820 Nos.
June 30	Returns in process (80% complete)	200 Nos.
Cost Data		
June 1	Returns in process:	
	Labour	₹ 16,000
	Overheads	8,000
June 1 to 30	Labour (4,000 hrs.)	2,00,000
	Overheads	1,00,000

You are required to compute:

- For each cost element, equivalent units of performance and the actual cost per equivalent unit.
- Actual cost of returns in process on June 30
- The standard cost per return, and
- The labour rate Variance, labour efficiency variance, overhead volume and overhead expenditure variance.

Solution

- Statement showing cost elements equivalent units of performance and the actual cost per equivalent unit:**

Detail of Returns	Detail of Input Units	Details	Equivalent Units					
			Output Units	Labour		Overheads		
				Units	%	Units	%	
Returns in Process at Start	180	Returns Completed in June	800	800	100	800	100	
Returns Started in June	820	Returns in Process at the end of June	200	160	80	160	80	
	1,000		1,000	960		960		
Costs:				₹		₹		
From previous month				16,000		8,000		
During the month				2,00,000		1,00,000		
Total Cost				2,16,000		1,08,000		
Cost per Equivalent Unit				225.00		112.50		
Note: Since company follows Weighted Average Method, the stages of completion of returns at the beginning of June has been ignored.								

(b) Actual cost of returns in process on June 30:

	Numbers	Stage of Completion	Rate per Return (₹)	Total (₹)
Labour	200 returns	0.80	225.00	36,000
Overhead	200 returns	0.80	112.50	<u>18,000</u>
				<u>54,000</u>

(c) Standard Cost per Return:

Labour	10 Hrs x ₹30 per hour = ₹ 300
Overhead	10 Hrs x ₹15 per hour = ₹ <u>150</u>
	<u>450</u>

(d) Computation of Variances:

Statement showing output (Jun only) element wise	Labour	Overhead
Actual performance in June in terms of equivalent units as Calculated above	960	960
Less: Returns in process at the beginning of June in terms of equivalent units i.e. 25% of returns (180)	<u>45</u>	<u>45</u>
	<u>915</u>	<u>915</u>

Variance Analysis:**Labour Rate Variance**

- = Actual Time x (Standard Rate – Actual Rate)
- = Standard Rate x Actual Time – Actual Rate x Actual Time
- = ₹ 30 x 4,000 hrs. – ₹ 2,00,000 = ₹ 80,000(A)

Labour Efficiency Variance

- = Standard Rate x (Standard Time – Actual Time)
- = Standard Rate x Standard Time – Standard Rate x Actual Time
- = ₹ 30 x (915 units x 10 hrs.) – ₹ 30 x 4,000 hrs. = ₹ 154,500(F)

Overhead Expenditure or Budgeted Variance

- = Budgeted Overhead – Actual Overhead
- = ₹ 108,000 – ₹ 100,000
- = ₹ 8,000(F)

Overhead Volume Variance

- = Recovered/Absorbed Overhead – Budgeted Overhead
- = 915 Units x 10 hrs. x ₹ 15 – ₹ 108,000 = ₹ 29,250(F)

Illustration 18

Electro-Soft Ltd. has prepared the following cost sheet based on 8,000 units of output per month

	₹
Direct Materials 1.5 kg @ ₹ 24 per kg	36.00
Direct Labour 3 hours @ ₹ 4 per hours	12.00
Factory overheads	<u>12.00</u>
Total	<u>60.00</u>

The flexible budget for factory overhead is as under:

Output (units)	6,000	7,500	9,000	10,500
Factory overhead (₹)	81,600	92,400	1,03,200	1,14,000

The actual results for the month of October, 2002 are given below:

- Direct Materials purchased and consumed were 11,224 kg at ₹ 2,66,750.
- Direct Labour hours worked were 22,400 and Direct Wages paid amounted to ₹ 96,320.
- Factory overhead incurred amounted to ₹ 96,440 out of which the variable overhead is ₹ 2.60 per direct hour worked.
- Actual output is 7,620 units.
- Work-in-progress:
 - Opening WIP: 300 units:
Materials 100% complete; Labour and Overhead 60% complete
 - Closing WIP: 200 units:
Materials 50% complete; Labour and Overheads 40% complete

You are required to analyse the variances.

Solution**Statement of Equivalent Product**

	Material	Labour & Overhead
Output of Units produced	7,620	7,620
Add : Closing WIP (200 units × 50% for Materials)	100	80
(200 units × 40% for Labour & Overhead)	7,720	7,700
Less: Opening WIP (300 units × 100% Complete)	(300)	(180)
	7,420	7,520

Statement Showing Standard Cost & Actual Cost of Material

Standard Cost			Actual Cost		
Qty. [SQ] (Kg.)	Price [SP] (₹)	Amount [SQ × SP] (₹)	Qty. [AQ] (Kg.)	Price [AP] (₹)	Amount [AQ × AP] (₹)
11,130 (7,420 × 1.5)	24	2,67,120	11,224	23.766*	2,66,750

* Amount/Quantity

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Note :

SQ = Standard Quantity = Expected Consumption for Actual Output
 AQ = Actual Quantity of Material Consumed
 SP = Standard Price Per Unit
 AP = Actual Price Per Unit

Material Cost Variance = Standard Cost – Actual Cost
 = $SQ \times SP - AQ \times AP$
 = ₹ 2,67,120 – ₹ 2,66,750
 = ₹ 370 (F)

Material Price Variance = Standard Cost of Actual Quantity – Actual Cost
 = $AQ \times SP - AQ \times AP$
 Or
 = $AQ \times (SP - AP)$
 = $11,224 \times (\text{₹ } 24 - \text{₹ } 23.766)$
 = 2,626 (F)

Material Usage Variance = Standard Cost of Standard Quantity for Actual Output – Standard Cost for Actual Quantity
 = $SQ \times SP - AQ \times SP$
 Or
 = $SP \times (SQ - AQ)$
 = ₹ 24 × (11,130 Kg. – 11,224 Kg.)
 = ₹ 2,256 (A)

Statement showing Standard Cost & Actual Cost: Labour

Standard Cost			Actual Cost		
Time SH (Hrs.)	Rate SR (₹)	Amount SH × SR (₹)	Time AH (Hrs.)	Rate AR (₹)	Amount AH × AR (₹)
22,560 [7,520 Units × 3 Hrs.]	4	90,240	22,400	4.30*	96,320

*Amount/Hrs.

Note :

SH = Standard Hours = Expected time (Time allowed) for Actual Output.
 AH = Actual Hours paid for
 SR = Standard Rate per Labour Hour
 AR = Actual Rate per Labour Hour Paid

Labour Cost Variance = Standard Cost – Actual Cost
 = $SH \times SR - AH \times AR$
 = ₹ 90,240 – ₹ 96,320
 = ₹ 6,080 (A)

Labour Rate Variance = Standard Cost of Actual Time – Actual Cost
 = $AH \times SR - AH \times AR$
 Or
 = $AH \times (SR - AR)$
 = $22,400 \times (\text{₹ } 4 - \text{₹ } 4.30)$
 = ₹ 6,720 (A)

Labour Efficiency Variance = Standard Cost of Standard Time for Actual Output – Standard Cost of Actual Time
 = $SH \times SR - AH \times SR$
 Or
 = $SR \times (SH - AH)$
 = ₹ 4 × (22,560 hrs – 22,400 hrs)
 = ₹ 640 (F)

Statement Showing Standard/ Actual/ Budgeted Variable Overheads

Standard Variable Overheads [SH × SR]	Actual Variable Overheads [AH × AR]	Budgeted Overheads for Actual Hours [SR × AH]
[7,520 Units × 3 Hrs.] × ₹2.40 = ₹ 54,144	22,400 Hrs. × ₹ 2.60 = ₹ 58,240	22,400 Hrs. × ₹ 2.40 = ₹ 53,760

Note:

SH = Standard Hours = Expected Time for Actual Output
 SR = Standard Rate per Hour
 AH = Actual Hours Worked
 AR = Actual Rate per Hour

Variable Overhead Cost Variance = Standard Variable Overheads – Actual Variable Overheads
 = $SH \times SR - AH \times AR$
 = ₹ 54,144 – ₹ 58,240
 = ₹ 4,096 (A)

Variable Overhead Expenditure Variance = Budgeted Variable Overheads for Actual hours – Actual Variable Overheads
 = $SR \times AH - AR \times AH$
 = ₹ 53,760 – ₹ 58,240 = ₹ 4,480 (A)

Variable Overhead Efficiency Variance = Standard Variable Overheads – Budgeted Variable Overheads for Actual Hours
 = $SH \times SR - SR \times AH$
 = ₹ 54,144 – ₹ 53,760
 = ₹ 384 (F)

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Statement showing Absorbed/Budgeted/Actual Fixed Overheads

Absorbed Fixed Overheads (SH × SR)	Budgeted Fixed Overheads (BH × SR)	Actual Fixed Overheads (AR × AH)	Budgeted Fixed Overheads for Actual Hours* (SR × AH)
(7,520 Units × 3 Hrs.) × ₹ 1.60 = ₹ 36,096	(8,000 Units × 3 hrs.) × ₹ 1.60 = ₹ 38,400	22,400 Hrs. × ₹ 1.7054* = ₹ 38,200	₹ 1.60 × 22,400 hrs. = ₹ 35,840

* Amount/Hrs.

Note:

SH = Standard Hours = Expected Time for Actual Output
 SR = Standard Rate per Hour
 BH = Budgeted Hours = Expected Time for Budgeted Output
 AH = Actual Hours Worked
 AR = Actual Rate per Hour

Workings:

Standard Variable Overhead Rate per Unit = Change in Factory Overheads/Change in Output
 = (₹ 92,400 – ₹ 81,600)/(7,500 units – 6,000 units)
 = ₹ 7.20 per unit
 Standard Variable Overhead Rate per Hour = 2.40 per hour (7.20 per unit/3 hrs.)
 Standard Fixed Overhead Rate per Unit = Total Standard Factory Overhead per Unit –
 Standard Variable Overhead per unit
 Standard Fixed Overhead per Unit = ₹ 12 – ₹ 7.20 = ₹ 4.80
 Standard Fixed Overhead Rate per hour = ₹ 4.80/3 = ₹ 1.60 per hour

Fixed Overhead Cost Variance = Absorbed Fixed Overheads – Actual Fixed Overheads
 = SH × SR – AR × AH
 = ₹ 36,096 – ₹ 38,200 = ₹ 2,104 (A)
 Fixed Overhead Expenditure Variance = Budgeted Fixed Overheads – Actual Fixed Overheads
 = BH × SR – AR × AH
 = ₹ 38,400 – ₹ 38,200 = ₹ 200 (F)
 Fixed Overhead Volume Variance = Absorbed Fixed Overheads – Budgeted Fixed Overheads
 = SH × SR – BH × SR
 = ₹ 36,096 – ₹ 38,400 = ₹ 2,304 (A)
 Fixed Overhead Capacity Variance = Budgeted Fixed Overheads for Actual Hours – Budgeted Fixed Overheads
 = SR × AH – BH × SR

$$\begin{aligned}
 &= ₹ 35,840 - ₹ 38,400 = 2,560 \text{ (A)} \\
 \text{Fixed Overhead Efficiency Variance} &= \text{Absorbed Fixed Overheads} - \text{Budgeted Overheads for Actual hours} \\
 &= SH \times SR - SR \times AH \\
 &= ₹ 36,096 - ₹ 35,840 \\
 &= ₹ 256 \text{ (F)}
 \end{aligned}$$

Preparation of Financial Profit & Loss Statement *with given Variances*

Illustration 19

The following is the Operating Statement of a company for April 2012:

				(₹)
Budgeted Profit				2,00,000
Variances:		<u>Favourable</u> (₹)	<u>Adverse</u> (₹)	
Sales	Volume		8,000	
	Price	19,200		
Direct Material	Price		9,920	
	Usage		12,800	
Direct Labour	Rate		7,200	
	Efficiency	7,200		
Fixed Overheads				
	Efficiency	4,800		
	Capacity		8,000	
	Expense	<u>2,800</u>		
		<u>34,000</u>	<u>45,920</u>	<u>11,920 (A)</u>
Actual Profit				188,080

Additional information is as under:

Budget for the year 1,20,000 units
 Budgeted fixed overheads ₹ 9,60,000 per annum
 Standard cost of one unit of product is:
 Direct Materials 5 kg. @ ₹8 per kg.
 Direct Labour 2 hours @ ₹6 per hour
 Fixed overheads are absorbed on direct labour hour basis.
 Profit 25% on sales

You are required to prepare the Annual Financial Profit / Loss Statement for April, 2012 in the following format:

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Account	Qty./ Hours	Rate / Price (₹)	Actual Value (₹)
Sales			
Direct Materials			
Direct Labour			
Fixed Overheads			
Total Costs			
Profit			

Solution

Working Notes:

- Budgeted Fixed Overhead (per unit):

$$= (\text{Budgeted Fixed Overheads p.a.} / \text{Budgeted Output for the Year})$$

$$= ₹9,60,000 / 1,20,000 \text{ units} = ₹8 \text{ (per unit)}$$
 - Budgeted Fixed Overhead Hour:

$$= \text{Budgeted Fixed Overhead (per unit)} / \text{Standard Labour Hours (per unit)}$$

$$= ₹8 / 2 \text{ hours} = ₹4 \text{ per hour}$$
- Statement showing Standard Cost and Budgeted Selling Price

	(₹)
(a) Standard Cost (per unit):	
Direct Material	40
(5 kg. × ₹8/- per kg.)	
Direct Labour	12
(2 hours × ₹6/- per hour)	
Fixed Overhead	8
(2 hours × ₹4)	
Total Standard Cost (per unit)	<u>60</u>
(b) Budgeted Selling Price (per unit)	
Standard Cost (per unit)	60
Standard Profit (per unit)	20
(25% on Sales or 33-1/3% of Standard Cost)	
Budgeted Selling Price (per unit)	<u>80</u>

- Actual Output (units) for April, 2012:
Fixed Overhead Volume Variance:

$$= \text{Efficiency Variance} + \text{Capacity Variance}$$

$$= ₹4,800 (F) + ₹8,000 (A)$$

$$= ₹3,200 (A)$$

Fixed Overhead Volume Variance:

$$= \text{Absorbed Overheads} - \text{Budgeted Overheads}$$

$$= (\text{Standard Hours for Actual Output} - \text{Budgeted Hours}) \times \text{Standard Fixed Overhead Rate}$$

$$\Rightarrow (2 \text{ hrs} \times \text{Actual Output} - 10,000 \text{ units} \times 2 \text{ hrs}) \times ₹ 4 = (-) ₹3,200$$

$$\Rightarrow \text{Actual Output} = 9,600 \text{ units}$$

(b) Actual Fixed Overhead Expenses:

$$\text{Fixed Overhead Expenses Variance} = (\text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads})$$

$$\Rightarrow (₹80,000 - \text{Actual Fixed Overheads}) = ₹2,800 (F)$$

$$\Rightarrow \text{Actual Fixed Overheads} = ₹77,200$$

4. (a) Actual Sales Quantity (units):

Sales Margin Volume Variance

$$= \text{Budgeted Margin per unit} \times \left(\frac{\text{Actual Sales Quantity} - \text{Budgeted Sales Quantity}}{\text{Quantity units}} \right)$$

$$\Rightarrow ₹20 (\text{Actual Sales Quantity} - 10,000 \text{ units}) = ₹8,000 (A)$$

$$\Rightarrow \text{Actual Sales Quantity} = 9,600 \text{ units}$$

(b) Actual Selling Price (per unit):

$$\text{Sales Price Variance} = \left(\frac{\text{Actual Selling Price per unit} - \text{Budgeted Selling Price per unit}}{\text{Price per unit}} \right) \times \text{Actual Sales units}$$

$$\Rightarrow (\text{Actual Selling Price per unit} - ₹80) \times 9,600 \text{ units} = ₹19,200 (F)$$

$$\Rightarrow \text{Actual Selling Price per unit} = ₹82$$

5. (a) Actual Quantity of Material Consumed:

$$\text{Material Usage Variance} = \left(\frac{\text{Standard Quantity} - \text{Actual Quantity}}{\text{Quantity}} \right) \times \text{Standard Price per unit}$$

$$\Rightarrow (9,600 \text{ units} \times 5 \text{ kg.} - \text{Actual Quantity}) \times ₹8 = ₹12,800 (A)$$

$$\Rightarrow \text{Actual Quantity} = 49,600 \text{ Kg.}$$

(b) Actual Price per kg:

Material Price Variance

$$= (\text{Standard Price per kg.} - \text{Actual Price per kg.}) \times$$

Actual Quantity of Material Consumed

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⇒ (₹8 – Actual Price *per kg.*) x 49,600 Kg. = 9,920 (A)

⇒ Actual Price *per kg* ₹ 8.20

6. (a) Actual Direct Labour Hours Used:

Labour Efficiency Variance = (Standard Hours – Actual Hours) x Standard Rate per hour

⇒ (9,600 units × 2 hrs – Actual Hours) x ₹6 = ₹7,200 (F)

⇒ Actual Direct Labour Hours = 18,000 hours

- (b) Actual Direct Labour Hour Rate:

Labour Rate Variance = $\left(\text{Standard Rate per hour} - \text{Actual Rate per hour} \right) \times \text{Actual Direct Labour Hours}$

⇒ (₹6 per hour – Actual Rate *per hour*) x 18,000 hours = ₹7,200 (A)

⇒ Actual Direct Labour Hour Rate = ₹6.40 per hour

Annual financial Profit /Loss Statement (for April, 2012)

Account	Qty./ Hours	Rate/Price (₹)	Actual Value (₹)
(a)	(b)	(c)	(d)=(b)×(c)
Sales: (A) [Refer to working note 4]	9,600 units	82	7,87,200
Direct Materials: [Refer to working note 5]	49,600 kgs.	8.20 per kg.	4,06,720
Direct Labour: [Refer to working note 6]	18,000 hours	6.40 per hour	115,200
Fixed Overheads: [Refer to working note 6 (a) and 3 (b)] (Rs.77,200/18,000 hours) (absorbed on direct labour hour basis)	18,000 hours	4.288... per hour	77,200
Total Costs: (B)			5,99,120
Profit : [(A) – (B)]			188,080

Factors Contributing to Change in Profit

Illustration 20

The working results of a company for two corresponding years are shown below:

	Year 1 ₹ in lakhs	Year 2 ₹ in lakhs
Sales	1,200	1,540
Direct Material	600	648
Direct Wages and Variable Overheads	360	412
Fixed Overheads	160	300
	1,120	1,360
Profit	80	180

In year 2, there has been an increase in the selling price by 10%. Following are the details of material consumption and utilization of direct labour hours during the two years.

	Year 1	Year 2
Direct Material Consumption in m/t	5,00,000	5,40,000
Direct Labour Hours	75,00,000	80,00,000

You are required to:

- Keeping year 1 as base year, analyse the results of year 2 and work out the amount which each factor has contributed to change in profit.
- Find out the break even sales for both years.
- Calculate the percentage increase in selling price that would be needed over the sale value of year 2 to earn a margin of safety of 45%.

Solution

(i) Reconciliation statement showing which factor has contributed change in profit

(₹ in lacs)

	Favourable	Adverse
Increase in Contribution Due to Increase in Volume (₹ 280 lacs – ₹ 240 lacs) (Refer to working note 3)	40	—
Sales Price Variance (Refer to working note 3)	140	—
Material Usage Variance (Refer to working note 4)	52	—
Material Price Variance (Refer to working note 4)	—	—
Direct Labour Rate Variance (Refer to working note 4)	—	28
Direct Labour Efficiency Variance (Refer to working note 4)	36	—
Fixed Overhead Expenditure Variance (Refer to working note 3)	—	140

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Change in Profit	268	168
Change in Profit (Net)		100

(ii) Break-even sales

$$\text{Break-even Sales (Year 1)} = \frac{\text{Fixed cost}}{\text{P/V ratio}}$$

(Refer to working note 3)

$$\text{Break-even Sales (Year 2)} = \frac{\text{₹ 160 lacs}}{\left(\frac{\text{₹ 240 lacs}}{\text{₹ 1,200 lacs}} \right)} = \text{₹ 800 lacs}$$

(Refer to working note 3)

$$= \frac{\text{₹ 300 lacs}}{\left(\frac{\text{₹ 480 lacs}}{\text{₹ 1,540 lacs}} \right)} = \text{₹ 962.50 lacs}$$

(iii) Percentage increase in selling price needed over the sales value of year 2 to earn a margin of safety of 45% in year 2

$$\text{P/V Ratio} = (\text{₹ 480 lacs} / \text{₹ 1,540 lacs}) \times 100 = 31.169\%$$

$$\text{Break-even Sales} = \frac{\text{₹ 962.50 lacs}}{\text{₹ 1,540 lacs}} \times 100 = 62.5\%$$

(as % to sales)

If Margin of Safety to be earned is 45% then Break-even Point should be 55%

$$\text{Contribution increase required} = \frac{62.5 \times 31.169}{55} = 35.4193\%$$

$$\text{Revised Contribution} = 1,540 \text{ lacs} \times 35.4193\% = 545.45 \text{ lacs}$$

$$\text{Present Contribution} = \text{₹ 480 lacs}$$

$$\text{Increase in Selling Price required} = \text{₹ 65.45 lacs} (\text{₹ 545.45 lacs} - \text{₹ 480 lacs})$$

Percentage increase in Selling Price

$$\text{over the Sales Value of year 2} = \frac{\text{₹ 65.45 lacs}}{\text{₹ 1,540 lacs}} \times 100 = 4.25\%$$

Working Notes :

1. Budgeted Sales in year 2

If Actual Sales in year 2 is ₹ 110 then Budgeted Sales is ₹ 100.

$$\text{If Actual Sales in year 2 is ₹ 1 then Budgeted Sales} = \frac{\text{₹ 100}}{\text{₹ 110}}$$

If Actual Sales in year 2 are ₹ 15,40,00,000 then Budgeted Sales are

$$= \frac{₹100}{₹110} \times ₹15,40,00,000 = ₹1,400 \text{ lacs}$$

2. Budgeted figures of direct material; direct wages; and variable overhead worked out on the basis of % of sales in year 2:

$$\begin{aligned} \text{Direct Material \% to Sales (in year 1)} &= \frac{\text{Direct Wages and Variable Overhead}}{\text{Sales}} \\ &= \frac{600}{1,200} \times 100 = 50\% \end{aligned}$$

$$\begin{aligned} \text{Budgeted figure of Direct Material (in year 2)} &= 50\% \times ₹ 1,400 \text{ lacs} = 700 \text{ lacs} \end{aligned}$$

$$\begin{aligned} \text{Direct Wages and Variable Overhead (\% to sales in year 1)} &= \frac{\text{Direct Wages and Variable Overhead}}{\text{Sales}} \\ &= \frac{360}{1,200} \times 100 = 30\% \end{aligned}$$

$$\begin{aligned} \text{Budgeted figure of Direct Wages and Variable Overhead (in year 2)} &= 30\% \times 1,400 \text{ lacs} = 420 \text{ lacs} \end{aligned}$$

3. Statement of figures extracted from working results of a company

(Figure in lacs of ₹)

	Year 1 [Actual] (a)	Year 2 [Budgeted] (b)	Year 2 [Actual] (c)	Total [Variance] (d) = (c) – (b)
Sales : (A) (*Refer to working note 1)	1,200	1,400*	1,540	140 (F)
Direct Material...(a) (*Refer to working note 2)	600	700*	648	52 (F)
Direct Wages and Variable Overhead...(b) (*Refer to working note 2)	360	420*	412	8 (F)
Total Variable Costs: (B) = (a + b)	960	1,120	1,060	60(F)
Contribution (C) = (A) – (B)	240	280	480	200 (F)
Less : Fixed Cost	160	160	300	140 (A)
Profit	80	120	180	60(F)

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(4) (i) Data for Material Variances :

Standard Cost for Actual Output			Actual Cost		
Quantity of Material (m/t)	Rate per m/t (₹)	Amount (₹)	Quantity of Material (m/t)	Rate per m/t (₹)	Amount (₹)
5,83,333 $\left[\frac{₹700 \text{ lacs}}{₹120} \right]$	120*	700 lacs	5,40,000	120	648 lacs

* ₹ 600 lacs / 5 lacs m/t

Material Price Variance = (Standard Rate – Actual Rate) × Actual Quantity = Nil

Material Usage Variance = (Standard Quantity – Actual Quantity) × Standard Rate per m/t
= (5,83,333 – 5,40,000) × ₹ 120 = ₹ 52 lacs (F)

(ii) Data for labour variances overhead variances

Standard Cost for Actual Output			Actual Cost		
Labour Hours	Rate per hour (₹)	Amount (₹)	Labour Hours	Rate per hour (₹)	Amount (₹)
87,50,000 $\left[\frac{₹420 \text{ lacs}}{₹4.80} \right]$	4.80*	420 lacs	80,00,000	5.15	412 lacs

* ₹ 360 lacs / 75 lacs hours

Labour Rate Variance:

= (Standard Rate – Actual Rate) × Actual Labour Hours
= (₹ 4.80 – ₹ 5.15) × 80,00,000 = ₹ 28 lacs (A)

Labour and Variable Overhead Efficiency Variance:

= (Standard Labour Hours – Actual Labour Hours) × Standard Rate per Hour
= (87,50,000 – 80,00,000) × ₹ 4.80 = ₹ 36 lacs (F)

Selling Cost Variance

Illustration 21

Ravi, Richard, Rahim and Roop Singh are regional salesmen distributing the product of Super Perfumes Ltd. The selling price of the product is ₹ 400 per unit. The sales quota and the standard selling expenses for the year are:

Salesmen	Sales Quota (₹)	Standard Selling Expenses (₹)
Ravi	7,50,000	2,25,000
Richard	9,00,000	2,47,500
Rahim	11,50,000	2,87,500
Roop Singh	6,00,000	2,25,000

Actual data for the year were as follows: -

	Ravi	Richard	Rahim	Roop Singh
Days on field work	200	175	225	250
Kilometres covered	20,000	18,000	18,000	30,000
	₹	₹	₹	₹
Sales	8,00,000	10,00,000	10,50,000	5,20,000
Salary	80,000	80,000	80,000	80,000
Free samples	9,000	7,500	5,375	8,000
Postage and stationery	8,000	9,000	10,000	6,000
Other expenses	9,000	5,000	4,000	10,000

The salesmen are allowed conveyance allowance of ₹ 1.50 per kilometre and a daily allowance of ₹ 80 per day for the days spent on field work. Ravi gets a commission of 6 percent on sales and others are given a commission of 5 percent on sales. Corporate sales office expenses are chargeable at the rate of ₹ 30 per unit sold in the case of Ravi and Richard and ₹ 40 per unit in the case of Rahim and Roop Singh. Prepare a schedule showing the selling cost variances by salesmen.

Solution

Working Note:

		Ravi	Richard	Rahim	Roop Singh
(i)	Standard Sales Units (Sales Quota ÷ ₹ 400)	1,875	2,250	2,875	1,500
(ii)	Standard Selling Expenses per Unit (₹) (Std. Selling Expenses/Std. Sales Units)	120	110	100	150
(iii)	Actual Sales Units (Actual Sales ÷ ₹ 400)	2,000	2,500	2,625	1,300
(iv)	Actual Selling Costs	₹	₹	₹	₹
	Daily Allowance	16,000	14,000	18,000	20,000
	Conveyance Allowances	30,000	27,000	27,000	45,000
	Salaries	80,000	80,000	80,000	80,000

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	Free Samples	9,000	7,500	5,375	8,000
	Postage & Stationery	8,000	9,000	10,000	6,000
	Other Expenses	9,000	5,000	4,000	10,000
	Commission on Sales	48,000	50,000	52,500	26,000
	Corporate Sales Office Expenses	60,000	75,000	1,05,000	52,000
	Total Actual Selling Cost	2,60,000	2,67,500	3,01,875	2,47,000
(v)	Standard Selling Cost (Actual Units Sold × Std. Selling Expenses per Unit)	2,40,000	2,75,000	2,62,500	1,95,000

Calculation of Variances:

Since all the selling expenses have been related to sales units, only one variance can be calculated by comparing the standard and actual selling costs as is shown in the schedule below:

Schedule showing the selling cost variances by salesman

	Ravi (₹)	Richard (₹)	Rahim (₹)	Roop Singh (₹)	Total (₹)
Standard Selling Expenses (Refer to Working Note (v))	2,40,000	2,75,000	2,62,500	1,95,000	9,72,500
Actual Selling Expenses (Refer to Working Note (iv))	2,60,000	2,67,500	3,01,875	2,47,000	10,76,375
Selling Cost Variance	20,000 (A)	7,500 (F)	39,375(A)	52,000(A)	1,03,875(A)

Illustration 22

X Manufacturing company takes over sales from the Selling Agents. In the first month of operation of direct sales, the following costs have been incurred. Prepare the actual percentage of selling cost on total sales, compare with the standard selling cost.

Compute the variances and offer your comments about the standards, which are based on actual for the previous year, and performance of the Zonal offices.

Zonal offices	Sales Budgets (units)	Standard Selling Expenses
Eastern India (E.I.)	20,000	₹ 16,000
Western India (W.I.)	12,000	12,000
Northern India (N.I.)	6,000	8,000
Southern India (S.I.)	15,000	12,000
Central India (C.I.)	10,000	10,000
Northern Western India (N.W.I.)	5,000	8,000
Selling (price per unit) – ₹ 25		

Actual:	E.I.	W.I.	N.I.	S.I.	C.I.	N.W.I.
Units Sold ('000 units)	19	10	5.9	17.5	9.5	5
Salesmen's Salaries (₹ '000)	8	7	5	7	6	5
Sales Travelling (₹ '000)	4	5	3.6	2.7	2.7	1.8
Halting Charges & Bhatta (₹)	850	800	500	500	700	500
Salesmen's Commission on Selling Prices @	1%	1.25%	1%	0.9%	1%	1%

Solution**COMPARATIVE COST STATEMENT OF SELLING EXPENSES**

		E.I.	W.I.	N.I.	S.I.	C.I.	N.W.I.
Standard Data							
1.	Selling Exp. (₹)	16,000	12,000	8,000	12,000	10,000	8,000
2.	Budgeted Sales (units)	20,000	12,000	6,000	15,000	10,000	5,000
3.	Selling Cost (per unit) (₹)	0.80	1.00	1.33	0.80	1.00	1.60
4.	Actual Sales (units)	19,000	10,000	5,900	17,500	9,500	5,000
5.	Standard Selling Cost for Actual Sales (₹) [(3)×(4)]	15,200	10,000	7,847	14,000	9,500	8,000
Actual Selling Actual Data							
	Salesmen's Salaries (₹)	8,000	7,000	5,000	7,000	6,000	5,000
	Sales Travelling (₹)	4,000	5,000	3,600	2,700	2,700	1,800
	Halting Charges etc. (₹)	850	800	500	500	700	500
	Salesmen's Commission (₹)	4,750	3,125	1,475	3,937	2,375	1,250
6.	Total Actual Selling Costs (₹)	17,600	15,925	10,575	14,137	11,775	8,550
Analysis							
7.	Selling Costs Variance (₹) [(5) – (6)]	- 2,400	- 5,925	- 2,728	- 137	- 2,275	- 550
8.	Budgeted Sales [Budgeted Qty.× Budgeted Price] (₹)	5,00,000	3,00,000	1,50,000	3,75,000	2,50,000	1,25,000

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9.	Budgeted Selling Expenses as a % of Budgeted Sales [(1)/(8)×100]	3.20%	4.00%	5.33%	3.20%	4.00%	6.40%
10.	Actual Sales (₹)	4,75,000	2,50,000	1,47,500	4,37,500	2,37,000	1,25,000
11.	Actual Selling Expenses as a % of Actual Sales	3.71%	6.37%	7.17%	3.23%	4.97%	6.84%

Comments : The above table shows that except for southern India and North – western India Zonal offices, actual sales expenses widely differ from budgeted selling expenses. However, the following points have to be noted:

- (i) *The standards are based on the actual expenses for the last year. Truly speaking they are not standards and, therefore, they cannot provide realistic guidance for exercising control over the selling expenses. Variances may be there because current year's conditions might have completely changed or circumstances which were applicable last year may have ceased to become applicable now.*
- (ii) *The causes of the variances cannot be correctly spelt out in the absence of details about the "Standard selling expenses." The details of actual selling expenses have been given but the details of standard selling expenses have not been given. Salesmen's salaries is a fixed charge, variance may be there on account of increase in their salaries. Sales travelling expenses are of a semi-variable nature. Less volume of sales might have resulted in less recovery of fixed sales travelling expenses such as railway freight, hotel charges.*

Finding of Missing Information, Variance Analysis

Illustration 23

Following is the standard cost card of a component:

Materials	2 Units at ₹ 15	₹ 30
Labour	3 Hours at ₹ 20	₹ 60
Total overheads	3 Hours at ₹ 10	₹ 30

During a particular month 10,000 units of the component were produced and the same was found to be at 60% capacity of the budget. In preparing the variance report for the month, the cost accountant gathered the following information:

Labour	₹ 6,50,000
Variable overheads	₹ 2,00,000
Fixed overheads	₹ 3,00,000
Material price variance	₹ 70,000 (A)
Material cost variance	₹ 50,000 (A)
Labour rate variance	₹ 50,000 (F)
Fixed overhead expenditure variance	₹ 50,000 (A)

You are required to prepare from the above details:

- (1) Actual material cost incurred
- (2) Standard cost of materials actually consumed
- (3) Labour efficiency variance
- (4) Variable OH efficiency variance
- (5) Variable OH expenditure variance
- (6) Fixed OH efficiency variance
- (7) Fixed OH capacity variance
- (8) Fixed OH volume variance

Solution

Computation of Requirements of the Question:

1. Actual Material Cost Incurred

Material Cost Variance

$\text{= (Standard Cost of Std. Qty. for Actual Output) - (Actual Cost)}$

Or

Actual Cost

$\text{= (Standard Cost of Std. Qty for Actual Output) - (Material Cost Variance)}$

$\text{= } 10,000 \text{ units} \times 2 \text{ units} \times ₹ 15 + ₹ 50,000$

$\text{= ₹ } 3,00,000 + ₹ 50,000 = ₹ 3,50,000$

2. Standard Cost of Materials Actually Consumed

Material Price Variance

$\text{= (Standard Price - Actual Price) } \times \text{ Actual Quantity}$

Or

Standard Cost of Actual Quantity

$\text{= (Actual Cost) + (Material Price Variance)}$

$\text{= ₹ } 3,50,000 - ₹ 70,000 = ₹ 2,80,000$

3. Labour Efficiency Variance

(Refer to working note 1)

Labour Efficiency Variance

$\text{= (Standard Hours - Actual Hours) } \times \text{ Standard Rate per Hour}$

$\text{= } (10,000 \text{ units} \times 3 \text{ hours} - 35,000 \text{ hours}) \times ₹ 20$

$\text{= } (₹ 6,00,000 - ₹ 7,00,000) = ₹ 1,00,000 \text{ (A)}$

4. Variable Overhead Efficiency Variance*(Refer to working note 2)*

<i>Variable Overhead Efficiency Variance</i> $= (\text{Standard Hours for Actual Output} - \text{Actual Hours}) \times \text{Standard Variable Overhead Rate per Hour}$
--

$$= ₹ 5 \times (30,000 \text{ Hours} - 35,000 \text{ Hours}) = ₹ 25,000 \text{ (A)}$$

5. Variable Overhead Expenditure Variance*(Refer to working note 1)*

<i>Variable Overhead Expenditure Variance</i> $= (\text{Budgeted Variable Overheads for Actual Hours}) - (\text{Actual Variable Overheads})$

$$= (₹ 5 \times 35,000 \text{ Hours} - ₹ 2,00,000) = ₹ 25,000 \text{ (A)}$$

6. Fixed Overhead Efficiency Variance*(Refer to working notes 1 & 2)*

<i>Fixed Overhead Efficiency Variance</i> $= (\text{Standard Hours for Actual Output} - \text{Actual Hours}) \times \text{Standard Fixed Overhead Rate per Hour}$
--

$$= ₹ 5 \times (30,000 \text{ Hours} - 35,000 \text{ Hours}) = ₹ 25,000 \text{ (A)}$$

7. Fixed Overhead Capacity Variance*(Refer to working notes 1 & 2)*

<i>Fixed Overhead Capacity Variance</i> $= (\text{Actual Hours} - \text{Budgeted Hours}) \times \text{Standard Fixed Overhead Rate per Hour}$
--

$$= ₹ 5 \times (35,000 \text{ Hours} - 50,000 \text{ Hours})$$

$$= ₹ 75,000 \text{ (A)}$$

8. Fixed Overhead Volume Variance*(Refer to working note 2)*

<i>Fixed Overhead Volume Variance</i> $= (\text{Actual Output} - \text{Budgeted Output}) \times \text{Standard Fixed Overhead Rate per Unit}$
--

$$= ₹ 15 \times [10,000 \text{ units} - (50,000 \text{ hours} / 3 \text{ hours p. u.})]$$

$$= ₹ 1,50,000 - ₹ 2,50,000 = ₹ 1,00,000 \text{ (A)}$$

Basic Calculations:

1. Labour Rate Variance = (Standard Rate per Hour x Actual Hours) – (Actual Cost)

Or $₹ 50,000 = ₹ 20 \times \text{Actual Hours} - ₹ 6,50,000$

Or Actual Hours = 35,000

2. Standard Hours = 10,000 Units × 3 Hours = 30,000 Hours
- $$\text{Budgeted Hours} = \left\{ \frac{30,000 \text{ hours} \times 100\%}{60\%} \right\} = 50,000 \text{ Hours}$$
- $$\begin{aligned} \text{Budgeted Fixed Overheads} &= \text{Actual Fixed Overheads} + \text{Expenditure Variance} \\ &= ₹ 3,00,000 - ₹ 50,000 = ₹ 2,50,000 \end{aligned}$$
- $$\left\{ \begin{array}{l} \text{Standard fixed overhead} \\ \text{recovery rate per hour} \end{array} \right\} = \frac{₹ 2,50,000}{50,000 \text{ hours}} = ₹ 5 \text{ per hour}$$
- $$\begin{aligned} \text{Total Overhead Rate per Hour} &= ₹ 10 \\ \text{Variable Overhead Rate per Hour (₹ 10 - ₹ 5)} &= ₹ 5 \end{aligned}$$
3. Standard Fixed Overhead per Unit (3 hours × ₹ 5) = ₹ 15

Illustration 24

Mr. M provides the following information relating to 1,000 units of product 'ZED' during the month of April, 2012

Standard price per kg. of raw material – ₹ 3

Actual total direct material cost – ₹ 10,000

Standard direct labour hours – 1,600

Actual direct labour hours – 1,800

Total standard direct labour cost – ₹ 8,000

Standard variable overhead per direct labour hour – ₹ 1

Standard variable cost per unit of ZED – ₹ 1.60

Total standard variable overheads – ₹ 1,600

Actual total variable overheads – ₹ 1,620

The material usage variance is ₹ 600 (adverse) and the overall cost variance per unit of ZED is ₹ 0.07 (adverse) as compared to the total standard cost per unit of ZED of ₹ 21.

You are required to compute the following:

- Standard quantity of raw-material per unit of ZED.
- Standard direct labour rate per hour.
- Standard direct material cost per unit of ZED.
- Standard direct labour cost per unit of ZED.
- Standard total material cost for the output.
- Actual total direct labour cost for the output
- Material price variance.
- Labour rate variance.
- Labour efficiency variance.
- Variable overhead expenditure variance.
- Variable overheads efficiency variance.

Solution**Basic Calculations:**

1. **Standard Cost of Raw-Material Consumed:**

	₹	₹
Total Standard Cost of ZED (1,000 units × ₹ 21)		21,000
Less: Standard Cost: Labour	8,000	
Overheads	<u>1,600</u>	<u>9,600</u>
Standard Cost of Raw Materials Used		<u>11,400</u>
2. **Standard Cost of Raw-Material per Finished Unit:**
$$\frac{\text{Total Cost of Material}}{\text{Output}} = \frac{\text{₹ 11,400}}{1,000 \text{ Units}} = \text{₹ 11.40}$$
3. **Standard Quantity of Raw – Material per Finished Unit and Total Quantity of Raw Material Required:**
$$\frac{\text{Standard Cost of Material per Unit}}{\text{Standard Rate per Kg.}} = \frac{\text{₹ 11.40}}{\text{₹ 3.00}} = 3.8 \text{ Kg. per finished unit}$$

Total Quantity – 3.8 Kg. × 1,000 units = 3,800 Kg.
4. **Total Material Cost Variance:**

Actual Cost of Raw Material	₹ 10,000
Standard Cost of Raw Material	<u>₹ 11,400</u>
Total Material Cost Variance	<u>₹ 1,400 (F)</u>
5. **Actual Quantity (AQ) of Raw-Material (in Kg):**

Material Usage Variance = Standard Cost of Standard Quantity for Actual Output – Standard Cost of Actual Quantity
= Standard Rate × (Standard Quantity for Actual Output – Actual Quantity)

Or ₹ 600 (A) = ₹ 3 × (3,800 Kg. – AQ)
Or 3AQ = 12,000 Kg. or, AQ = 4,000 Kg.

(Material usage variance is as given in the question and standard quantity is as per (3) above)
6. **Actual Rate of Raw Material per Kg.**
$$\frac{\text{Actual Material Cost}}{\text{Actual Quantity}} = \frac{\text{₹ 10,000}}{4,000 \text{ Kg.}^*} = \text{₹ 2.50 per Kg. (*As per (5) above)}$$
7. **Standard Direct Labour Rate**

Standard Direct Labour Hours = 1,600 (given)
Standard Direct Labour Cost = ₹ 8,000 (given)

$$\text{Standard Direct Labour Hour Rate} = \frac{\text{₹ 8,000}}{1,600 \text{ hrs.}} = \text{₹ 5}$$

8. **Actual Labour Cost and Actual Labour Rate per Hour:**

Actual Total Cost of 1,000 Units		₹ 21,070
1,000 units (₹ 21 + ₹ 0.07)		
Less: Actual Cost of Material	₹ 10,000	
Actual Variable Overheads	₹ 1,620	₹ 11,620
Actual Direct Labour Cost		₹ 9,450

$$\text{Actual Direct Labour Rate per Hr.} = \frac{\text{₹ 9,450}}{1,800 \text{ hrs.}} = \text{₹ 5.25}$$

9. **Standard Labour Hours to Produce One Unit:**

$$\frac{\text{Standard Hours}}{\text{Output in Units}} = \frac{1,600 \text{ hours}}{1,000 \text{ units}} = 1.6 \text{ hours}$$

10. **Standard Labour Cost per Unit:**

$$\text{Standard Labour Cost per Unit} = 1.6 \text{ hours} \times \text{₹ 5} = \text{₹ 8}$$

11. **Actual Hourly Rate of Variable Overheads:**

$$\frac{\text{Actual Variable Overheads}}{\text{Actual Hours}} = \frac{\text{₹ 1,620}}{1,800 \text{ hours}} = \text{₹ 0.90}$$

Computations of Requirements:

(a) **Standard Quantity of Raw Material per Unit of ZED:** 3.8 kg. (Refer to working note 3).

(b) **Standard Direct Labour Rate per Hour:** ₹ 5 (Refer to working note 7).

(c) **Standard Direct Material Cost per Unit of ZED:** ₹ 11.40 (Refer to working note 2).

(d) **Standard Direct Labour Cost per Unit of ZED:** ₹ 8 (Refer to working note 10).

(e) **Standard Total Material Cost for the Output:** ₹ 11,400 (Refer to working note 1).

(f) **Actual Total Direct Labour Cost for the Output:** ₹ 9,450 (Refer to working note 8).

(g) **Material Price Variance:**

= Material Cost Variance – Material Usage Variance.

$$= \text{₹ 1,400 (F)}^* - \text{₹ 600 (A)}$$

(*Refer to working note 4)

$$= \text{₹ 2,000 (F)}$$

Alternatively,

$$= \text{Actual Quantity} \times (\text{Standard Price} - \text{Actual Price})$$

$$= 4,000 \text{ units} (\text{₹ 3} - \text{₹ 2.50}^*)$$

(*Refer to working note 5 & 6)

$$= \text{₹ 2,000 (F)}$$

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(h) Labour Rate Variance:

$$\begin{aligned} &= \text{Actual Hours} \times (\text{Standard Rate} - \text{Actual Rate}) \\ &= 1,800 \text{ Hours} \times (\text{₹ } 5 - \text{₹ } 5.25) \\ &= \text{₹ } 450 \text{ (A)} \end{aligned}$$

(i) Labour Efficiency Variance:

$$\begin{aligned} &\text{Standard Rate} \times (\text{Standard Hours} - \text{Actual Hours}) \\ &= \text{₹ } 5 \text{ per hour} \times (1,600 \text{ hours} - 1,800 \text{ hours}) = \text{₹ } 1,000 \text{ (A)} \end{aligned}$$

(j) Variable Overhead Expenditure Variance:

$$\begin{aligned} &= \text{Actual Hours} \times (\text{Standard Rate per Hour} - \text{Actual Rate per Hour}) \\ &= 1,800 \text{ Hours} \times (\text{₹ } 1 - \text{Re. } 0.90) = \text{₹ } 180 \text{ (F)} \end{aligned} \quad (*\text{Refer to working note 11})$$

(k) Variable Overhead Efficiency Variance:

$$\begin{aligned} &= \text{Standard Variable Overhead Rate per Hour} \times (\text{Standard Hours for Actual Output} - \\ &\quad \text{Actual Hours}) \\ &= \text{₹ } 1 \text{ per hour} \times (1,600 \text{ hours} - 1,800 \text{ hours}) = \text{₹ } 200 \text{ (A)} \end{aligned}$$

Reconciliation between Budgeted Profit and Actual Profit through given Variances

Illustration 25

The budgeted output of a single product manufacturing company for the year ending 31st March was 5,000 units. The financial results in respect of the actual output of 4,800 units achieved during the year were as under:

	₹
Direct material	29,700
Direct wages	44,700
Variable overheads	72,750
Fixed overheads	39,000
Profit	36,600
Sales	2,22,750

The standard wage rate is ₹ 4.50 per hour and the standard variable overhead rate is ₹ 7.50 per hour.

The cost accounts recorded the following variances for the year:

Variances	Favourable ₹	Adverse ₹
Material price		300
Material usage	—	600
Wage rate	750	—

Labour efficiency	–	2,250
Variable overhead expenses	3,000	–
Variable overhead efficiency	–	3,750
Fixed overhead expense	–	1,500
Selling price	6,750	–

Required:

- (i) Prepare a statement showing the original budget.
- (ii) Prepare the standard product cost sheet per unit.
- (iii) Prepare a statement showing the reconciliation of originally budgeted profit and the actual profit.

Solution

Basic Calculations:

	₹
(a) Actual Sales	2,22,750
Less : Price Variance (Favourable)	6,750
Standard Sales	<u>2,16,000</u>
Units Sold	4,800

$$\text{Budgeted Price per Unit} = \frac{\text{₹ } 2,16,000}{4,800 \text{ units}} = \text{₹ } 45$$

	₹	₹
(b) Material Used		29,700
Less: Price Variance (Adverse)	300	
Usage Variance (Adverse)	<u>600</u>	900
Standard Cost		<u>28,800</u>

$$\text{Standard Material Cost per Unit} = \frac{\text{₹ } 28,800}{4,800 \text{ units}} = \text{₹ } 6$$

	₹
(c) Direct Wages Spent	44,700
Add: Wage Rate Variance (Favourable)	750
	<u>45,450</u>
Less: Efficiency Variance (Adverse)	2,250
Standard Wages	<u>43,200</u>

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$$\text{Standard Wage Rate per Unit} = \frac{\text{₹ } 43,200}{4,800 \text{ units}} = \text{₹ } 9$$

- (d) Standard Direct Wage Rate is ₹ 4.50 per Hour
Hence Standard Time per Unit: ₹ 9 ÷ 4.50 Hour = 2 Hours

- (e) Variable Overheads :

Standard Rate ₹ 7.50 per Hour

Variable Overhead per Unit: 2 hrs. × ₹ 7.50 = ₹ 15

(Note: Alternatively, this may be calculated by adjusting variances as in other cases)

	₹
(f) Fixed Overhead Spent	39,000
Less : Fixed Overhead Expense Variance (Adverse)	1,500
Budgeted Overheads	37,500
Std. Fixed Overhead Rate per Unit :	
	$\frac{\text{₹ } 37,500}{5,000 \text{ units}} = \text{₹ } 7.50$
(g) Fixed Overhead Recovered: 4,800 Units × ₹ 7.50 = ₹ 36,000	(Absorbed)
(h) Fixed Overhead Volume Variance	
(Absorbed Overheads – Budgeted Overheads)	= ₹ 36,000 – ₹ 37,500
	= ₹ 1,500 (Adverse)
(i) Budgeted Sales: 5,000 units × ₹ 45	= ₹ 2,25,000
(j) Actual Sales	= ₹ 2,22,750
(k) Sale Volume Variance	₹ 45 × (4,800 Units – 5,000 Units)
[Budgeted Price × (Actual Qty. – Budgeted Qty.)]	= ₹ 9,000 (A)

(i) Statement Showing the Original Budget:

		₹
Budgeted Sales	(5,000 units × ₹ 45)	2,25,000
Less: Budgeted Costs:		
Direct Material	(5,000 units × ₹ 6)	30,000
Direct Wages	(5,000 units × ₹ 9)	45,000
Variable Overheads	(5,000 units × ₹ 15)	75,000
Fixed Overheads	(5,000 units × ₹ 7.50)	37,500
Profit :		37,500

(ii) Statement Showing Standard Product Cost Sheet per Unit:

	₹
Direct Materials	6.00
Direct Wages	9.00
<i>Prime Cost</i>	15.00
Variable Overheads	15.00
Fixed Overheads	7.50
<i>Total Cost</i>	37.50
Profit	7.50
<i>Selling Price</i>	45.00

(iii) Statement Showing Reconciliation of the Original Budgeted Profit and the Actual Profit

Particulars	₹	₹	₹
Budgeted Profit: (Budgeted Quantity x Budgeted Margin)			37,500.00
Sales Margin Variances: Sales Margin Volume Variance*			(1,500.00)
Standard Profit			36,000.00
Effect of Other Variances			
Material Cost Variances:			
Material Price Variance	(300.00)		
Material Usage Variance	(600.00)	(900.00)	
Labour Cost Variances:			
Labour Rate Variance	750.00		
Labour Efficiency Variance	(2,250.00)	(1,500.00)	
Variable Overhead Cost Variances:			
Variable Overhead Expenditure Variance	3,000.00		
Variable Overhead Efficiency Variance	(3,750.00)	(750.00)	
Fixed Overhead Cost Variances:			
Fixed Overhead Expenditure Variance	(1,500.00)		
Fixed Overhead Volume Variance	(1,500.00)	(3,000.00)	
Sales Margin Variances: Sales Margin Price Variance		6,750.00	600.00
Actual Profit for the Month			36,600.00

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Adverse Shown by (-) Symbol

$$\begin{aligned} \text{*Sales Margin Volume Variance} &= \text{Sales Volume Variance} \times \text{Budgeted Net Profit Ratio} \\ &= ₹ 9,000 \text{ (A)} \times [₹ 7.50 / ₹ 45 \times 100] \% = 1,500 \text{ (A)} \end{aligned}$$

Reconciliation between Standard Profit and Actual Profit, Analysis of Variances

Illustration 26

The following information is available in respect of Y Ltd. for a week:

- (a) 400 kg of raw material were actually used in producing product 'EXE'. The purchase cost thereof being ₹ 24,800. The standard price per kg of raw material is ₹ 60. The expected output is 12 units of product 'EXE' from each kg of raw material. Raw material price variance and usage variance as computed by cost accountant are ₹ 800 (adverse) and ₹ 600 (adverse) respectively.
- (b) The week is of 40 hours. The standard time to produce one unit of 'EXE' is 30 minutes. The standard wage rate is ₹ 5 per labour hour. The company employs 60 workers who have been paid hourly wage rate as under :

Number of workers	6	8	46
Hourly wage rate (₹)	4.80	5.20	5.00

- (c) Budgeted overheads for a four-weekly period is ₹ 81,600. The actual fixed overheads spent during the said week are ₹ 19,800.
- (d) Entire output of 'EXE' has been sold at its standard selling price of ₹ 15 per unit.

You are required to :

- (i) Compute the variances relating to labour and overheads.
- (ii) Prepare a statement showing total standard costs, standard profit and actual profit for the week.

Solution

Basic Calculations:

1. Standard Quantity and Cost of Raw Material required for Actual Output:

Material Cost Variance = Standard Material Cost – Actual Material Cost

$$\Rightarrow ₹ 800 \text{ (A)} + ₹ 600 \text{ (A)} = \text{Standard Material Cost} - ₹ 24,800$$

$$\Rightarrow \text{Standard Material Cost} = ₹ 23,400$$

$$\Rightarrow \text{Standard Price per Kg.} \times \text{Standard Qty. for Actual Output} = ₹ 23,400$$

$$\Rightarrow \text{Standard Qty. for Actual Output} = ₹ 23,400 / 60 = 390 \text{ Kg.}$$

$$\Rightarrow \text{Standard Qty. per Unit Output} \times \text{Actual Output in Units} = 390 \text{ Kg.}$$

$$\Rightarrow \text{Actual Output in Units} = 390 \text{ Kg.} \times 12 = 4,680 \text{ Units}$$

2. Basic data for the computation of Labour Variances:

Standard Labour Cost for Actual Output				Actual Cost		
Standard Hours	Rate Per Hour	Amount	Standard Cost for Actual Hours	Actual Hours	Rate Per Hour	Amount
2,340	₹5	₹11,700	₹12,000	240	₹4.80	₹1,152
(4,680 units × 1/2 hr.)			(2,400 hrs × ₹ 5)	320	₹5.20	₹1,664
				1,840	₹5.00	₹ 9,200
2,340 hrs.		₹11,700	₹12,000	2,400 hrs.		₹12,016

3. Basic data for the computation of Fixed Overhead Variances:

Budgeted Std. Data		Actual Data	
Budgeted Fixed Overhead (₹) (for 1 week)	20,400	Actual Fixed Overhead (₹)	19,800
Budgeted Hours (60 workers × 40 hrs. per week)	2,400	Actual Labour Hours	2,400
Budgeted Output (units)	4,800	Actual Output (units)	4,680
Std. Rate p.h. (₹)	8.50		
Std. Rate p.u. (₹)	4.25		

Computation of Variances:**(i) Computation of labour and overhead (variances):**

Labour Cost Variance: (Refer to Working note 2)

$$= (\text{Std. Cost} - \text{Actual Cost})$$

$$= ₹ 11,700 - ₹ 12,016 = ₹ 316 \text{ (A)}$$

Labour Rate Variance:

$$= \text{Standard Cost of Actual Time} - \text{Actual Cost}$$

$$= ₹ 12,000 - ₹ 12,016$$

$$= ₹ 16 \text{ (A)}$$

Labour Efficiency Variance:

$$= \text{Standard Cost of Standard Time for Actual Output} - \text{Standard Cost of Actual Time}$$

$$= (₹ 11,700 - ₹ 12,000) = ₹ 300 \text{ (A)}$$

Fixed Overhead Cost Variance:

$$= \text{Fixed Overheads Absorbed} - \text{Actual Fixed Overheads}$$

$$= 4,680 \text{ Units} \times ₹ 4.25 - ₹ 19,800$$

$$= ₹ 19,890 - ₹ 19,800 = ₹ 90 \text{ (F)}$$

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Fixed Overhead Volume Variance:

$$\begin{aligned}
 &= \text{Std. Fixed Overhead Rate per Unit} \times (\text{Actual Output} - \text{Budgeted Output}) \\
 &= ₹ 4.25 \times (4,680 \text{ units} - 4,800 \text{ units}) \\
 &= ₹ 510 \text{ (A)}
 \end{aligned}$$

Fixed Overhead Expenditure Variance:

$$\begin{aligned}
 &= \text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads} \\
 &= ₹ 20,400 - ₹ 19,800 \\
 &= ₹ 600 \text{ (F)}
 \end{aligned}$$

(ii) Statement showing Total Standard Cost, Standard Profit and Actual Profit for the week

	₹	₹	₹
Sales (4,680 units × ₹ 15)			70,200
Less : Standard Costs of :			
Direct Material		23,400	
Direct Labour		11,700	
Overheads (4,680 × ₹ 4.25) (Refer to working notes 1 to 3)		19,890	(54,990)
Standard Profit			15,210
Less : Adjustment for Variance :			
<i>Raw Material :</i>		1,400 (A)	
Price Variance :	800 (A)		
Usage Variance :	600 (A)		
<i>Labour :</i>		316 (A)	
Rate Variance :	16 (A)		
Efficiency Variance	300 (A)		
<i>Overhead :</i>		90 (F)	
Expenditure variance :	600 (F)		
Volume variance :	510 (A)		(1,626)
Actual profit			13,584

5.7 Behavioural Aspects of Standard Costing

1. *Projection of fixed overheads and estimated selling price in a Standard Cost Sheet is a circular exercise with no added value.*

In an award winning article, "COST / MANAGEMENT ACCOUNTING: THE 21ST CENTURY PARADIGM", published in Management Accounting (USA), December 1995, William L Ferrara argues that while preparing a Standard Cost Sheet, one of the

objectives of which is to assist management in pricing products, a professional cannot project fixed overheads until and unless he is aware of the production quantum to be effected. The forecast of future production can only be made if a tentative selling price of the product is known because, in a competitive market, it is the selling price which decides the sale quantity and therefore the production volume. The authors contend that in case the selling price is known at the time of projecting fixed overheads then the re-computation of the same is a valueless exercise.

2. *Traditional costing tools like standard costing induce a static behaviour in the employees.*

During the past decade and a half, various writers such as Johnson and Kaplan, Ferrara and Monden etc have questioned the productivity and use of traditional systems such as standard costing and variance analysis. They argue that the use of standard costing renders employees static and curbs innovation and that companies following traditional standard costing find it difficult to improve upon standards because of severe resistance from employees who are convinced that the established best practise cannot be improved further.

3. *Fear of adverse variances forces managers to give undue importance to material price, labour rate and efficiency and capacity utilisation. These concepts are detrimental to the modern day world class manufacturing environment characterised by concepts of JIT and TQM.*

In a World Class Manufacturing environment, characterised by Just in Time policies, the focus of the management is to produce only as much as is required. This requires purchase of small quantities of raw material, increase in the number of set ups and minimal importance to capacity utilisation. Policies like this result in increased adverse variances related to raw material prices, labour efficiency and production volume. Critics argue that the fear of such adverse variances affects goal congruence and forces managers to behave against their company's policies.

4. *Traditional costing does not provide the management with what is the allowable cost; rather it emphasises on the standard or actual costs.*

This is looked upon as one of the major reasons for lack of innovation especially in the global era where competition amongst companies is unprecedented. It is argued that techniques like Target costing are much more motivating when compared to Traditional costing since the former encourage the use of concepts like value engineering and value analysis.