LEARNING OBJECTIVES:
After studying this unit you will be able to:

- Understand terms as standard Cost, standard Costing, standard Hour
- Understand how a standard costing system operates
- Calculate material, labour, overhead, sales value and sales margin variances
- Explain the terms operational and planning variances
- Explain the difference between actual profit and profit as per standard relating to the operating period

6.1 INTRODUCTION

You were introduced to Standard Costing in the earlier stages of your studies in which you understood the following:

- The evolution of Standard Costing
- The meaning of a Cost Sheet and its use for computing variances.
- The process of setting standards
- Computation of basic variances like Material Usage and Price, Labour Rate and Efficiency, Production Volume and Overhead Expenses.
- The reporting pattern of these variances
- Reconciliation of variances so as to arrive at the actual costing profit.
- Advantages and disadvantages of Standard Costing.
- The Accounting procedure for Standard Cost.
6.2 Advanced Management Accounting

In this chapter we shall extend our understanding of this important topic by studying elaborately the computation of various variances and the behavioral impact they can have on concerned personals.

6.2 DEFINITIONS

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.

6.2.1 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

1) 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.

2) Variances of Price Rates
   Variances arising due to change in unit material prices, standard labour hour rates and standard allowances for indirect costs.

3) 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.

6.2.2 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.

<table>
<thead>
<tr>
<th>Type of Variance</th>
<th>Reasons of Variance</th>
<th>Suggestive Course of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATERIAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Material Price   | • Change in Basic Price  
                   • Fail to purchase the anticipated standard quantities at appropriate price | • 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   | • Use of sub-standard material  
                   • Ineffective use of materials  
                   • Pilferage  
                   • Non standardised mix | • Regular Inspection of quality of materials  
                   • Proper training of operators  
                   • Ensure best utilisation of resources |
| **LABOUR**       |                     |                             |
| Labour Efficiency| • Change in design and quality standard  
                   • Poor working conditions  
                   • Improper scheduling | • Proper planning  
                   • Proper training  
                   • Healthy working environment  
                   • Timelines for achieving set targets |
| Labour Rate      | • Improper placement of labour  
                   • Increments / high labour wages  
                   • Overtime | • Time Scheduling for work performance  
                   • Proper job allocation according to capabilities of workers |
### OVERHEADS

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Selling and Distribution</th>
<th>Administrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improper planning</td>
<td>• Increase in delivery cost</td>
<td>• Over expenditure</td>
</tr>
<tr>
<td>• Under or over absorption of fixed overheads</td>
<td>• Increase in stock holding period</td>
<td></td>
</tr>
<tr>
<td>• Reduction of sales</td>
<td>• Overtime</td>
<td>• Comparison of budgets with actuals</td>
</tr>
<tr>
<td>• Breakdowns</td>
<td></td>
<td>• Introduction of Operating costing</td>
</tr>
<tr>
<td>• Power failure</td>
<td></td>
<td>• Introduction of cost ratios</td>
</tr>
<tr>
<td>• Labour Trouble</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Efficient planning for better Capacity utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check on expenditure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sales quotas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sale Targets</td>
</tr>
</tbody>
</table>

### 6.3 COMPUTATION OF VARIANCES

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

#### 6.3.1 Direct Material Variances

The total direct 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:

![Diagram of Direct Material Cost Variance]

\[
\text{Direct Material Cost Variance} = (SQ \times SP) - (AQ \times AP)
\]

\[
\text{Price Variance} = \frac{AQ \times (SP - AP)}{SP}
\]

\[
\text{Usage Variance} = SP \times (SQ - AQ)
\]

*SQ* – *Standard Quantity*  
*SP* – *Standard Price*  
*AQ* – *Actual Quantity*  
*AP* – *Actual Price*
6.3.2 Relation Verification

In relation to the verify the authenticity of the variance following are the identity proofs

- Cost Variance = Price Variance + Usage Variance
- Usage Variance = Mix Variance + Sub-usage Variance

6.3.3 Practical Problems

Illustration -1

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

<table>
<thead>
<tr>
<th>Material</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard mix %</td>
<td>30%</td>
<td>40%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Price per kg. (Rs.)</td>
<td>1.25</td>
<td>1.50</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Actual qty. used (Kg.)</td>
<td>1,180</td>
<td>1,580</td>
<td>830</td>
<td>440</td>
</tr>
<tr>
<td>Actual price per kg. (Rs)</td>
<td>1.30</td>
<td>1.80</td>
<td>3.40</td>
<td>3.00</td>
</tr>
<tr>
<td>Actual output: 1,000 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Solution

Notes:

1) Since the actual output is 1,000 units, the standard quantity of materials required for the actual output is 1,000 units x 4 kgs. = 4,000 kgs.
Statement showing computation of standard cost, standard cost of actual quantity and actual cost.

<table>
<thead>
<tr>
<th>Material</th>
<th>Std Cost (per Kg)</th>
<th>Act cost (per Kg)</th>
<th>Std Qty</th>
<th>Act Qty</th>
<th>Total Std Cost</th>
<th>Std. Cost of Actual Qty</th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.25</td>
<td>1.30</td>
<td>1,200</td>
<td>1,180</td>
<td>1,500</td>
<td>1,475</td>
<td>1,534</td>
</tr>
<tr>
<td>B</td>
<td>1.50</td>
<td>1.80</td>
<td>1,600</td>
<td>1,580</td>
<td>2,400</td>
<td>2,370</td>
<td>2,844</td>
</tr>
<tr>
<td>C</td>
<td>3.50</td>
<td>3.40</td>
<td>800</td>
<td>830</td>
<td>2,800</td>
<td>2,905</td>
<td>2,822</td>
</tr>
<tr>
<td>D</td>
<td>3.00</td>
<td>3.00</td>
<td>400</td>
<td>440</td>
<td>1,200</td>
<td>1,320</td>
<td>1,320</td>
</tr>
</tbody>
</table>

2) Standard cost per unit of the standard mix

\[
\text{Rs. 7,900} = \frac{4,000 \text{ Kgs.}}{} = \text{Rs 1.975}
\]

3) Standard cost per unit of the actual mix

\[
\text{Rs. 8,070} = \frac{4,030 \text{ Kgs}}{} = \text{Rs 2.002}
\]

Variances:

i) Cost Variance = std. cost – actual cost

\[
= \text{Rs. 7,900} – \text{Rs. 8,520} = \text{Rs. 620 (A)}
\]

ii) Price Variance = actual qty. (std. price – actual price)

\[
= \text{Rs 8,070} – \text{Rs 8,520} = \text{Rs 450 (A)}
\]

iii) Mix Variance = actual qty (std cost per unit of std mix – std cost per unit of actual mix)

\[
= 4,030 \text{ Kg (Rs 1.975 – Rs 2.002)} = \text{Rs 110 (A)}
\]

iv) Sub Usage = std price per unit of std mix (std qty – actual qty)

\[
\text{Variance} = 4,030 \text{ Kg (Rs 1.975 – Rs 2.002)} = \text{Rs 110 (A)}
\]

Verification:

Cost variance = price variance + mix variance + sub-usage variance

\[
\text{Rs. 620 (A)} = \text{Rs 450 (A)} + \text{Rs 110 (A)} + \text{Rs 60 (A)}
\]
**Illustration -2**

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

<table>
<thead>
<tr>
<th>Material</th>
<th>Mix %</th>
<th>Standard Price Per Kg (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>B</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Actual Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>in Kg</td>
</tr>
<tr>
<td>A</td>
<td>90</td>
</tr>
<tr>
<td>B</td>
<td>110</td>
</tr>
</tbody>
</table>

Calculate the variances.

**Solution**

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

\[
\frac{182}{90} \times 100 = 202.22 \text{ Kgs.}
\]

**Statement showing the standard and actual costs and standard cost of actual mix**

<table>
<thead>
<tr>
<th>Component</th>
<th>Standard cost Qty.</th>
<th>Rate</th>
<th>Amount</th>
<th>Actual cost Qty.</th>
<th>Rate</th>
<th>Amount</th>
<th>Std. cost of Actual quantity Qty.</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (40% of 202.22 kg.)</td>
<td>80.89</td>
<td>20</td>
<td>1,617.80</td>
<td>90</td>
<td>18</td>
<td>1,620</td>
<td>90</td>
<td>20</td>
<td>1,800</td>
</tr>
<tr>
<td>B (60% of 202.22 kg.)</td>
<td>121.33</td>
<td>30</td>
<td>3,639.90</td>
<td>110</td>
<td>34</td>
<td>3,740</td>
<td>110</td>
<td>30</td>
<td>3,300</td>
</tr>
<tr>
<td>Total Input (-) Loss</td>
<td>202.22</td>
<td>26</td>
<td>5,257.70</td>
<td>200</td>
<td>26.40</td>
<td>5,360</td>
<td>200</td>
<td>25.50</td>
<td>5,100</td>
</tr>
<tr>
<td>Total output</td>
<td>182.00</td>
<td>28.89</td>
<td>5,257.70</td>
<td>182</td>
<td>29.45</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>
Standard yield in actual input is 90% of 200 kg i.e. 180 kg.

Variance:

i) Price Variance = Actual qty. (Std. price – Actual price.)
= Standard cost of actual qty. – Actual cost.
= Rs. 5,100 — Rs. 5,360 = Rs. 260 (A)

ii) Usage Variance = Std. price (Std. qty. – Actual qty.)
= Standard cost – Standard cost of actual quantity
= Rs. 5,257.70 – Rs. 5,100 = Rs. 157.70 (F)

iii) Mix Variance = Total actual qty. of input (Std. cost per unit of std. mix – Std. cost per unit of actual mix)
= 200 (Rs.26 – Rs.25.50) = Rs. 100(F)

iv) Yield Variance = Std. price of yield (Actual yield – Std. yield)
= Rs.28.89 (182 – 180) = Rs. 57.70 (F)

v) Total Variance = Std. cost – Actual cost
= Rs. 5,257.70 – Rs. 5,360 = Rs. 102.30 (A)

Verification:

Usage Variance = Mix variance + Sub-usage variance
Rs. 157.70 (F) = Rs 100 (F) + Rs 57.70 (F)

Cost variance = Price variance + Mix variance + Sub-usage variance
Rs. 102.30 (A) = Rs 260 (A) + Rs 110 (A) + Rs 60 (A)

6.3.4 Direct Labour Variances

The two basic variances that can be calculated in respect of direct labour are (a) rate variance and (b) efficiency variance. The formula’s for calculating labour variances are as under:

\[
\text{Direct Labour Cost Variance} = (ST \times SR) - (AT \times AR)
\]

\[
\text{Rate} = AT (SR - AR)
\]

\[
\text{Efficiency} = SR^* (ST - AT)
\]

**ST** – Standard Time

**SR** – Standard Rate

**AT** – Actual Time

**AR** – Actual Rate
Given the following data, compute the variances.

<table>
<thead>
<tr>
<th></th>
<th>Skilled</th>
<th>Semi-Skilled</th>
<th>Unskilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of workers</td>
<td>16</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Standard rate</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Actual no. of workers</td>
<td>14</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Actual rate of pay per hour (Rs.)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

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

**Solution**

In a 40-hour week, the standard gang should have produced 1,000 standard 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

Total: 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:
### Statement showing the Standard cost, Actual cost and Standard cost of Actual time for Actual output, i.e. 900

<table>
<thead>
<tr>
<th>Gang</th>
<th>Std Cost of actual time</th>
<th>Actual Cost</th>
<th>Std Cost Actual Cost</th>
<th>Std Cost of actual time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours</td>
<td>Rate</td>
<td>Amt</td>
<td>Hours</td>
</tr>
<tr>
<td>Skilled</td>
<td>576</td>
<td>3</td>
<td>1,728</td>
<td>560</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>216</td>
<td>2</td>
<td>431</td>
<td>360</td>
</tr>
<tr>
<td>Unskilled</td>
<td>108</td>
<td>1</td>
<td>108</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>900</td>
<td></td>
<td>2,268</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Variances:

i) **Rate Variance** = Actual time (Std. rate – Actual rate)  
   = (Standard cost of actual time – Actual cost)  
   = Rs. 2,480 – Rs.3,480 = Rs. 1,000 (A)

ii) **Gang Variance** = Total actual time ( Std. rate of std. gang– Std. rate of actual gang)  
    = 1,000 (Rs. 2.52 – Rs. 2.48) = Rs 40(F)

iii) **Sub-efficiency Variance** = Std rate (Total std. time – Total actual time)  
    = Rs. 2.52 (900 hours – 1,000) = Rs. 252 (A)

iv) **Cost Variance** = Std. labour cost – Actual labour cost  
    = Rs. 2,268 – Rs. 3,480 = Rs. 1,212 (A)

v) **Efficiency variance** = Std. rate (Std. time – Actual time)  
   = Standard cost – Std. cost of actual time  
   = Rs. 2,268 – Rs. 2,480 = Rs.212 (A)

### Illustration - 4

A firm gives you the following data:

- **Standard time per unit**: 2.5 hours
- **Actual hours worked**: 2,000 hours
- **Standard rate of pay**: Rs. 2 per hour

25 % of the actual hours has been lost as idle time.

- **Actual output**: 1,000 units
- **Actual wages**: Rs. 4,500

Calculate the idle time variance.
Solution

Standard cost charged to production

\( (1,000 \text{ units} \times 2.5 \text{ hours} \times Rs.2) \)

Rs. 5,000

Actual wages paid

Rs. 4,500

Actual wage rate per hour (Rs. 4,500 ÷ 2,000 hours)

Rs. 2.25

Std. wage rate per hour

Rs. 2.00

Abnormal idle time (25% of 2,000 hours)

500 hrs.

Variance:

\[ \text{i) Rate Variance} = \text{Actual time} \times (\text{Std.rate} - \text{Actual rate}) \]
\[ = 2,000 \text{ hours} \times (Rs.2 - Rs.2.25) = Rs.500 \ (A) \]

\[ \text{ii) Efficiency Variance} = \text{Std. rate} \times (\text{Std.time} - \text{Actual time}*) \]
\[ = Rs.2 \times (2,500 \text{ hrs.} - 1,500 \text{ hrs.}) = Rs. 2,000 \ (F) \]

\[ \text{iii) Idle time Variance} = \text{Idle time} \times \text{Std.rate} \]
\[ = 500 \text{ hrs.} \times Rs.2 = Rs. 1,000 \]

\[ \text{iv) Total Variance} = \text{Std.labour cost} - \text{Actual labour cost} \]
\[ = Rs. 5,000 - Rs. 4,500 = Rs. 500 \ (F) \]

*Actual time less idle time.

6.3.5 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:

\[ \text{Std Fixed Overhead Rate} = \frac{\text{Budgeted Fixed Overheads}}{\text{Normal Volume}} \]
Overhead variances can be classified in the following two major categories:

1) Variable Overhead Variances
2) Fixed Overhead Variances

**Variable Overhead Variances**

These variances arise due to the difference between the standard variable overhead for actual output and the actual variable overhead.

$$\text{Variable overhead variance} = \begin{bmatrix} \text{Standard} & \text{Actual} \\ \text{variable overhead} & \text{variable overhead} \end{bmatrix}$$

Variable overheads are usually measured in relation to output if the details of input quantities on which these variable overheads have been incurred are not readily available. In such cases, only variable overhead variance (as above) is calculated.

In case details of input quantities of variable overheads are available or variable overheads are related to hours of production, the variable overhead variance can be analysed further as:

**a) Variable overhead budget variance (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.

$$\text{Variable overhead budget variance} = (\text{Budgeted variable overhead for actual hours} - \text{Actual variable overheads})$$

**b) 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.

$$\text{Variable overhead efficiency variance} = \text{Standard Variable overhead per hour} \times (\text{Std. hours for actual output} - \text{Actual hours})$$

**Illustration - 5**

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

Standard hours per unit : 6

Variable overhead per hour : Rs. 2/-
The actual data for the month are as follows:
Actual variable overheads incurred Rs. 2,00,000
Actual output (units) 20,000
Actual hours worked 1,12,000

Calculate variable overhead variances viz

Solution

Working notes:
1) **Standard variable overhead**
   = Standard cost of actual output
   = 20,000 units × 6 hours × Rs. 2
   = Rs. 2,40,000

2) **Budgeted variable overhead (for actual hours)**
   = 1,12,000 hours × Rs.2 = Rs.2,24,000

Variances
i) **Variable overhead variance**
   = (Standard variable overhead – Actual variable overhead)
   (refer Note 1 above)
   = (Rs. 2,40,000 – Rs. 2,00,000)
   = Rs. 40,000 (Favourable)

ii) **Variable overhead budget variance**
    = (Budgeted variable overhead for actual hours – Actual variable overhead)
    (refer Note 2 above)
    = Rs. 2,24,000 – Rs. 2,00,000
    = Rs. 24,000 (Favourable)

iii) **Variable overhead efficiency variance**
    = Standard variable overhead rate per hour [Std. hours for actual output – Actual hours]
    = Rs. 2 [1,20,000 hours – 1,12,000 hours]
    = Rs.2 × 8,000 hours
    = Rs. 16,000 (Favourable)
6.14 Advanced Management Accounting

Fixed Overhead Variances

Fixed overhead variances may be broadly classified into

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

b) 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.

Illustration - 6

Fixed overhead as per budget i.e., estimated Rs.5,000
Budgeted hours, i.e., estimated 10,000
Actual hours worked 7,000
Actual fixed overheads Rs. 5,600

Compute the expenditure and volume variances.

Solution

Standard fixed overhead rate: = Rs 5000 / 10000 hrs = Rs 0.50 per hour

a) Fixed overhead absorbed 7,000 hours × Rs.0.50 = Rs 3,500
b) Fixed overheads budgeted Rs.5,000
c) Actual fixed overheads Rs.5,600

Variances

Expenditure Variance = Budgeted overheads – Actual overheads
= Rs. 5,000 – Rs. 5,600
= Rs. 600 (A)

Volume Variance = Std. fixed overhead rate of absorption ×
(Actual hrs. worked – Budgeted hrs. to be worked)
= Rs.0.50 (7,000hrs. – 10,000hrs.)
= Rs. 1,500 (A)

Total variance = Fixed overheads absorbed – Actual fixed overheads
= Rs. 3,500 – Rs. 5,600
= Rs.2,100 (A)
Illustration – 7
You are given the following data:

<table>
<thead>
<tr>
<th></th>
<th>Budgeted</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed overhead for July</td>
<td>Rs.10,000</td>
<td>Rs. 10,200</td>
</tr>
<tr>
<td>Units of production in July</td>
<td>5,000</td>
<td>5,200</td>
</tr>
<tr>
<td>Standard time for one unit</td>
<td>4 hours</td>
<td></td>
</tr>
<tr>
<td>Actual hours worked</td>
<td>20,100 hours</td>
<td></td>
</tr>
</tbody>
</table>

Calculate all variances relating to fixed overheads

Solution
(a) **Total fixed overhead variance**
    \[
    = \text{Absorbed fixed overheads} - \text{Actual fixed overheads}
    \]
    \[
    = (5,200\text{units} \times Rs. 2) - Rs. 10,200 = Rs.200 \text{ (F)}
    \]

(b) **Expenditure variance**
    \[
    = \text{Budgeted overheads} - \text{Actual overheads}
    \]
    \[
    = Rs. 10,000 - Rs. 10,200 = Rs. 200 \text{ (A)}
    \]

(c) **Volume variance**
    \[
    = \text{Standard rate of absorption per unit} \times \\
    (\text{Actual production} - \text{Budgeted production})
    \]
    \[
    = Rs.2 (5,200 \text{ units} - 5,000 \text{ units}) = Rs. 400 \text{ (F)}
    \]

This can be divided into capacity variance and efficiency variance as shown below:

**Capacity variance**
    \[
    = \text{Standard rate of absorption per hour} \times \\
    (\text{Actual hours capacity} - \text{Budgeted hours capacity})
    \]
    \[
    = \text{Re. 0.50} (20,100 \text{ hours} - 20,000 \text{ hours}) = \text{Rs.50 (F)}
    \]

**Efficiency variance**
    \[
    = \text{Standard rate of absorption per hour} \times (\text{Standard hours required} - \text{Actual hours})
    \]
    \[
    = \text{Re.0.50} (20,800 \text{ hours} - 20,100 \text{ hours}) = \text{Rs.350 (F)}
    \]

**Working Notes**:

*Std. hours required for actual production:* 5,200 units \times 4 hours = 20,800 hours

*Calendar variance:* Calendar 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 – 7**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted No. of working days</td>
<td>24</td>
</tr>
<tr>
<td>Budgeted No. of hours per month</td>
<td>12,000</td>
</tr>
<tr>
<td>Fixed overhead rate</td>
<td>Re.0.50 per hour</td>
</tr>
<tr>
<td>Actual No. of working days in June</td>
<td>25</td>
</tr>
</tbody>
</table>

Compute the calendar variance.

**Solution**

Budgeted daily hours per day of June = 12,000 hrs./24 days = 500 hrs.

Actual available hours for June = 500 hours × 25 days = 12,500 hours

Calendar Variance = Std. fixed overhead rate per hr

\[
\text{Calendar Variance} = \text{Std. fixed overhead rate per hr} \times (\text{No. of hrs. in actual period} - \text{No. of hrs. in budgeted period}) \\
= \text{Re.0.50} \times (12,500 \text{ hours} - 12,000 \text{ hours}) = \text{Rs. 250 (F)}
\]

Alternatively, this variance can be calculated by using number of days instead of hours. In that case, overhead rate will be on per day basis.

**Overhead Expenses Variance:**

Normally, for several type of overhead expenses either a single recovery rate or two recovery rates, one representing fixed overheads and the other representing variable overheads, will be prepared. The following illustration shows how overhead expense rates are computed and variances analysed.

**Illustration - 8**

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect material</td>
<td>Re.0.40 per hour</td>
</tr>
<tr>
<td>Indirect labour</td>
<td>Re.0.60 per hour</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Re. 0.40 per hour</td>
</tr>
<tr>
<td>Power</td>
<td>Re. 0.30 per hour</td>
</tr>
<tr>
<td>Sundries</td>
<td>Re. 0.30 per hour</td>
</tr>
<tr>
<td>Total variable expenses</td>
<td>Rs. 2.00 per hour</td>
</tr>
<tr>
<td>Fixed overhead budgeted</td>
<td>Rs. 240</td>
</tr>
</tbody>
</table>

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

Solution

<table>
<thead>
<tr>
<th>Expenses</th>
<th>Budget: 120 Std. Hours</th>
<th>Actual: 156 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate per hour Rs.</td>
<td>Expenses Rs.</td>
</tr>
<tr>
<td>Indirect material</td>
<td>0.40</td>
<td>48</td>
</tr>
<tr>
<td>Indirect labour</td>
<td>0.60</td>
<td>72</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0.40</td>
<td>48</td>
</tr>
<tr>
<td>Power</td>
<td>0.30</td>
<td>36</td>
</tr>
<tr>
<td>Sundries</td>
<td>0.30</td>
<td>36</td>
</tr>
<tr>
<td>Total variable</td>
<td>2.00</td>
<td>240</td>
</tr>
<tr>
<td>overheads</td>
<td>Fixed overheads</td>
<td>2.00</td>
</tr>
<tr>
<td>Total overheads</td>
<td>480</td>
<td></td>
</tr>
</tbody>
</table>

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: A. Fixed expenses

(a) Charged to production (152 hours \times Rs. 2 per hours) Rs. 304

(b) Fixed expenses as per budget Rs. 240

(c) Actual fixed overheads Rs. 250

Volume variance = Fixed overhead recovery rate (Actual volume in std. hrs. – Budgeted volume in standard hrs.)

\[
= Rs.2 (152 – 120) = Rs.64 \text{ (F)}
\]
### Expenses variance

\[ \text{Expenses variance} = (\text{Budgeted expenses} - \text{Actual expenses}) \]
\[ = \text{Rs.240} - \text{Rs.250} = \text{Rs.10 (A)} \]

### Total variance

\[ \text{Total variance} = (\text{Fixed overheads absorbed} - \text{Actual fixed overheads}) \]
\[ = \text{Rs.304} - \text{Rs.250} = \text{Rs.54 (F)} \]

<table>
<thead>
<tr>
<th>Volume variance: (a – b)</th>
<th>Rs.64 (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses variance: (b – c)</td>
<td>Rs. 10 (A)</td>
</tr>
<tr>
<td>Total variance : (a – c)</td>
<td>Rs.54 (F)</td>
</tr>
</tbody>
</table>

### B. Variable expenses

1. Charged to production: (152 hours × Rs.2) = Rs.304
2. Actual expenses = Rs.337
3. Variable expenses variance (a – b) = Rs.33 (A)

### Fixed expenses

1. Charged to production 152 hours (Std.hours) at Rs.2 per hour = Rs.304
2. Actual working hours × Std. rate: (156 hours × Rs. 2) = Rs.312
3. Fixed expenses as per budget = Rs.240
4. Actual fixed overheads = Rs.250

#### Efficiency variance

\[ \text{Efficiency variance} = \text{Std. fixed overhead rate per hr.} \times (\text{Std. hrs. for actual production} - \text{Actual hrs}) \]
\[ = \text{Rs. 2} \times (152 \text{ hours} - 156 \text{ hours}) = \text{Rs.8 (A)} \]

#### Capacity variance

\[ \text{Capacity variance} = \text{Std. fixed overhead rate per hour} \times (\text{Actual capacity} - \text{Budgeted capacity}) \]
\[ = \text{Rs.2} \times (156 \text{ hours} - 120 \text{ hours}) = \text{Rs.72 (F)} \]

#### Volume variance

\[ \text{Volume variance} = \text{Fixed overhead recovery rate per hr.} \times (\text{Actual volume in Standard hrs.} - \text{Budgeted volume in standard hrs.}) \]
\[ = \text{Rs. 2} \times (152 \text{ hours} - 120 \text{ hours}) = \text{Rs. 64 (F)} \]

#### Expense variance

\[ \text{Expense variance} = \text{Budgeted expenses} - \text{Actual expenses} \]
\[ = \text{Rs. 240} - \text{Rs.250} = \text{Rs. 10 (A)} \]

#### Total variance

\[ \text{Total variance} = \text{Fixed overheads absorbed} - \text{Actual fixed overheads} \]
\[ \text{Standard Costing} \quad 6.19 \]

\[ = \text{Rs. 304} - \text{Rs. 250} = \text{Rs. 54 (F)} \]

\[
\begin{align*}
\text{Efficiency variance} & : (a - b) & \text{Rs. 8 (A)} \\
\text{Capacity variance} & : (b - c) & \text{Rs. 72 (F)} \\
\text{Volume variance} & : (a - c) & \text{Rs. 64 (F)} \\
\text{Expenses variance} & : (c - d) & \text{Rs. 10 (A)} \\
\text{Total variance} & : (a - d) & \text{Rs. 54 (F)}
\end{align*}
\]

**Illustration 9**

Following is the standard cost card of a component:

- **Materials**: 2 Units at Rs. 15 = Rs. 30
- **Labour**: 3 Hours at Rs. 20 = Rs. 60
- **Total overheads**: 3 Hours at Rs. 10 = Rs. 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**: Rs. 6,50,000
- **Variable overheads**: Rs. 2,00,000
- **Fixed overheads**: Rs. 3,00,000
- **Material price variance**: Rs. 70,000 (A)
- **Material cost variance**: Rs. 50,000 (A)
- **Labour rate variance**: Rs. 50,000 (F)
- **Fixed overhead expenditure variance**: Rs. 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. Variance OH expenditure variance
6. Fixed OH efficiency variance
(7) Fixed OH capacity variance

(8) Fixed OH volume variance

Solution

1. **Actual material cost incurred**

   *Material cost variance*
   
   \[
   \text{Material cost variance} = \text{Standard cost of material of actual output} - \text{Actual material cost incurred}
   \]

   Or \[
   \text{Actual material cost incurred} = \{\text{Standard cost of material} - \text{Material cost variation}\}
   \]

   \[
   = \{10,000 \times 2 \times 15 + 50,000\}
   \]

   \[
   = 3,00,000 + 50,000 = 3,50,000
   \]

2. **Standard cost of materials actually consumed**

   *Material price variance*

   \[
   \text{Material price variance} = (\text{Standard cost} - \text{Actual cost}) \times \text{Actual quantity consumed}
   \]

   Or \[
   \text{Standard cost of materials actually consumed} = \left\{\frac{\text{Actual material cost incurred}}{\text{Material price variance}}\right\}
   \]

   \[
   = \frac{3,50,000 - 70,000}{20} = 2,80,000
   \]

3. **Labour efficiency variance**

   *(Refer to working note 1)*

   \[
   = \left\{\frac{\text{Standard hours for actual output} - \text{Actual hours worked}}{\text{Standard rate per hour}}\right\}
   \]

   \[
   = \{10,000 \times 3 - 35,000\} \times 20
   \]

   \[
   = \{6,00,000 - 7,00,000\} = 1,00,000 (\text{Adv.})
   \]

4. **Variable OH efficiency variance**

   *(Refer to working note 2)*

   \[
   = \left\{\frac{\text{Standard variable overhead rate per hour} - \text{Actual hours}}{\text{Standard rate per hour}}\right\}
   \]

   \[
   = \{5 \times (30,000 - 35,000)\} = 25,000 (\text{Adv.})
   \]
5. **Variable OH expenditure variance**  
*(Refer to working note 1)*  
\[
= \left\{ \frac{\text{Budgeted variable overhead for actual hours}}{} - \frac{\text{Actual variable overhead}}{} \right\}
\]
\[
= (Rs. 5 \times 35,000 \text{ hours} - Rs. 2,00,000) = Rs. 25,000 \text{ (Adv.)}
\]

6. **Fixed OH efficiency variance**  
*(Refer to working notes 1 & 2)*
\[
= \left\{ \frac{\text{Standard hours for actual output}}{} - \frac{\text{Actual hours}}{\text{for overhead}} \right\}
\]
\[
= Rs.5 \ \{30,000 \text{ hours} - 35,000 \text{ hours}\} = Rs. 25,000 \text{ (Adv.)}
\]

7. **Fixed OH capacity variance**  
*(Refer to working notes 1 & 2)*
\[
= \left\{ \frac{\text{Actual capacity hours}}{\text{budgeted}} - \frac{\text{Budgeted capacity hours}}{\text{hours}} \right\}
\]
\[
= Rs. 5 \ \{35,000 \text{ hours} - 50,000 \text{ hours}\}
\]
\[
= Rs. 75,000 \text{ (Adv.)}
\]

8. **Fixed OH volume variance**  
*(Refer to working note 2)*
\[
= \left\{ \frac{\text{Actual output}}{\text{budgeted}} - \frac{\text{Budgeted output}}{\text{hours}} \right\}
\]
\[
= Rs.15 \ \{10,000 \text{ units} - \frac{50,000 \text{ hours}}{3 \text{ hours}} \}
\]
\[
= Rs.1,50,000 - Rs.2,50,000 = Rs. 1,00,000 \text{ (Adv.)}
\]

**Working notes:**
1. **Labour rate variance** = (SR – AR) x AH  
   Or \[50,000 = 20 \times AH = 50,000 + 6,50,000\]  
   Or \[20 \times AH = 50,000 + 6,50,000\]  
   Or \[AH = 35,000\]
2. Standard hours = 10,000 units × 3 hours = 30,000 hours

\[
\text{Budgeted hours} = \frac{30,000 \text{ hours} \times 100}{60} = 50,000 \text{ hours}
\]

Budgeted fixed overhead = Actual fixed overhead + Expenditure variance

\[
= \text{Rs.3,00,000} – \text{Rs. 50,000} = \text{Rs. 2,50,000}
\]

\[
\left\{ \text{Standard fixed overhead recovery rate per hour} \right\} = \frac{\text{Rs.2,50,000}}{50,000 \text{ hours}} = \text{Rs. 5 per hour}
\]

Total overhead rate per hour = Rs.10

Variable overhead rate per hour (Rs. 10 – Rs. 5) = Rs. 5

3. Standard fixed overhead per unit (3 hours × Rs.5/-) = Rs.15

**Illustration 10**

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material —</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>12 Kg.</td>
<td>Rs.10/-</td>
<td>120</td>
</tr>
<tr>
<td>B</td>
<td>5 Kg.</td>
<td>Rs.6/-</td>
<td>30</td>
</tr>
<tr>
<td>Direct wages —</td>
<td>5 Hrs.</td>
<td>Rs.3/-</td>
<td>15</td>
</tr>
<tr>
<td>Fixed production overheads</td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Total standard cost:</td>
<td></td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>

Standard gross profit = 50

Standard sale price = 250

Fixed Production overhead is absorbed on expected annual output of 13,200 units. Actual result for the month of September, 1997 are as under:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1,000 units @ Rs.250</td>
<td>2,50,000</td>
<td></td>
</tr>
<tr>
<td>Direct material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>11,000 Kg.</td>
<td></td>
<td>1,21,00</td>
</tr>
<tr>
<td>B</td>
<td>5,200 Kg.</td>
<td></td>
<td>28,600</td>
</tr>
</tbody>
</table>
Direct wages 5,500 Hrs. 17,500
Fixed Overheads 39,000
Gross profit 43,900

You are required to calculate all variances. Material price variance is taken out at the time of receipt of Material. Material purchased were:

12,000 Kg. of ‘A’ @ Rs.11 & 5,000 Kg. of ‘B’ @ Rs.5.50.

Solution

Basic data:

(1) Statement showing standard and actual costs of material for 1,000 units of output and standard cost of actual input

<table>
<thead>
<tr>
<th>Materials</th>
<th>Standard Cost</th>
<th>Actual cost</th>
<th>Standard cost of actual input</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qty. (Kg)</td>
<td>Price (Rs.)</td>
<td>Amount (Rs.)</td>
</tr>
<tr>
<td>A</td>
<td>12,000</td>
<td>10</td>
<td>1,20,000</td>
</tr>
<tr>
<td>B</td>
<td>5,000</td>
<td>6</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,50,000</td>
<td>1,49,600</td>
<td>1,41,200</td>
</tr>
</tbody>
</table>

Standard yield (units) = $\frac{16,200 \text{ kgs}}{17,000 \text{ kgs}} = 952.941764$ units approx.

(2) Statement showing standard and actual labour cost of 1,000 units produced and standard cost of actual labour hrs.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Rate p.h. (Rs.)</th>
<th>Amount (Rs.)</th>
<th>Hours</th>
<th>Rate p.h. (Rs.)</th>
<th>Amount (Rs.)</th>
<th>Hours</th>
<th>Rate p.h. (Rs.)</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,000</td>
<td>3</td>
<td>15,000</td>
<td>5,500</td>
<td>3.1818</td>
<td>17,500</td>
<td>5,500</td>
<td>3</td>
<td>17,500</td>
</tr>
</tbody>
</table>
(3) 

<table>
<thead>
<tr>
<th></th>
<th>Budgeted</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed overhead (Rs.)</td>
<td>38,500</td>
<td>39,000</td>
</tr>
<tr>
<td>Hours</td>
<td>5,500</td>
<td>5,500</td>
</tr>
<tr>
<td>Output (units)</td>
<td>1,100</td>
<td>1,000</td>
</tr>
<tr>
<td>Standard time p.u. (hrs)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Standard fixed overhead p.u. (Rs.)</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Standard fixed overhead rate p.h. (Rs.)</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**Computation of material variances (Refer to Basic data 1):**

\[ \text{Material cost variance} = \text{Standard cost} - \text{Actual cost} \]
\[ = \text{Rs.1,50,000} - \text{Rs.1,49,600} = \text{Rs.400 (Fav.)} \]

\[ \text{Material price variance} = \text{Actual quantity (Std. price} - \text{Actual price)} \]
\[ = 11,000 \text{ kgs. (Rs.10 – Rs.11)} + 5,200 \text{ kgs. (Rs.6 – Rs.5.50)} \]
\[ = \text{Rs.11,000 (Adv.) + Rs.2,600 (Fav.)} \]
\[ = \text{Rs.8,400 (Adv.)} \]

\[ \text{Material usage variance} = \text{Standard price (Standard quantity – Actual quantity)} \]
\[ = \text{Rs.10 (12,000 kgs – 11,000 kgs) + Rs.6 (5,000 kgs – 5,200 kgs)} \]
\[ = \text{Rs.10,000 (Fav.) + Rs.1,200 (Adv.)} \]
\[ = \text{Rs.8,800 (Fav.)} \]

\[ \text{Material mix variance} = \text{Total actual quantity} \left\{ \frac{\text{Std. price of std. mix per kg}}{\text{std. mix per kg}} - \frac{\text{Std price of actual mix per kg}}{\text{actual mix per kg}} \right\} \]
\[ = 16,200 \text{ kgs} \left\{ \frac{\text{Rs.1,50,000}}{17,000 \text{ kgs}} - \frac{\text{Rs.1,41,200}}{16,200 \text{ kgs}} \right\} \]
\[ = \text{Rs.1,741.18 (Fav.)} \]

\[ \text{Material yield variance} = \text{Std. rate (Actual yield – Std. yield)} \]
\[ = \text{Rs.150 \{1,000 units – 952.9411764 units\}} \]
\[ = \text{Rs.7,058.82 (Fav.)} \]
Material purchase price variance:

\[ \text{Material purchase price variance} = \text{Actual quantity of material purchased} \times (\text{Std. price per kg} - \text{Actual price per kg}) \]

\[ = 12,000 \text{ kgs} \times (Rs.10 - Rs.11) + 5,000 \text{ kgs} \times (Rs.6 - Rs.5.50) \]

\[ = Rs.12,000 \text{ (Adv.)} + Rs.2,500 \text{ (Fav.)} = Rs.9,500 \text{ (Adv.)} \]

Computation of labour variances (Refer to basic data 2):

Labour cost variance

\[ \text{Labour cost variance} = \text{Standard cost} - \text{Actual cost} \]

\[ = Rs.15,000 - Rs.17,500 = Rs.2,500 \text{ (Adv.)} \]

Labour rate variance

\[ \text{Labour rate variance} = \text{Actual hrs.} \times (\text{Std. rate} - \text{Actual rate}) \]

\[ = 5,500 \times (Rs.3 - Rs.3.1818) \]

\[ = Rs.1,000 \text{ (Adv.)} \]

Labour efficiency variance

\[ \text{Labour efficiency variance} = \text{Std. rate p.h.} \times (\text{Std. hours} - \text{Actual hours}) \]

\[ = Rs.3 \times (5,000 \text{ hrs.} - 5,500 \text{ hrs.}) \]

\[ = Rs.1,500 \text{ (Adv.)} \]

Computation of fixed overhead variance:

Total fixed overhead variance:

\[ \text{Total fixed overhead variance} = \text{Fixed overhead absorbed} - \text{Actual fixed overhead} \]

\[ = 1,000 \text{ units} \times Rs.35 - Rs.39,000 \]

\[ = Rs.35,000 - Rs.39,000 = Rs.4,000 \text{ (Adv.)} \]

Fixed overhead expenditure variance:

\[ \text{Fixed overhead expenditure variance} = \text{Budgeted fixed overhead} - \text{Actual fixed overhead} \]

\[ = Rs.38,500 - Rs.39,000 = Rs.500 \text{ (Adv.)} \]

Fixed overhead volume variance:

\[ \text{Fixed overhead volume variance} = \text{Std. fixed overhead rate per unit} \times (\text{Actual output} - \text{Budgeted output}) \]

\[ = Rs.35 \times (1,000 \text{ units} - 1,100 \text{ units}) = Rs.3,500 \text{ (Adv.)} \]
Efficiency variance:

\[ \text{Efficiency Variance} = \text{Std. fixed overhead rate per unit} \times (\text{Actual output} - \text{Budgeted output}) \]

\[ = \text{Rs.35} \times (1,000 \text{ units} - 1,100 \text{ units}) = \text{Rs.3,500 (Adv.)} \]

Illustration 11

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 Rs. 24,800. The standard price per kg of raw material is Rs. 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 Rs. 800 (adverse) and Rs. 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 Rs. 5 per labour hour. The company employs 60 workers who have been paid hourly wage rate as under:

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>6</th>
<th>8</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly wage rate (Rs.)</td>
<td>4.80</td>
<td>5.20</td>
<td>5.00</td>
</tr>
</tbody>
</table>

(c) Budgeted overheads for a four-weekly period is Rs. 81,600. The actual fixed overheads spent during the said week are Rs. 19,800.

(d) Entire output of ‘EXE’ has been sold at its standard selling price of Rs. 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

Working notes:

1. Standard quantity and cost of raw material required for actual output:

<table>
<thead>
<tr>
<th>Actual output of EXE (units)</th>
<th>4,680</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard output per kg. of raw material (units)</td>
<td>12</td>
</tr>
<tr>
<td>Standard quantity of raw materials required for actual output (kgs.)</td>
<td>390</td>
</tr>
</tbody>
</table>

\[(4,680 \text{ units} / 12 \text{ units})\]

| Standard cost of 390 kgs. of raw material at Rs. 60 per kg* (Rs.) | 23,400 |
2. Basic data for the computation of labour variances:

<table>
<thead>
<tr>
<th>Std. time hours</th>
<th>Rate p.h.</th>
<th>Amount (Rs.)</th>
<th>Standard cost for actual hours (Rs.)</th>
<th>Actual hours</th>
<th>Rate p.h.</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,340</td>
<td>5</td>
<td>11,700</td>
<td>12,000</td>
<td></td>
<td>240</td>
<td>4.80</td>
</tr>
<tr>
<td>(4,680 units × 1/2 hr.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,340</td>
<td></td>
<td>11,700</td>
<td>12,000</td>
<td>1,840</td>
<td>5.00</td>
<td>9,200</td>
</tr>
</tbody>
</table>

3. Basic data for the computation of fixed overhead variances:

<table>
<thead>
<tr>
<th>Budgeted Std. data</th>
<th>Actual data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted fixed overhead (Rs.)</td>
<td>20,400</td>
</tr>
<tr>
<td>Budgeted hours</td>
<td>2,400</td>
</tr>
<tr>
<td>Budgeted output (units)</td>
<td>4,800</td>
</tr>
<tr>
<td>Std. rate p.h. (Rs.)</td>
<td>8.50</td>
</tr>
<tr>
<td>Std. rate p.u. (Rs.)</td>
<td>4.25</td>
</tr>
</tbody>
</table>

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

Labour cost variance : (Refer to Working note 2)
= (Std. cost of labour – Actual cost of labour)
= Rs. 11,700 – Rs. 12,016 = Rs. 316 (Adv.)

Labour rate variance :
= Actual hours (Std. rate - Actual rate)
= Rs. 12,000 – Rs. 12,016
= Rs. 16 (Adv.)

Labour efficiency variance :
= Standard rate per hr. (Std. hours – Actual hours paid)
= (Rs. 11,700 – Rs. 12,000) = Rs. 300 (Adv.)
Total fixed overhead cost variance:
= (Fixed overhead absorbed – Actual fixed overhead)
= (4,680 units × Rs. 4.25 – Rs. 19,800)
= (Rs. 19,890 – Rs. 19,800) = Rs. 90 (Fav.)

Fixed overhead volume variance:
= Std. fixed overhead rate per unit (Actual output – Budgeted output)
= Rs. 4.25 (4,680 units – 4,800 units)
= Rs. 510 (Adverse)

Fixed overhead expenditure variance:
= (Budgeted fixed overhead – Actual fixed overhead)
= (Rs. 20,400 – Rs. 19,800)
= Rs. 600 (Fav.)

(ii) Statement showing total standard cost, standard profit and actual profit for the week

<table>
<thead>
<tr>
<th></th>
<th>Rs.</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>70,200</td>
<td></td>
</tr>
<tr>
<td>(4,680 units × Rs. 15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less : Standard costs of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct material</td>
<td>23,400</td>
<td></td>
</tr>
<tr>
<td>Direct labour</td>
<td>11,700</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td>19,890</td>
<td>54,99</td>
</tr>
<tr>
<td>(4,680 × Rs. 4.25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Refer to working notes 1 to 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard profit</td>
<td>15,210</td>
<td></td>
</tr>
<tr>
<td>Less : Adjustment for variance :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw material :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price variance   : 800 (A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usage variance   : 600 (A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate Variance :  16 (A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency variance : 300 (A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Illustration 12
Assuming the expenses to be fixed, calculate from the following data:
(a) Efficiency variance, (b) Volume variance, (c) Calendar variance and (d) Expense variance

<table>
<thead>
<tr>
<th></th>
<th>Budget</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of working days per month</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Man hours per day</td>
<td>8,000</td>
<td>8,400</td>
</tr>
<tr>
<td>Output per man hour in units</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Standard overhead rate per man hour</td>
<td>Rs.2</td>
<td></td>
</tr>
<tr>
<td>Actual fixed expenses per month</td>
<td></td>
<td>Rs.3,25,000</td>
</tr>
</tbody>
</table>

Solution
Actual output: 8,400 hours × 22 days × 1.2 units per hour = 2,21,760 units.
Standard output per man hour: 1
Standard hours produced or std. hrs. for actual production: 2,21,760 units × 1 hr. = 2,21,760 hrs.
Budgeted hrs. in budgeted days: 8,000 hours × 20 days = 1,60,000 hours
Budgeted hours (capacity) in actual working days: 8,000 hrs. × 22 days = 1,76,000 hours
Actual hours worked: 8,400 hours × 22 days = 1,84,800 hours
Overheads as per budget: 8,000 hours × 20 days × Rs. 2 per hour = Rs.3,20,000

(a) Standard cost charged to production: 2,21,760 hours × Rs.2 = 4,43,520
(b) Actual hours worked × Standard rate: 1,84,800 hours × Rs.2 = 3,69,600
(c) Budgeted hours in actual days × Std. rate: 1,76,000 × Rs.2 = 3,52,000
(d) Overheads as per budget = 3,20,000
(e) Actual overheads = 3,25,000

Efficiency variance = Std. fixed overhead rate per hour (Std. hrs. for production – Actual hrs.)
= Rs.2 (2,21,760 hours – 1,84,800 hours) = Rs.73,920 (F)
6.30  Advanced Management Accounting

**Capacity variance**
= Standard fixed overhead rate per hour (Actual capacity – Budgeted capacity)
= Rs.2 (1,84,800 hours – 1,76,000 hours) = Rs.17,600 (F)

**Calendar variance**
= Standard fixed overhead rate per hour (Budgeted hrs. in actual days – Budgeted hrs. in budgeted days)
= Rs.2 (1,76,000 hours – 1,60,000 hours) = Rs.32,000 (F)

**Volume variance**
= Standard fixed overhead rate per hour
(Actual volume in hrs. – Budgeted volume in hrs.)
= Rs.2 (2,21,760 hours – 1,60,000 hours) = Rs. 1,23,520 (F)

**Expenses variance**
= Budgeted expenses – Actual expenses
= Rs.3,20,000 – Rs.3,25,000 = Rs.5,000 (A)

**Total variance**
= Overheads charged to production – Actual overheads
= Rs. 4,43,520 – Rs.3,25,000 = Rs. 1,18,520 (F)

OR

Rs.
Efficiency variance : (a – b) 73,920 (F)
Capacity variance : (b – c) 17,600 (F)
Calendar variance : (c – d) 32,000 (F)
Volume variance : (a – d) 1,23,520 (F)
Expense variance : (d – e) 5,000 (A)
Total variance : (a – e) 1,18,520 (F)

**Illustration 13**

Mr. M provides the following information relating to 1,000 units of product 'ZED' during the month of April, 1998

Standard price per kg. of raw material – Rs.3
Actual total direct material cost – Rs.10,000
Standard direct labour hours – 1,600
Actual direct labour hours – 1,800
Total standard direct labour cost – Rs.8,000
Standard variable overhead per direct labour hour – Re.1
Standard variable cost per unit of ZED – Rs.1.60
Total standard variable overheads – Rs.1,600
Actual total variable overheads – Rs.1,620
The material usage variance is Rs. 600 (adverse) and the overall cost variance per unit of ZED is Re.0.07 (adverse) as compared to the total standard cost per unit of ZED of Rs. 21.

You are required to compute the following:

(a) Standard quantity of raw-material per unit of ZED.
(b) Standard direct labour rate per hour.
(c) Standard direct material cost per unit of ZED.
(d) Standard direct labour cost per unit of ZED.
(e) Standard total material cost for the output.
(f) Actual total direct labour cost for the output.
(g) Material price variance.
(h) Labour rate variance.
(i) Labour efficiency variance.
(j) Variable overhead expenditure variance.
(k) Variable overheads efficiency variance.

Solution

Working Notes:

1. Standard cost of raw-material consumed:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total standard cost of ZED (1,000 units × Rs.21)</td>
<td></td>
<td>21,000</td>
</tr>
<tr>
<td>Less: Standard cost: Labour</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td>1,600</td>
<td></td>
</tr>
<tr>
<td>Standard cost of raw materials used</td>
<td>11,400</td>
<td></td>
</tr>
</tbody>
</table>

2. Standard cost of raw–material per finished unit:

\[
\frac{\text{Total cost of material}}{\text{Output}} = \frac{\text{Rs. 11,400}}{1,000 \text{ units}} = \text{Rs. 11.40}
\]

3. Standard quantity of raw - material per finished unit and total quantity of raw material required:

\[
\frac{\text{Standard cost of material per unit}}{\text{Standard rate per kg.}} = \frac{\text{Rs. 11.40}}{\text{Rs. 3.00}} = 3.8 \text{ kgs. per finished unit}
\]

Total quantity = 3.8 kg. × 1,000 units = 3,800 kgs.
4. Total material cost variance:
   
   Actual cost of raw material: Rs.10,000
   
   Standard cost of raw material: Rs.11,400
   
   Total material cost variance: Rs. 1,400 (F)
   
5. Actual quantity (AQ) of raw material (in kgs):
   
   Material usage variance = Standard rate (Standard quantity – Actual quantity).
   
   or, Rs. 600 (A) = Rs. 3 (3,800 Kgs. – AQ)
   
   or, 3AQ = 12,000 kgs. or, AQ = 4,000 kgs.
   
   (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.
   
   Actual material cost = Rs. 10,000
   
   Actual quantity = 4,000 kgs.
   
   Actual rate of raw material per kg = Rs. 2.50 per kg. (*As per (5) above.)
   
7. Standard direct labour rate
   
   Standard direct labour hours = 1,600 (given)
   
   Standard direct labour cost = Rs. 8,000 (given)
   
   Standard direct labour hour rate = Rs. 8,000
   
   = 1,600 hrs.
   
   = Rs. 5
   
8. Actual labour cost and actual labour rate per hour:
   
   Actual total cost of 1,000 units = Rs. 21,070
   
   1,000 units (Rs. 21 + Re. 0.07)
   
   Less : Actual cost of material = Rs. 10,000
   
   Actual variable overheads = Rs. 1,620
   
   Actual direct labour cost = Rs. 11,620
   
   Rs. 9,450
   
   Actual direct labour rate per hr. = Rs. 9,450
   
   = 1,800 hrs.
   
   = Rs.5.25
   
9. Standard labour hours to produce one unit:
   
   Standard hours = 1,600 hours
   
   Output in units = 1,000 units
   
   = 1.6 hours
10. **Standard labour cost per unit:**
    Standard labour cost per unit = 1.6 hours × Rs. 5 = Rs. 8

11. **Actual hourly rate of variable overheads:**
    \[
    \frac{\text{Actual variable overheads}}{\text{Actual hours}} = \frac{\text{Rs. 1,620}}{1,800 \text{ hours}} = \text{Rs. 0.90}
    \]

**Computations:**

(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 Rs. 5** *(Refer to working note 7)*.

(c) **Standard direct material cost per unit of ZED:** Rs. 11.40 *(Refer to working note 2)*.

(d) **Standard direct labour cost per unit of ZED:** Rs. 8 *(Refer to working note 10)*.

(e) **Standard total material cost for the output:** Rs. 11,400 *(Refer to working note 1)*.

(f) **Actual total direct labour cost for the output:** Rs. 9,450 *(Refer to working note 8)*.

(g) **Material price variance** = Total material cost variance – Material usage variance.
    = Rs. 1,400 (favourable)* – Rs. 600 (Adverse)
    (*Refer to working note 4)*

Alternatively,
    = Rs. 2000 (Favourable)
    = Actual quantity (Standard rate – Actual rate)
    = 4,000 units (Rs. 3 – Rs. 2.50)*
    (* Refer to working note 6)*
    = Rs. 2,000 (Favourable)

(h) **Labour rate variance:**
    = Actual hours (Standard rate – Actual rate)
    = 1,800 hours (Rs. 5 – Rs. 5.25)
    = Rs. 450 (Adverse)

(i) **Labour efficiency variance:**
    Standard rate (Standard hours – Actual hours)
    = Rs. 5 per hour (1,600 hours – 1,800 hours) = Rs. 1,000 (Adverse)

(j) **Variable overhead expenditure variance:**
    = Actual hours (Standard rate – Actual rate)
    = 1,800 hours (Re. 1 – Re. 0.90)* = Rs. 180 (Favourable) *(Refer to working note)*
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(k) Variable overhead efficiency variance
   = Standard rate (Standard hours – Actual hours)
   = Re. 1 per hour (1,600 hours – 1,800 hours) = Rs. 200 (Adverse)

6.3.4 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.

The sales value variances are more or less similar to material cost variances or labour cost variances.

1. Sales value variance: It is the difference between the budgeted sales and actual sales. The variance can be bifurcated into sales price variance and sales volume variance.

2. Sales price variance:
   Actual quantity of Sales (Actual price – Budgeted price) or Actual sales minus actual quantity at budgeted prices.

3. Sales volume variances:
   Budgeted price (Actual quantity – Budgeted quantity) or Actual quantity at budgeted price minus 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.

4. Sales mix variance: For calculating the sales mix variance, 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 (Budgeted price per unit of actual mix – Budgeted price per unit of budgeted mix)

5. Sales quantity variance:
   Budgeted price per unit of budgeted mix (Actual total sales qty. – Budgeted total sales qty.)
Illustration

Compute the sales turnover variances from the following figures:

<table>
<thead>
<tr>
<th>Product</th>
<th>Budget</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
<td>Price Rs.</td>
</tr>
<tr>
<td>A</td>
<td>2,000</td>
<td>2.50</td>
</tr>
<tr>
<td>B</td>
<td>1,500</td>
<td>5.00</td>
</tr>
<tr>
<td>C</td>
<td>1,000</td>
<td>7.50</td>
</tr>
</tbody>
</table>

Solution

Basic calculation:

<table>
<thead>
<tr>
<th>Product</th>
<th>Budgeted price</th>
<th>Actual price</th>
<th>Budgeted quantity</th>
<th>Actual quantity</th>
<th>Budgeted sales</th>
<th>Actual quantity at budgeted sales price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.50</td>
<td>3.00</td>
<td>2,000</td>
<td>2,400</td>
<td>5,000</td>
<td>6,000</td>
</tr>
<tr>
<td>B</td>
<td>5.00</td>
<td>4.50</td>
<td>1,500</td>
<td>1,400</td>
<td>7,500</td>
<td>7,000</td>
</tr>
<tr>
<td>C</td>
<td>7.50</td>
<td>7.00</td>
<td>1,000</td>
<td>1,200</td>
<td>7,500</td>
<td>9,000</td>
</tr>
<tr>
<td>D</td>
<td>10.00</td>
<td>10.50</td>
<td>500</td>
<td>400</td>
<td>5,000</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Computation of Variances:

Sales price variance = Actual quantity (Actual price – Budgeted price)
= Actual sales – Standard sales
= Rs.26,100 – Rs. 26,000 = Rs.100 (F)

Sales volume variance = Budgeted price (Actual quantity – Budgeted quantity)
= Std. sales – Budgeted sales
= Rs.26,000 – Rs.25,000 = Rs.1,000 (F)

Total variance = Actual sales – Budgeted sales
= Rs.26,100 – Rs.25,000 = Rs.1,100 (F)
The sales mix and the sales quantity variances are worked out as below:

Average budgeted price per unit of budgeted mix: \[ \frac{\text{Rs. } 25,000}{5,000 \text{ units}} = \text{Rs. } 5.00 \]

Average budgeted price per unit of actual mix: \[ \frac{\text{Rs. } 26,000}{5,400 \text{ units}} = \text{Rs. } 4.815 \]

Hence, sales mix variance = Actual total qty. \( \times \) (Budgeted price per unit of actual mix – Budgeted price per unit of budgeted mix)

\[ = 5,400 \text{ units } (\text{Rs. } 4.815 – \text{Rs. } 5.00) \]
\[ = \text{Rs. } 1,000 \text{ (A)} \]

Sales quantity variance = Budgeted price per unit of budgeted mix \( \times \) (Actual total qty. – Budgeted total qty.)

\[ = \text{Rs. } 5 (5,400 – 5,000) = \text{Rs. } 2,000 \text{ (F)} \]

Note: Instead of computing average price, one may use total figures to do away with the effect of rounding off.

For example, in case of sales mix variance figures may be as under:

\[ 5,400 \text{ Units } \left( \frac{\text{Rs. } 26,000}{5,400 \text{ units}} - \frac{\text{Rs. } 25,000}{5,000 \text{ units}} \right) \]
\[ = \text{Rs. } 26,000 – \text{Rs. } 27,000 = \text{Rs. } 1,000 \text{ (A)} \]

(b) Profit or 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:

(a) Changes in unit price and cost.

(b) Changes in physical volume of each product sold. This is quantity variance.

(c) Changes in the physical volume of the more profitable or less profitable products.

This is mix variance.

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

(a) Direct substitution of products.

(b) Actual quantity of the constituents of sales being different from the budgeted quantity.

(c) Actual total quantity being different from the budgeted total quantity.
(d) Difference between actual and budgeted unit cost.

(e) 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:

1. **Total Sales Margin Variance (TSMV):** It is the difference between the budgeted margin and the actual margin.

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

   \[ SMPV = \text{Actual quantity} \times (\text{Actual margin per unit} - \text{Budgeted margin per unit}) \]

3. **Sales Margin Volume Variance (SMVV):** This variance arises because of the difference between the budgeted and actual quantities of each product both evaluated at budgeted margin.

   \[ SMVV = \text{Budgeted margin per unit} \times (\text{Actual units} - \text{Budgeted units}) \]

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

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

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

   \[ SMMV = \text{Total actual quantity sold} \times (\text{Budgeted margin per unit of actual mix} - \text{Budgeted margin per unit of budgeted mix}) \]

**Illustration 15**

Compute the sales margin variances from the following data:

<table>
<thead>
<tr>
<th>Products</th>
<th>Budgeted quantity</th>
<th>Actual quantity</th>
<th>Budgeted sale price Rs.</th>
<th>Actual sale price Rs.</th>
<th>Standard cost per unit Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,200</td>
<td>2,000</td>
<td>5.00</td>
<td>4.50</td>
<td>3.00</td>
</tr>
<tr>
<td>B</td>
<td>800</td>
<td>1,000</td>
<td>2.50</td>
<td>2.00</td>
<td>1.50</td>
</tr>
</tbody>
</table>
Solution

1. The margin for each product may be calculated as under:

<table>
<thead>
<tr>
<th>Products</th>
<th>Budgeted price Rs.</th>
<th>Actual price Rs.</th>
<th>Std. cost Rs.</th>
<th>Budgeted margin Rs.</th>
<th>Actual margin Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.00</td>
<td>4.50</td>
<td>3.00</td>
<td>2.00</td>
<td>1.50</td>
</tr>
<tr>
<td>B</td>
<td>2.50</td>
<td>2.00</td>
<td>1.50</td>
<td>1.00</td>
<td>0.50</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Products</th>
<th>Margin Budget</th>
<th>Quantity Budget</th>
<th>Budgeted margin on actual sales</th>
<th>Actual margin</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e) = (a×c)</th>
<th>(f) = (a) × (d)</th>
<th>(g) = (b)× (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.00</td>
<td>1,200</td>
<td>2,400</td>
<td>3,200</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>B</td>
<td>1.00</td>
<td>800</td>
<td>800</td>
<td>500</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,000</td>
<td>3,200</td>
<td>5,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rs.3,200</td>
<td>Rs.5,000</td>
<td>Rs.3,500</td>
</tr>
</tbody>
</table>

Budgeted margin per unit of budgeted mix: \( \frac{Rs.3,200}{2,000 \text{ units}} = Rs.1.60 \)

Budgeted margin per unit of actual mix: \( \frac{Rs.5,200}{3,000 \text{ units}} = Rs.1.667 \)

Computation of Variances:

- **Sales margin price variance** = Actual quantity (Actual margin–Budgeted margin)
  = Actual margin – Budgeted margin on actual sale
  = Rs.3,500 – Rs.5,000 = Rs. 1,500 (A)

- **Sales margin volume variance** = Budgeted margin (Actual quantity – Budgeted quantity)
  = Budgeted margin on actual sales – Budgeted margin.
  = Rs.5,000 – Rs. 3,200 = Rs. 1,800 (F)
Total sales margin variance = Actual margin – Budgeted margin
= Rs.3,500 – Rs.3,200 = Rs. 300 (F)

The sales margin mix variance and sales margin quantity variance are worked out as under:

Sales margin mix variance = Total actual quantity sold (Budgeted margin per unit of actual mix – Budgeted margin per unit of budgeted mix)
= 3,000 units (Rs. 1.667 – Rs. 1.60) = Rs. 200 (F)

Sales margin quantity variance = Budgeted margin per unit of budgeted mix (Total actual quantity – Total budgeted quantity)
= Rs. 1.60 (3,000 – 2,000) = Rs. 1,600 (F)

The sales variances above have been calculated on the basis of both the methods, viz., turnover method and margin method. Students are advised to grasp both the methods. Further, mix and quantity variances have been calculated according to quantity technique.

Illustration 16

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

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

<table>
<thead>
<tr>
<th>Products</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X (units)</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
</tr>
</tbody>
</table>

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

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

Sales variances (Sales Value Method)

Basic Calculations:

<table>
<thead>
<tr>
<th>Product</th>
<th>Qty.</th>
<th>Rate</th>
<th>Amount</th>
<th>Qty.</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units</td>
<td>Rs.</td>
<td></td>
<td>Units</td>
<td>Rs.</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Computation of sales variances:

1. **Sales value variance**
   \[ \text{Sales value variance} = \text{Actual sales} - \text{Budgeted sales} \]
   \[ = Rs. 2,78,950 - Rs. 2,82,000 \]
   \[ = Rs. 3,050 \text{ (A)} \]

2. **Sales price variance**
   \[ \text{Sales price variance} = \text{Actual quantity} \times \text{(Actual price} - \text{Budgeted price}) \]
   \[ = Rs. 2,78,950 - Rs. 2,88,000 \]
   \[ = Rs. 9,050 \text{ (A)} \]

3. **Sales quantity variance**
   \[ \text{Sales quantity variance} = \text{Budgeted price} \times \text{(Actual Qty.} - \text{Budgeted Qty.}) \]
   \[ = Rs. 2,88,000 - Rs. 2,82,000 \]
   \[ = Rs. 6,000 \text{ (F)} \]

4. **Sales mix variance**
   \[ \text{Sales mix variance} = \text{Total actual qty.} \times \text{(Budgeted price of actual mix} - \text{Budgeted price of budgeted mix}) \]
   \[ = 25,000 \left( \frac{\text{Rs. 2,88,000}}{25,000 \text{ units}} - \frac{\text{Rs. 2,82,000}}{24,000 \text{ units}} \right) \]
   \[ = 25,000 \text{ units} \times (11.52 - 11.75) \]
   \[ = Rs. 5,750 \text{ (A)} \]

5. **Sales sub quantity variance**
   \[ \text{Sales sub quantity variance} = \text{Budgeted price of budgeted mix} \times \text{(Total actual qty.} - \text{Total budgeted qty.)} \]
   \[ = Rs. 11.75 \times (25,000 - 24,000) \]
   \[ = Rs. 11,750 \text{ (F)} \]
Check

Sales value variance = Sales price variance + Sales quantity variance
Rs. 3,050 (A) = Rs. 9,050 (A) + Rs. 6,000 (F)
Sales quantity variance = Sales mix variance + Sales sub-quantity variance
Rs. 6,000 (F) = Rs. 5,750 (A) + Rs. 11,750 (F)

Alternative solution (sales margin method)

Basic calculations:

<table>
<thead>
<tr>
<th>Product</th>
<th>Qty.</th>
<th>Rate</th>
<th>Amount</th>
<th>Qty.</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units</td>
<td>Rs</td>
<td>Rs.</td>
<td>Units</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>A</td>
<td>10,000</td>
<td>5</td>
<td>50,000</td>
<td>11,000</td>
<td>4.50</td>
<td>49,50</td>
</tr>
<tr>
<td>B</td>
<td>6,000</td>
<td>6</td>
<td>36,000</td>
<td>5,000</td>
<td>6.10</td>
<td>30,50</td>
</tr>
<tr>
<td>C</td>
<td>8,000</td>
<td>3</td>
<td>24,000</td>
<td>9,000</td>
<td>2.55</td>
<td>22,95</td>
</tr>
</tbody>
</table>

Computation of variances:

Sales margin variance = Actual margin – Budgeted margin
= Rs. 1,02,950 – Rs. 1,10,000
= Rs. 7,050 (A)

Sales price margin variance = Actual quantity (Actual margin – Budgeted margin)
= Rs. 1,02,950 – Rs. 1,12,000 = Rs. 9,050 (A)

Sales margin mix variance = Total actual quantity (Budgeted margin of actual mix –Budgeted margin of budgeted mix)
= 25,000 units \( \left( \frac{Rs.1,12,000}{25,000 \text{ units}} - \frac{Rs.1,10,000}{24,000 \text{ units}} \right) \)
= Rs. 2583 (A)

Sales margin sub quantity variance = Budgeted margin of budgeted mix × (Total actual Qty. –Total budgeted Qty.)
Rs. 1,10,000
= \( \frac{24,000 \text{ units}}{24,000 \text{ units} - 24,000 \text{ units}} \)
= Rs. 4,583 (F)
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Material Variances :

Basic calculations

Standard and actual costs of material for actual output i.e. 11,000 units of A, 5,000 units of B and 9,000 units of C and standard cost of actual input material.

<table>
<thead>
<tr>
<th>Material</th>
<th>Standard cost</th>
<th>Actual cost</th>
<th>Actual quantity × standard price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qty Units</td>
<td>Rate Rs.</td>
<td>Amount Rs.</td>
</tr>
<tr>
<td>X</td>
<td>51,000*</td>
<td>2</td>
<td>1,02,000</td>
</tr>
<tr>
<td>Y</td>
<td>74,000**</td>
<td>1</td>
<td>74,000</td>
</tr>
<tr>
<td></td>
<td>1,25,000</td>
<td>1,76,000</td>
<td>1,26,000</td>
</tr>
</tbody>
</table>

* 11,000 × 2 + 5,000 × 4 + 9,000 × 1 = 51,000

**11,000 × 3 + 5,000 × 1 + 9,000 × 4 = 74,000.

Computation of variances:

Material cost variance = Standard cost – Actual cost
= Rs. 1,76,000 – 1,82,620 = Rs. 6,620 (A)

Material price variance = Actual quantity (Standard price – Actual price)
= Rs. 1,80,000 – Rs. 1,82,620 = Rs. 2,620 (A)

Material mix variance = Total quantity (Standard price of standard mix – Standard price of actual mix)
= 1,26,000 units \( \left( \frac{Rs. 1,76,000}{1,25,000 \text{ units}} - \frac{Rs. 1,80,000}{1,26,000 \text{ units}} \right) \)
= Rs. 2,592(A)

Material yield variance = Standard price of standard mix \times \{(Total standard quantity – Total actual quantity) / Rs. 1,76,000 \}
= (Rs.1,25,000 – Rs.1,26,000) / 1,25,000 units
= Rs. 1,408 (A)

Check:
Material cost variance = Material price variance + Material mix variance + Material yield variance
= Rs. 2,620(A) + Rs. 2,592(A) + Rs. 1,408(A)
Illustration 17

A. Trident Toys Ltd. had drawn up the following Sales Budget for August, 1998

<table>
<thead>
<tr>
<th>Product</th>
<th>Units</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo Toys</td>
<td>5,000</td>
<td>100</td>
<td>5,00,000</td>
</tr>
<tr>
<td>Champion Toys</td>
<td>4,000</td>
<td>200</td>
<td>8,00,000</td>
</tr>
<tr>
<td>Super Toys</td>
<td>6,000</td>
<td>180</td>
<td>10,80,000</td>
</tr>
</tbody>
</table>

The actual sales for August, 1998 were:

<table>
<thead>
<tr>
<th>Product</th>
<th>Units</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo Toys</td>
<td>5,750</td>
<td>120</td>
<td>6,90,000</td>
</tr>
<tr>
<td>Champion Toys</td>
<td>4,850</td>
<td>180</td>
<td>8,73,500</td>
</tr>
<tr>
<td>Super Toys</td>
<td>5,000</td>
<td>165</td>
<td>8,25,000</td>
</tr>
</tbody>
</table>

The costs per unit of Bravo, Champion and Super Toys were Rs. 90, Rs. 170 and Rs. 130 respectively.

Analyse the variances to show:

(a) the effects on turnover:

(i) Sales price variance
(ii) Sales mix variance
(iii) Sales quantity variance
(iv) Total sales value variance

(b) the effects on profit:

(i) Sales margin : Price variance
(ii) Sales margin : Mix variance
(iii) Sales margin : Quantity variance
(iv) Total sales margin variance.

Solution

A. (a) Analysis of variances to show the effects on turnover: Working Notes:

1. Budgeted sales:

<table>
<thead>
<tr>
<th>Product</th>
<th>Units</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>5,000</td>
<td>100</td>
<td>5,00,000</td>
</tr>
<tr>
<td>Champion</td>
<td>4,000</td>
<td>200</td>
<td>8,00,000</td>
</tr>
<tr>
<td>Super</td>
<td>6,000</td>
<td>180</td>
<td>10,80,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,000</strong></td>
<td><strong>23,80,000</strong></td>
<td></td>
</tr>
</tbody>
</table>
(2) **Actual sales:**

*Actual sales units at actual prices*

<table>
<thead>
<tr>
<th>Units</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Bravo</td>
<td>5,750</td>
<td>120</td>
</tr>
<tr>
<td>Champion</td>
<td>4,850</td>
<td>180</td>
</tr>
<tr>
<td>Super</td>
<td>5,000</td>
<td>165</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,600</strong></td>
<td></td>
</tr>
</tbody>
</table>

(3) **Standard sales:**

*Actual sales units at Budgeted (or Standard) prices.*

<table>
<thead>
<tr>
<th>Units</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Bravo</td>
<td>5,750</td>
<td>100</td>
</tr>
<tr>
<td>Champion</td>
<td>4,850</td>
<td>200</td>
</tr>
<tr>
<td>Super</td>
<td>5,000</td>
<td>180</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,600</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Computation of Variances:**

(i) **Sales price variance**

= Actual quantity (Actual price – Budgeted price)

or

= Actual sales – Standard sales

= Rs.23,88,000 – Rs.24,45,000 = Rs.57,000 (A)

(ii) **Sales mix variance**

= Total actual quantity (Budgeted price of actual mix – Budgeted price of budgeted mix)

= 15,600 units \(\frac{Rs.\ 24,45,000}{15,600} - \frac{Rs.\ 23,80,000}{15,000} \)

= Rs. 24,45,000 – Rs. 24,75,200 = Rs. 30,200 (A)

(iii) **Sales quantity variance**

= Budgeted price of budgeted mix \times (Total actual quantity – Total budgeted quantity)

= Rs. 23,80,000

= \(\frac{15,000 \ units}{15,600 \ units} \) \times (15,600 units – 15,000 units)

= Rs. 24,75,200 – Rs. 23,80,000 = Rs. 95,200 (F)

(iv) **Total sales value variance**

= Actual sales – Budgeted sales

= Rs.23,88,000 – Rs.23,80,000 = Rs. 8,000 (F)
(b) Analysis of variances to show the effects on profit:

Working Notes:

(1) **Budgeted margin per unit**

<table>
<thead>
<tr>
<th></th>
<th>Sales price</th>
<th>Cost</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 100</td>
<td>Rs. 90</td>
<td>Rs. 10</td>
</tr>
<tr>
<td>Champion</td>
<td>Rs. 200</td>
<td>Rs. 170</td>
<td>Rs. 30</td>
</tr>
<tr>
<td>Super</td>
<td>Rs. 180</td>
<td>Rs. 130</td>
<td>Rs. 50</td>
</tr>
</tbody>
</table>

(2) **Actual margin per unit**

<table>
<thead>
<tr>
<th></th>
<th>Sales price</th>
<th>Cost</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 120</td>
<td>Rs. 90</td>
<td>Rs. 30</td>
</tr>
<tr>
<td>Champion</td>
<td>Rs. 180</td>
<td>Rs. 170</td>
<td>Rs. 10</td>
</tr>
<tr>
<td>Super</td>
<td>Rs. 165</td>
<td>Rs. 130</td>
<td>Rs. 35</td>
</tr>
</tbody>
</table>

(3) **Budgeted profit**

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Margin</th>
<th>Total profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 5,000</td>
<td>Rs. 10</td>
<td>Rs. 50,000</td>
</tr>
</tbody>
</table>
| Champion | Rs. 4,000 | Rs. 30 | Rs. 1,20,000 | 1,20,000
| Super  | Rs. 6,000 | Rs. 50 | Rs. 3,00,000 |

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Margin</th>
<th>Total profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 15,000</td>
<td>Rs. 4,70,000</td>
<td></td>
</tr>
</tbody>
</table>

(4) **Actual profit**

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Margin</th>
<th>Total profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 5,750</td>
<td>Rs. 30</td>
<td>Rs. 1,72,500</td>
</tr>
<tr>
<td>Champion</td>
<td>Rs. 4,850</td>
<td>Rs. 10</td>
<td>Rs. 48,500</td>
</tr>
<tr>
<td>Super</td>
<td>Rs. 5,000</td>
<td>Rs. 35</td>
<td>Rs. 1,75,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Margin</th>
<th>Total profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Rs. 15,600</td>
<td>Rs. 3,96,000</td>
<td></td>
</tr>
</tbody>
</table>
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5) **Standard profit**

<table>
<thead>
<tr>
<th></th>
<th>Actual quantity</th>
<th>Budgeted margin</th>
<th>Total profit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Bravo</td>
<td>5,750</td>
<td>10</td>
<td>57,500</td>
</tr>
<tr>
<td>Champion</td>
<td>4,850</td>
<td>30</td>
<td>1,45,500</td>
</tr>
<tr>
<td>Super</td>
<td>5,000</td>
<td>50</td>
<td>2,50,000</td>
</tr>
<tr>
<td></td>
<td>15,600</td>
<td></td>
<td>4,53,000</td>
</tr>
</tbody>
</table>

**Computation of variances:**

(i) **Sale margin price variance**

Actual quantity (Actual margin – Budgeted margin)

\[
\text{Actual profit – Standard profit} = \text{Rs. 3,96,000 – Rs. 4,53,000} = \text{Rs. 57,000 (A)}
\]

(ii) **Sales margin mix variance**

\[
= \text{Total actual quantity} \left( \frac{\text{Budgeted margin on actual mix}}{\text{Budgeted margin on budgeted mix}} \right)
\]

\[
= 15,600 \text{ units} \left( \frac{\text{Rs. 4,53,000}}{15,600} \frac{\text{Rs. 4,70,000}}{15,000} \right)
\]

\[
= \text{Rs. 4,53,000 – Rs. 4,88,800 = Rs. 35,800 (A)}
\]

(iii) **Sales quantity variance**

\[
= \text{Budgeted margin on budgeted mix} \ (\text{Total actual qty. – Total budgeted qty.})
\]

\[
= \text{Rs. 4,70,000} \frac{15,600}{15,000} \ (15,600 \text{ units} – 15,000 \text{ units})
\]

\[
= \text{Rs. 4,88,800 – Rs. 4,70,000 = Rs. 18,800 (F)}
\]

(iv) **Total sales margin variance** = Actual profit – Budgeted profit

\[
= \text{Rs. 3,96,000 – Rs. 4,70,000 = Rs. 74,000 (A)}
\]

6.3.5 Market size and market-share variances:

**Market size variance :**

\[
\left( \frac{\text{Budgeted market share percentage}}{\text{industry sales volume per unit}} \right) \times \left( \frac{\text{Actual industry sales volume in units}}{\text{Budgeted industry sales volume in units}} \right) \times \left( \frac{\text{Budgeted average contribution margin per unit}}{\text{industry contribution margin per unit}} \right)
\]
Market share variance:

\[
\left( \frac{\text{Actual market share}}{\text{Budgeted market share}} \right) \times \left( \frac{\text{Actual industry sales volume in units}}{\text{Budgeted average contribution margin per unit}} \right)
\]

Illustration 18
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 1995 is as follows:

**Budgeted for 1995**

<table>
<thead>
<tr>
<th></th>
<th>Selling price per unit (Rs.)</th>
<th>Variable cost per unit (Rs.)</th>
<th>Contribution margin per unit (Rs.)</th>
<th>Sales volume in units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>24,000</td>
<td>14,000</td>
<td>10,000</td>
<td>7,000</td>
</tr>
<tr>
<td>Portable PC</td>
<td>16,000</td>
<td>10,000</td>
<td>6,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Super PC</td>
<td>1,00,000</td>
<td>60,000</td>
<td>40,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Actuals for 1995**

<table>
<thead>
<tr>
<th></th>
<th>Selling price per unit (Rs.)</th>
<th>Variable cost per unit (Rs.)</th>
<th>Contribution margin per unit (Rs.)</th>
<th>Sales volume in units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>22,000</td>
<td>10,000</td>
<td>12,000</td>
<td>8,250</td>
</tr>
<tr>
<td>Portable PC</td>
<td>13,000</td>
<td>8,000</td>
<td>5,000</td>
<td>1,650</td>
</tr>
<tr>
<td>Super PC</td>
<td>70,000</td>
<td>50,000</td>
<td>20,000</td>
<td>1,100</td>
</tr>
<tr>
<td>Total :</td>
<td></td>
<td></td>
<td></td>
<td>11,000</td>
</tr>
</tbody>
</table>

Super computers derived its total unit sales budget for 1995 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.
6.48 Advanced Management Accounting

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.
(iv) Compute individual product and total sales mix variances.
(v) Comment on your results.

Solution 18

Working Notes:

1. Statement of budgeted average contribution margin per unit for the year 1995

<table>
<thead>
<tr>
<th>Products/ Different PC models</th>
<th>Budgeted contribution margin per unit (Rs.)</th>
<th>Budgeted sales volume (units)</th>
<th>Total budgeted contribution margin (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>10,000</td>
<td>7,000</td>
<td>7,0,00,000</td>
</tr>
<tr>
<td>Portable PC</td>
<td>6,000</td>
<td>1,000</td>
<td>60,00,000</td>
</tr>
<tr>
<td>Super PC</td>
<td>40,000</td>
<td>2,000</td>
<td>8,00,00,000</td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td>10,000</td>
<td>15,60,00,000</td>
</tr>
</tbody>
</table>

Budgeted average contribution margin per unit = \( \frac{15,60,00,000}{10,000 \text{ units}} \) = Rs.15,600.

2. Actual market share percentage

Actual sales of 3 – C models = \( \frac{11,000 \text{ units}}{68,750 \text{ units}} \) \times 100 = 16%

3. Actual sales mix percentage of product

Actual sale of product = \( \frac{\text{Actual sales of product}}{\text{Total Actual sales of 3 PC models}} \) \times 100
Actual sales mix percentage of product PC = 8,250 units \(\frac{11,000\text{ units}}{11,000\text{ units}} = 75\%\)

Actual sales mix percentage of product Portable PC = 1,650 units \(\frac{11,000\text{ units}}{11,000\text{ units}} = 10\%\)

Actual sales mix percentage of product Super PC = 1,100 units \(\frac{11,000\text{ units}}{11,000\text{ units}} = 10\%\)

(i) Computation of individual product and total sales volume variance

Sales volume variance = \[
\begin{bmatrix}
\text{Actual} & \text{Budgeted} \\
\text{sales} & \text{sales} \\
\text{volume in units} & \text{volume in units}
\end{bmatrix} \times \text{Budgeted contribution margin per unit}
\]

Individual product sales volume variance:

PC
= (8,250 units – 7,000 units) × Rs.10,000 = Rs. 1,25,00,000 (Fav.)

Portable PC
= (1,650 units – 1,000 units) × Rs.6,000 = Rs. 39,00,000 (Fav.)

Super PC
= (1,100 units – 2,000 units) × Rs.40,000
= Rs. 3,60,00,000 (Adv.)

Total sales volume variance
= Rs. 1,96,00,000 (Adv.)

(ii) Computation of total sales quantity variance:

Total sales quantity variance:

= \left(\frac{\text{Total actual sales} - \text{Total budgeted sales}}{\text{units}}\right) \times \text{Budgeted average contribution margin per unit}

= (11,000 units – 10,000 units) × Rs.15,600 = Rs.1,56,00,000 (Fav.)

(iii) Computation of the market size and market share variances

1. Market size variance:

= \text{Budgeted market share percentage} \times \text{Budgeted contribution margin per unit}

= 0.20 \times (68,750 \text{ units} – 50,000 \text{ units}) \times Rs. 15,600
= Rs.5,85,00,000 (Fav.)
2. Market share variance:

\[
\text{Market share variance} = \left( \frac{\text{Actual market share percentage}}{\text{Budgeted market share percentage}} \right) \times \left( \frac{\text{Actual industry sales volume in units}}{\text{Budgeted average contribution margin per unit}} \right)
\]

\[
= (0.16 - 0.20) \times 68,750 \times \text{Rs}.15,600
\]

\[
= \text{Rs}.4,29,00,000 \text{ (Adv.)}
\]

(iv) Computation of individual product and total sales mix variances

1. Individual product sales mix variance:

Sales mix variance:

\[
\text{Sales mix variance} = \left( \frac{\text{Actual sales mix percentage}}{\text{Budgeted sales mix percentage}} \right) \times \left( \frac{\text{Actual total sales volume in units}}{\text{Budgeted average individual contribution margin per unit}} \right)
\]

\[
= (0.75 - 0.70) \times 11,000 \times (\text{Rs}.10,000 - \text{Rs}.15,600) = \text{Rs}. 30,80,000 \text{ (Adv)}
\]

Portable PC ***

\[
= (0.15 - 0.10) \times 11,000 \times (\text{Rs}.6,000 - \text{Rs}.15,600) = \text{Rs}. 52,80,000 \text{ (Adv)}
\]

Super PC ***

\[
= (0.10 - 0.20) \times 11,000 \times (\text{Rs}.40,000 - \text{Rs}.15,600) = \text{Rs}.2,68,40,000 \text{ (Adv)}
\]

Total sales mix variance

\[
= \text{Rs}.3,52,00,000 \text{ (Adv.)}
\]

* Refer to working note 1.

** Refer to working note 2.

*** Refer to working note 3.

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

(v) Comment on above results:

1. Favourable sales quantity variance of Rs. 1.56 crores was because of growth in industry as a whole. However, the firm could not retain the budgeted market share of 20%. As a result the benefit of increased market size i.e. Rs.5.85 crores is partly offset by loss due to fall in market share i.e. Rs.4.29 crores.
2. Increase in the percentage sale of computers below-average budgeted margins and a decrease in the percentage sale of computers above-average budgeted margins had resulted in the reduction of operating profit by Rs.3.52 crores.

3. As a result of above, the operating profit of ‘Super Computers’ had been adversely affected by Rs.1.96 crores due to sales variances.

6.4 REPORTING OF VARIANCES

Computation of variances and their reporting is not the final step towards the control of various elements of cost. It in fact 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 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.

6.4.1 Standard cost reports: Standard cost reports showing the details of the variances are prepared for control purposes. Two such reports are illustrated below:

(a) Standard Costing Profit & Loss statement: A standard costing profit and loss statement will show the variance of each type under each element of cost department wise and is illustrated as below:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Total</th>
<th>Dept. A</th>
<th>Dept. B</th>
<th>Dept. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Sales value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Less: Standard cost of sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Standard profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Add / Deduct variances</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Labour : Rate of pay
Efficiency
Overhead : Efficiency
Calendar
Capacity
Expense
Total
E. Actual profit

The adverse variance may be shown in red or in parenthesis.

(b) Material usage variance report :

This report is sent to the heads of departments for necessary corrective action. A typical report is as under:

<table>
<thead>
<tr>
<th>Material</th>
<th>Standard requirement</th>
<th>Actual consumption</th>
<th>This month’s variance</th>
<th>Cumulative variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,200</td>
<td>1,100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>B</td>
<td>1,800</td>
<td>2,000</td>
<td>(200)</td>
<td>(100)</td>
</tr>
<tr>
<td>C</td>
<td>4,100</td>
<td>4,000</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>D</td>
<td>1,000</td>
<td>950</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6.4.2 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. Preparation of these statements is illustrated below:

Illustration 19

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 Rs. 4.50 per hour and the standard variable overhead rate is Rs. 7.50 per hour.

The cost accounts recorded the following variances for the year:

<table>
<thead>
<tr>
<th>Variances</th>
<th>Favourable</th>
<th>Adverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material price – 300</td>
<td>–</td>
<td>300</td>
</tr>
<tr>
<td>Material usage – 600</td>
<td>–</td>
<td>600</td>
</tr>
<tr>
<td>Wage rate 750 –</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Labour efficiency – 2,250</td>
<td>–</td>
<td>2,250</td>
</tr>
<tr>
<td>Variable overhead expenses 3,000 –</td>
<td>2,250</td>
<td></td>
</tr>
<tr>
<td>Variable overhead efficiency –</td>
<td>3,750</td>
<td></td>
</tr>
<tr>
<td>Fixed overhead expense –</td>
<td>–</td>
<td>1,500</td>
</tr>
<tr>
<td>Selling price 6,750 –</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

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

Working Notes:

(a) Actual sales 2,22,750
Less: Price variance (Favourable) 6,750
Standard sales 2,16,000
Units sold 4,800

Budgeted price per unit: \( \frac{Rs. 2,16,000}{4,800 \text{ units}} = Rs. 45 \)
(b) Material used

Rs.

Less: Price variance (Adverse) 300
Usage variance (Adverse) 600
Standard cost 28,800

Standard material cost per unit: \( \frac{\text{Rs.} 28,800}{4,800 \text{ units}} = \text{Rs.} 6 \)

(c) Direct wages spent

44,700

Add: Wage rate variance (Favourable) 750

Less: Efficiency variance (Adverse) 2,250

Standard wages 43,200

Standard wage rate per unit: \( \frac{\text{Rs.} 43,200}{4,800 \text{ units}} = \text{Rs.} 9 \)

(d) Standard direct wage rate is Rs.4.50 per hour.

Hence standard time per unit: Rs. 9 ÷ 4.50 hour = 2 hours

(e) Variable overheads:

Standard rate Rs.7.50 per hour

Variable overhead per unit: 2 hrs. \( \times \) Rs.7.50 = Rs. 15

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

(f) Fixed overhead spent Rs.39,000

Less: Fixed overhead expense variance (Adverse) Rs.1,500

Budgeted overheads Rs.37,500

Std. fixed overhead rate per unit: \( \frac{\text{Rs.} 37,500}{5,000 \text{ units}} = \text{Rs.} 7.50 \)

(g) Fixed overhead recovered: 4,800 units \( \times \) Rs.7.50 = Rs.36,000

(h) Fixed overhead volume variance

Rs.36,000 – Rs.37,500 = Rs.1,500 (Adverse)

(i) Budgeted sales: 5,000 units \( \times \) Rs.45 = Rs.2,25,000

(j) Standard sales: 4,800 units \( \times \) Rs.45 = Rs.2,16,000
(k) Actual sales = Rs.2,22,750

(1) Sales volume variance: = Rs.9,000 (Adverse)
               Rs. 2,16,000 – Rs.2,25,000

(m) Sales price variance:
               Rs.2,22,750 – Rs.2,16,000 = Rs. 6,750 (Favourable)

(i) Original budget:

<table>
<thead>
<tr>
<th>Budgeted sales : (A)</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,000 units × Rs.45</td>
<td>2,25,000</td>
</tr>
</tbody>
</table>

Budgeted costs

<table>
<thead>
<tr>
<th>Direct material</th>
<th>Rs.600</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5,000 units × Rs.6)</td>
<td>30,000</td>
</tr>
<tr>
<td>Direct wages</td>
<td>Rs.900</td>
</tr>
<tr>
<td>(5,000 units × Rs.9)</td>
<td>45,000</td>
</tr>
<tr>
<td>Variable overheads</td>
<td>Rs.15</td>
</tr>
<tr>
<td>(5,000 units × Rs.15)</td>
<td>75,000</td>
</tr>
<tr>
<td>Fixed overheads</td>
<td>Rs.7.50</td>
</tr>
<tr>
<td>(5,000 units × Rs.7.50)</td>
<td>37,500</td>
</tr>
</tbody>
</table>

Total budgeted costs : (B) 1,87,500
Profit : (A) – (B) 37,500

(ii) Standard product cost sheet per unit

| Rs. |
| Direct materials | 6.00 |
| Direct wages     | 9.00 |

Prime cost 15.00
Variable overheads 15.00
Fixed overheads 7.50

Total cost 37.50
Profit 7.50

Selling price 45.00

(iii) Statement showing Reconciliation of the original Budgeted Profit and the Actual Profit.

| Rs. |
| Budgeted profit | 37,500 |

Less: Sales margin volume variance (Adverse)*
or loss of profit on sales volume variance

= Rs. 9,000 × 16 2/3 % **

Standard profit 36,000
**Sales margin volume variance (Adverse)**

\[(200 \text{ units} \times \text{Rs.} 7.50 = \text{Rs.} 1,500)\]

**Profit as % of selling price :**

\[
\times = \frac{7.50}{65} = 16.2\%
\]

*Add : Sales price variance (Favourable)*

\[6,750\]

\[42,750\]

*Add : Favourable cost variances:*

- Wage rate
  \[750\]

- Variable overhead expenses
  \[3,000\]

*Less : Adverse cost variances*

- Material price
  \[300\]

- Material usage
  \[600\]

- Labour efficiency
  \[2,250\]

- Variable overhead efficiency
  \[3,750\]

- Fixed overhead expense
  \[1,500\]

\[8,400\]

\[38,100\]

*Less: Fixed overhead volume variance (Adverse)*

\[1,500\]

[See working note (h)]

\[36,600\]

**Illustration 20**

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:

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard Cost Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material</td>
<td>Rs. 2.00</td>
</tr>
<tr>
<td>Direct wages</td>
<td>Rs. 4.00</td>
</tr>
<tr>
<td>Variable overheads</td>
<td>Rs. 0.60</td>
</tr>
<tr>
<td>Fixed overheads</td>
<td>Rs. 7.40</td>
</tr>
<tr>
<td>Standard cost</td>
<td>Rs. 14.00</td>
</tr>
<tr>
<td>Standard profit</td>
<td>Rs. 6.00</td>
</tr>
<tr>
<td>Standard selling price</td>
<td>Rs. 20.00</td>
</tr>
</tbody>
</table>
Selling and administration expenses are not included in the standard cost, and are deducted from profit as a period cost.

Budgeted output for April 1997 was 5,100 units.

*Actual results for April 1997 were as follows:*

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

Material consumed in production amounted to 2,300 kgs. at a total cost of Rs. 9,800.

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

Actual operating hours amounted to 8,000 hours. Variable overheads amounted to Rs. 2,600.

Fixed overheads amounted to Rs. 42,300.

Selling and administration expenses amounted to Rs. 18,000. You are required to

(a) Calculate all variances.

(b) Prepare an operating statement for the month ended 30th April 1997.

**Solution**

(a) Calculation of Variances:

(i) **Material price variance**

\[
\text{Material price variance} = \text{Actual quantity (Std. rate – Actual rate)}
\]

\[
= \text{Rs. 9,200 – Rs. 9,800} = \text{Rs. 600 (A)}
\]

(ii) **Material usage variance**

\[
\text{Material usage variance} = \text{Std. rate (Std. quantity – Actual quantity)}
\]

\[
= \text{Rs. 4 (2,425 kg. – 2,300 kg.)}
\]

\[
= \text{Rs. 500 (F)}
\]

(iii) **Labour rate variance**

\[
\text{Labour rate variance} = \text{Actual hours (Std. rate – Actual rate)}
\]

\[
= \text{Rs. 17,000 – Rs. 16,800} = \text{Rs. 200 (F)}
\]

(iv) **Labour efficiency variance**

\[
\text{Labour efficiency variance} = \text{Std. rate (Std. hours – Actual hours)}
\]

\[
= \text{Rs. 2 (9,700 – 8,000)}
\]

\[
= \text{Rs. 3,400 (F)}
\]

(v) **Labour idle time variance**

\[
\text{Labour idle time variance} = \text{Std. rate × Idle time}
\]

\[
= \text{Rs. 2 × 500 hrs = Rs. 1,000 (A)}
\]

(vi) **Variable overheads expenditure variance**

\[
\text{Variable overheads expenditure variance} = (\text{Budgeted variable overheads –Actual variable overheads})
\]

\[
= (8,000 \text{ hrs. × Re. 0.30}) – \text{Rs. 2,600}.
\]
= Rs. 200 (A)

(vii) **Variable overheads efficiency variance:**

\[ = \text{Std. rate} \times (\text{Std. hours} – \text{Actual hours}) \]

\[ = \text{Rs. 0.30} \times (9,700 – 8,000) \]

\[ = \text{Rs. 510 (F)} \]

(viii) **Fixed overhead expenditure variance :**

\[ = (\text{Budgeted fixed overheads} – \text{Actual fixed overheads}) \]

\[ = (5,100 \times \text{Rs. 7.40}) – \text{Rs. 42,300} \]

\[ = \text{Rs. 4,560 (A)} \]

(ix) **Fixed overheads volume variance:**

\[ = \frac{\text{Budgeted fixed overheads per unit}}{\text{Budgeted volume} – \text{Actual volume}} \]

\[ = \frac{\text{Rs. 7.40}}{5,100 \text{ units} – 4,850 \text{ units}} \]

\[ = \text{Rs. 1,850 (A)} \]

(x) **Fixed overheads efficiency variance :**

\[ = \frac{\text{Budgeted fixed overheads per hour}}{\text{Std. hrs.} – \text{Actual hrs.}} \]

\[ = \frac{\text{Rs. 3.70}}{9,700 \text{ hrs.} – 8,000 \text{ hrs.}} \]

\[ = \text{Rs. 6,290 (F)} \]

(xi) **Fixed overheads capacity variance:**

\[ = \frac{\text{Budgeted fixed overheads per hour}}{\text{Budgeted capacity} – \text{Actual capacity}} \]

\[ = \frac{\text{Rs. 3.70}}{5,100 \times 2} – 8,000 \}

\[ = \text{Rs. 8,140 (A)} \]

(xii) **Sales price variance**

\[ = \text{Actual qty.} \times (\text{Budgeted rate} – \text{Actual rate}) \]

\[ = \text{Rs. 97,000} – \text{Rs. 95,600} = \text{Rs. 1,400 (A)} \]

(xiii) **Sales volume variance**

\[ = \frac{\text{Std. profit per unit}}{\text{Budgeted sales volume} – \text{Actual sales volume}} \]

\[ = \text{Rs. 6} \times (5,100 – 4,850) \]
### Standard Costing

**= Rs. 1,500 (A)**

(b) **Operating Statement for the month ended 30th April 1997:**

<table>
<thead>
<tr>
<th>Budgeted profit before selling &amp; administration expenses</th>
<th>Rs.</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5,100 units × Rs. 6)</td>
<td>30,600</td>
<td></td>
</tr>
</tbody>
</table>

**Sales variances:**

| Price | 1400(A) |
| Volume | 1500(A) | 2,900(A) |

| Actual sales minus standard cost of sales | 27,700 |

**Cost variances:**

| Material price | – | 600 |
| Material usage | 500 | – |
| Labour rate | 200 | – |
| Labour efficiency | 3,400 | – |
| Labour idle time | – | 1,000 |
| Variable overheads expenditure | – | 200 |
| Variable overheads efficiency | 510 | – |
| Fixed overheads expenditure | – | 4,560 |
| Fixed overheads efficiency | 6,290 | – |
| Fixed overheads capacity | – | 8,140 |

| 10,900 | 14,500 | 3,600 (A) |

**Actual profit before selling & administration expenses:** 24,100

**Less:** Selling & administration expenses 18,000

**Actual profit for the month:** 6,100

**Note:** A = Adverse  F = Favourable.

**Check** (Not required):

| Sales | 95,600 |

| Less: Cost of materials | 9,800 |
| Labour | 16,800 |
| Variable overheads | 2,600 |
| Fixed overheads | 42,300 |
| Selling & Admin. expenses | 18,000 |

| Net profit | 6,100 |
Illustration 21

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

<table>
<thead>
<tr>
<th></th>
<th>Year 1 (Rs. in lakhs)</th>
<th>Year 2 (Rs. in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1,200</td>
<td>1,540</td>
</tr>
<tr>
<td>Direct Material</td>
<td>600</td>
<td>648</td>
</tr>
<tr>
<td>Direct Wages and Variable Overheads</td>
<td>360</td>
<td>412</td>
</tr>
<tr>
<td>Fixed Overheads</td>
<td>160</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,120</td>
</tr>
<tr>
<td>Profit</td>
<td>80</td>
<td>180</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Material</td>
<td>5,00,000</td>
<td>5,40,000</td>
</tr>
<tr>
<td>Direct Labour Hours</td>
<td>75,00,000</td>
<td>80,00,000</td>
</tr>
</tbody>
</table>

You are required to:

(i) 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.

(ii) Find out the break even sales for both years.

(iii) 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

<table>
<thead>
<tr>
<th></th>
<th>Favourable (Rs. in lacs)</th>
<th>Adverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in contribution due to increase in volume</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Rs. 280 lacs – Rs. 240 lacs)</td>
<td>40</td>
<td>—</td>
</tr>
<tr>
<td>(Refer to working note 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales price variance</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>(Refer to working note 3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Standard Costing  6.61

Material usage variance  
(Refer to working note 4)  52

Material price variance  
(Refer to working note 4) —  0

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

Total change in profit  
268 168

100

(ii) Break-even sales (Year 1) = \[
\frac{\text{Fixed cost}}{\text{P/V ratio}}
\]

(Refer to working note 3)

Break-even sales (Year 2)

(Refer to working note 3)

= \frac{\text{Rs. 300 lacs}}{\left(\frac{\text{Rs. 480 lacs}}{\text{Rs. 1,540 lacs}}\right) \times 100} = \text{Rs. 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.

P/V ratio = (Rs. 480 lacs/Rs. 1,540 lacs) \times 100 = 31.169%

Break-even sales = \frac{\text{Rs. 962.50 lacs}}{\text{Rs. 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%

Contribution increase required = \frac{62.5 \times 31.169}{55} \times 100 = 35.4193%

Revised contribution = 1,540 lacs \times 35.4193% = 545.45 lacs

Present contribution = \text{Rs. 480 lacs}

Increase in selling price required = \text{Rs. 65.45 lacs (Rs. 545.45 lacs – Rs. 480 lacs)}
Percentage increase in selling price over the sales value of year 2 = \( \frac{Rs. 65.45 \text{ lacs} \times 100}{Rs. 1,540 \text{ lacs}} = 4.25\% \)

**Working notes:**

1. **Budgeted sales in year 2**
   
   If actual sales in year 2 is Rs. 110 then budgeted sales is Rs. 100.
   
   If actual sales in year 2 is Re. 1 then budgeted sales = \( \frac{Rs. 100}{Rs. 110} \)
   
   If actual sales in year 2 are Rs. 15,40,00,000 then budgeted sales are
   
   \( \frac{Rs. 100}{Rs. 110} \times Rs. 15,40,00,000 = Rs. 1,400 \text{ Lacs.} \)

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

   **Direct material cost**
   
   \[ \text{Direct material} \times 100 \]
   
   \[ \text{Sales} \]
   
   Direct material % to sales (in year 1) = \( \frac{600}{1,200} \times 100 = 50\% \)

   **Budgeted figure of direct material (in year 2)**
   
   \( 50\% \times Rs. 1,400 \text{ lacs} = 700 \text{ lacs} \)

   **Direct wages and variable overhead**
   
   \[ \frac{\text{Direct wages and variable overhead}}{\text{Sales}} \]
   
   Direct wages and variable overhead (% to sales in year 1) = \( \frac{360}{1,200} \times 100 = 30\% \)

   **Budgeted figure of direct wages and variable overhead (in year 2)**
   
   \( 30\% \times 1,400 \text{ lacs} = 420 \text{ lacs} \)
3. Statement of figures extracted from working results of a company

\[(Figure \text{ in lacs of Rs.)}\]

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 2</th>
<th>Tot Varianc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>(Budgeted)</td>
<td>Actual</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td></td>
<td>d = (c) – (b)</td>
</tr>
<tr>
<td>Sales: (A)</td>
<td>1,20</td>
<td>1,400</td>
<td>1,540</td>
<td>140</td>
</tr>
</tbody>
</table>

Variable costs:

- Direct material: 600 lacs, 700 lacs, 648 lacs, 52 lacs (Fav.) (Refer to working note 1)
- Direct wages and variable overhead: 360 lacs, 420 lacs, 412 lacs, 8 lacs (Fav.) (Refer to working note 2)

Total variable costs: (B) 960 lacs, 1,120 lacs, 1,060 lacs, 60 lacs (Fav.)

Contribution (C) = (A) – (B) 240 lacs, 280 lacs, 480 lacs, 200 lacs (Fav.)

Less: Fixed cost 160 lacs, 160 lacs, 300 lacs, 140 lacs (Adv.)

Profit 80 lacs, 120 lacs, 180 lacs, 60 lacs (Fav)

(4) (i) Data for Material variances:

<table>
<thead>
<tr>
<th>Standard data for actual output</th>
<th>Actual data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of material m/t</td>
<td>Rate per m/t</td>
</tr>
<tr>
<td>m/t</td>
<td>m/t</td>
</tr>
<tr>
<td></td>
<td>Rs.</td>
</tr>
<tr>
<td>5,83,333</td>
<td>120</td>
</tr>
</tbody>
</table>

*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) Rs.120 = Rs. 52 lacs (Fav.)
(ii) Data for labour variances overhead variances

<table>
<thead>
<tr>
<th>Standard data for actual output</th>
<th>Actual data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour hours</td>
<td>Rate per Hour</td>
</tr>
<tr>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>87,50,000</td>
<td>4.80</td>
</tr>
</tbody>
</table>

Labour rate variance:

\[(\text{Standard rate} - \text{Actual rate}) \times \text{Actual labour hours}\]

\[(Rs.4.80 - Rs.5.15) \times 80,00,000 = Rs. 28 \text{ lacs (Adv.)}\]

Labour and variable overhead efficiency variance:

\[(\text{Standard labour hours} - \text{Actual labour hours}) \times \text{Standard rate per hour}\]

\[(87,50,000 - 80,00,000) \times \text{Rs.} 4.80 = Rs. 36 \text{ lacs (Adv.)}\]

Illustration 22

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

<table>
<thead>
<tr>
<th>Salesmen</th>
<th>Sales quota Rs.</th>
<th>Standard selling expenses Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravi</td>
<td>7,50,000</td>
<td>2,25,000</td>
</tr>
<tr>
<td>Richard</td>
<td>9,00,000</td>
<td>2,47,500</td>
</tr>
<tr>
<td>Rahim</td>
<td>11,50,000</td>
<td>2,87,500</td>
</tr>
<tr>
<td>Roop Singh</td>
<td>6,00,000</td>
<td>2,25,000</td>
</tr>
</tbody>
</table>

Actual data for the year were as follows:

<table>
<thead>
<tr>
<th>Salesmen</th>
<th>Days on field work</th>
<th>Kilometres covered Rs.</th>
<th>Sales Rs.</th>
<th>Salary Rs.</th>
<th>Free samples Rs.</th>
<th>Postage and stationery Rs.</th>
<th>Other expenses Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravi</td>
<td>200</td>
<td>20,000</td>
<td>8,00,000</td>
<td>80,000</td>
<td>9,000</td>
<td>8,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Richard</td>
<td>175</td>
<td>18,000</td>
<td>10,00,000</td>
<td>80,000</td>
<td>7,500</td>
<td>9,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Rahim</td>
<td>225</td>
<td>18,000</td>
<td>10,50,000</td>
<td>80,000</td>
<td>5,375</td>
<td>10,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Roop Singh</td>
<td>250</td>
<td>30,000</td>
<td>5,20,000</td>
<td>80,000</td>
<td>8,000</td>
<td>6,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>
The salesmen are allowed conveyance allowance of Rs. 1.50 per kilometre and a daily allowance of Rs. 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 Rs. 30 per unit sold in the case of Ravi and Richard and Rs. 40 per unit in the case of Rahim and Roop Singh. Prepare a schedule showing the selling cost variances by salesmen.

Solution

(b) Working notes:

<table>
<thead>
<tr>
<th></th>
<th>Ravi</th>
<th>Richard</th>
<th>Rahim</th>
<th>Roop</th>
<th>Singh</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Standard sales units</td>
<td>1,875</td>
<td>2,250</td>
<td>2,875</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Sales quota + Rs. 400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Standard selling expenses per unit (Rs.)</td>
<td>120</td>
<td>110</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>(Std. selling expenses/Std. sales units)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii) Actual sales units</td>
<td>2,000</td>
<td>2,500</td>
<td>2,625</td>
<td>1,300</td>
<td></td>
</tr>
<tr>
<td>Actual sales + Rs. 400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iv) Actual selling costs</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td></td>
</tr>
<tr>
<td>Daily allowance</td>
<td>16,000</td>
<td>14,000</td>
<td>18,000</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Conveyance allowances</td>
<td>30,000</td>
<td>27,000</td>
<td>27,000</td>
<td>45,000</td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
<td>80,000</td>
<td>80,000</td>
<td>80,000</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>Free samples</td>
<td>9,000</td>
<td>7,500</td>
<td>5,375</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>Postage &amp; stationery</td>
<td>8,000</td>
<td>9,000</td>
<td>10,000</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>Other expenses</td>
<td>9,000</td>
<td>5,000</td>
<td>4,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Commission on sales</td>
<td>48,000</td>
<td>50,000</td>
<td>52,500</td>
<td>26,000</td>
<td></td>
</tr>
<tr>
<td>Corporate sales office expenses</td>
<td>60,000</td>
<td>75,000</td>
<td>1,05,000</td>
<td>52,000</td>
<td></td>
</tr>
<tr>
<td>Total actual selling cost</td>
<td>2,60,000</td>
<td>2,67,500</td>
<td>3,01,875</td>
<td>2,47,000</td>
<td></td>
</tr>
<tr>
<td>(v) Standard selling cost</td>
<td>2,40,000</td>
<td>2,75,000</td>
<td>2,62,500</td>
<td>1,95,000</td>
<td></td>
</tr>
<tr>
<td>(Actual units sold × Std. selling expenses per unit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>Rs.</th>
<th>Rs.</th>
<th>Rs.</th>
<th>Rs.</th>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard selling expenses (Refer to Working Note (v))</td>
<td>2,40,000</td>
<td>2,75,000</td>
<td>2,62,500</td>
<td>1,95,000</td>
<td>9,72,500</td>
</tr>
<tr>
<td>Actual selling expenses (Refer to Working Note (iv))</td>
<td>2,60,000</td>
<td>2,67,500</td>
<td>3,01,875</td>
<td>2,47,000</td>
<td>10,76,375</td>
</tr>
<tr>
<td>Selling cost variance</td>
<td>(20,000)</td>
<td>7,500</td>
<td>(39,375)</td>
<td>(52,000)</td>
<td>(1,03,875)</td>
</tr>
</tbody>
</table>

\[(A)\quad (F)\quad (A)\quad (A)\quad (A)\]

\(A = \text{Adverse}\)

\(F = \text{Favourable}\)

**6.5 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:

**6.5.1 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.

**Illustration 24**

Material purchased 10,000 pieces at Rs. 1.10 Rs. 11,000
Materials consumed 9,500 pieces at Rs. 1.10 Rs. 10,450
Actual wages paid 2,475 hours at Rs. 3.50 Rs. 8,662.50
Actual factory expenses incurred Rs. 17,000 (Budgeted Rs. 16,500)
Units produced: 900 units and sold at Rs. 60 per unit.

The standard rates and prices are as under: Direct materials Re. 1.00 per unit

Standard input 10 pieces per unit
Direct labour rate Rs. 3.00 per hour
Standard requirement 2.5 hours per unit
Overheads Rs. 6.00 per labour hour

Solution

(A) The cost sheet for 900 units will appear as under:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Std. qty.</th>
<th>Std. rate</th>
<th>Std. cost Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material</td>
<td>9,000</td>
<td>1.00</td>
<td>9,000</td>
</tr>
<tr>
<td>Direct labour</td>
<td>2,250</td>
<td>3.00</td>
<td>6,750</td>
</tr>
<tr>
<td>Overheads</td>
<td>2,250</td>
<td>6.00</td>
<td>13,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29,250</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(B) Calculation of variances:

- **Material price variance** = 9,500 Pcs. (Re. 1.00 – Rs.1.10) = Rs. 950 (A)
- **Material usage variance** = Re. 1.00 (9,000 pcs. – 9,500 pcs.) = Rs. 500 (A)
- **Labour rate variance** = 2,475 hrs. (Rs. 3.00 – Rs. 3.50) = Rs. 1,237.50 (A)
- **Labour efficiency variance** = Rs. 3.00 (2,250 hrs. – 2,475 hrs.) = Rs. 675 (A)

**Overhead variances** :

(a) Charged to production as per cost sheet Rs. 13,500
(b) Actual hours x Std. rate: 2,475 hrs. x Rs. 6 Rs. 14,850
(c) Overheads as per budget Rs. 16,500
(d) Actual overheads Rs. 17,000

**Efficiency variance** : (a – b) Rs. 1,350 (A)

**Capacity variance** : (b – c) Rs. 1,650 (A) (idle time)

**Expense variance** : (c – d) Rs. 500 (A)

**Total variance** : (a – d) Rs. 3,500 (A)
(C) The journal entries for recording these transactions are as under:

<table>
<thead>
<tr>
<th>Dr. Rs.</th>
<th>Cr Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Control A/c Dr. 11,000</td>
<td>To General Ledger Adjustment A/c 11,000</td>
</tr>
<tr>
<td>(Being the purchase value of 10,000 pieces of materials at Rs. 1.10 each)</td>
<td></td>
</tr>
<tr>
<td>Work-in-Progress A/c Dr. 10,450</td>
<td>To Material Control A/c 10,450</td>
</tr>
<tr>
<td>(Being the cost of 9,500 pieces of materials actually issued to production at the actual price of Rs. 1.10 each)</td>
<td></td>
</tr>
<tr>
<td>Work-in-Progress A/c Dr. 8,662.50</td>
<td>To Wages Control A/c 8,662.50</td>
</tr>
<tr>
<td>(Being the actual amount of direct wages paid for 2,475 hours at Rs. 3.50 per hour)</td>
<td></td>
</tr>
<tr>
<td>Work-in-Progress A/c Dr. 17,000</td>
<td>To Overhead Expense Control A/c 17,000</td>
</tr>
<tr>
<td>(Being the actual overhead expenses incurred)</td>
<td></td>
</tr>
<tr>
<td>Finished Stock Control A/c Dr. 29,250</td>
<td>To Work-in-Progress A/c 29,250</td>
</tr>
<tr>
<td>(Being the standard cost of production transferred to finished goods account)</td>
<td></td>
</tr>
<tr>
<td>Cost of Sales A/c Dr. 29,250</td>
<td>To Finished Stock Control A/c 29,250</td>
</tr>
<tr>
<td>(Being the standard cost of goods sold transferred to Cost of Sales A/c)</td>
<td></td>
</tr>
</tbody>
</table>

After the basic transactions are posted, the materials control account will show the actual value of stock of material in hand and the work-in-progress account will show a balance representing the cumulative variances on all the accounts and closing balance of work-in-progress at standard cost. The variances have already been analysed in Para (B) above.
and they will be carried to the respective accounts pending investigation before being finally disposed off. In this problem we have assumed that there is no closing balance of work-in-progress.

(D) The journal entries for transferring the variances to their respective accounts are as under

| Material price variance A/c | Dr. 950.00 |
| Material usage variance A/c | Dr. 500.00 |
| Labour rate variance A/c | Dr. 1,237.50 |
| Labour efficiency variance A/c | Dr. 675.00 |
| Overhead efficiency variance A/c | Dr. 1,350.00 |
| Overhead capacity variance A/c | Dr. 1,650.00 |
| Overhead expense variance A/c | Dr. 500.00 |
| To work-in-progress A/c | 6,862.50 |

(E) The ledger accounts will appear as under:

| Dr. Material Control A/c | Rs. 11,000 |
| To Opening balance - By Work-in-Progress A/c | 10,450 |
| To General Ledger By Balance c/d | 550 |
| Adjustment A/c | 11,000 |

Work-in-Progress Control A/c

| Rs. 11,000 |
| To Opening balance – By Finished stock control A/c | 29,250.00 |
| To Material control A/c 10,450.00 By material price variance A/c | 950.00 |
| To Wages control A/c 8,662.50 By material usage variance A/c | 500.00 |
| To Overheads control A/c 17,000.00 By labour rate variance A/c | 1,237.50 |
| | By labour efficiency variance A/c | 675.00 |
| | By overhead efficiency Variance A/c | 1,350.00 |
| | By overhead capacity Variance A/c | 1,650.00 |
| | By overhead expense Variance A/c | 500.00 |

36,112.50 36,112.50
6.5.2 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 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.

Scheme of entries: So far as materials are concerned, material price variances are recorded at the time of receipt of the material and the material quantity variances are recorded as far as possible when excess materials are used. The entries will be as illustrated below:

1. Dr. Material Control A/c
   Dr. or Cr. Material Price Variance A/c
   Cr. Creditors A/c.
   This entry enables the firm to debit the material control account with the actual purchases at standard cost and credit the creditor’s account at the actual cost of actual prices thereby transferring the variances to price variance account.

2. Dr. Work-in-progress Control A/c
   Dr. or Cr. Material Usage Variances A/c
   Cr. Material Control A/c
   This entry charges the work-in-progress control account with the standard cost of standard quantity and credit the material control account at the standard cost of actual issue, the variance being transferred to usage variance account.

3. Dr. Wages Control A/c
   Dr./Cr. Labour Rate Variances A/c
   Cr. Cash
This entry is passed to record the wages at standard rate thereby transferring rate variances to the appropriate account.

4. Dr. Work-in-progress Control A/c
   Dr. or Cr. Overhead Expense Variances A/c
   Cr. Overhead Expense Control A/c.

The complete procedure in recording the transactions under this system is given in the following illustration:

**Illustration 25**

*Standard cost sheet per unit output is as under*

| Direct material 3 pcs. @ Rs. 2.15 | Rs. 6.45 |
| Direct Labour: |
| Dept. A 2 hrs @ Rs. 1.75 | Rs. 3.50 |
| Dept. B 4 hrs @ Rs. 1.50 | Rs. 6.00 |
| Overheads: |
| Dept. A 2 hrs. @ Re. 0.50 | Rs. 1.00 |
| Dept. B 4 hrs. @ Re. 1.00 | Rs. 4.00 |

*20.95*

**Transactions for the period are as under:**

Materials purchased and consumed:

- 8,600 pcs. @ Rs. 2.50 each

Labour time spent

- Dept. A. 5,200 hours
- Dept. B. 12,000 hours

There is no change in labour rates.

Actual factory overheads are:

- Dept. A. Rs. 3,000
- Dept. B. Rs. 12,500

Units produced:

- Dept. A. 2,800
- Dept. B. 2,800
Budgeted overheads:
Dept. A. Rs. 3,000
Dept. B. Rs. 12,000

Solution

(A) Computation of variance:
(i) Material price variance: 8,600 pcs. (Rs. 2.15 – Rs. 2.50) = Rs. 3,010 (A)
(ii) Material usage variance: Rs. 2.15 (8,400 Pcs. – 8,600 Pcs.) = Rs. 430 (A)
[Standard requirement of materials = 2,800 units produced × 3 pcs. per unit = 8,400 pcs.]
(iii) Labour efficiency variance:
Dept. A: Standard time required = 2,800 pcs. × 2 hrs. = 5,600 hours.
Dept. B: Standard time required = 2,800 pcs. × 4 hrs. = 11,200 hours.

Variances:
Dept. A: 1.75 (5,600 – 5,200) = Rs. 700 (F)
Dept. B: 1.50 (11,200 – 12,000) = Rs. 1,200 (A)

(iv) Overheads variances:
(a) Charged to production:

<table>
<thead>
<tr>
<th>Dept. A</th>
<th>Dept. B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Dept. A. 5,600 × 0.50</td>
<td>2,800</td>
<td></td>
</tr>
<tr>
<td>Dept. B. 11,200 × 1.00</td>
<td>11,200</td>
<td>14,000</td>
</tr>
</tbody>
</table>

(b) Actual hours at std. rate:

<table>
<thead>
<tr>
<th>Dept. A</th>
<th>Dept. B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Dept. A. 5,200 × 0.50</td>
<td>2,600</td>
<td></td>
</tr>
<tr>
<td>Dept. B. 12,000 × 1.00</td>
<td>12,000</td>
<td>14,600</td>
</tr>
</tbody>
</table>

(c) Budgeted overheads

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. A</td>
<td>Dept. B</td>
<td>Total</td>
</tr>
<tr>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>3,000</td>
<td>12,000</td>
<td>15,000</td>
</tr>
</tbody>
</table>

(d) Actual expense

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. A</td>
<td>Dept. B</td>
<td>Total</td>
</tr>
<tr>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Efficiency variance : (a – b)</td>
<td>3,000</td>
<td>12,500</td>
</tr>
<tr>
<td>Capacity variance : (b – c)</td>
<td>200(F)</td>
<td>800(A)</td>
</tr>
<tr>
<td>Expense variance : (c – d)</td>
<td>400(A)</td>
<td>500(A)</td>
</tr>
</tbody>
</table>

Total variance : (a – d) 200(A) 1,300(A) 1,500(A)
(B) Journal entries:

| (i) | Material Control A/c | Dr. 18,490 | Cr. |
|     | Material price variance A/c | Dr. 3,010 | |
|     | To Creditors A/c | 21,500 | |

(ii) Work-in-Progress Dept. A. A/c  
     Material usage variance A/c  
     Dr. 18,060  
     To Material Control A/c  
     Dr. 430  
     To Material Control A/c  
     Dr. 18,490  
     To Wages A/c  
     Dr. 9,800  
     To Wages control A/c  
     Dr. 9,800  

(iv) Wages Control A/c  
     To Labour Efficiency Variance Dept A A/c  
     Dr. 700  
     To Labour Efficiency Variance Dept A A/c  
     Dr. 700  

(v) Work-in-Progress Dept. B A/c  
    Labour Efficiency Variance Dept. B A/c  
    Dr. 16,800  
    To Wages Control A/c  
    Dr. 1,200  
    To Wages Control A/c  
    Dr. 18,000  

(vi) Work-in-Progress Dept. A A/c  
     Overhead Capacity Variance Dept. A. A/c  
     Dr. 2,800  
     To Overhead Efficiency Variance Dept. A. A/c  
     Dr. 400  
     To Overhead Efficiency Variance Dept. A. A/c  
     Dr. 200  
     To Overhead Expense Control Dept. A A/c  
     Dr. 3,000  

(vii) Work-in-Progress Dept. B A/c  
      Overhead Efficiency Variance A/c  
      Dr. 11,200  
      Overhead Expenses Variance A/c  
      Dr. 800  
      Overhead Expenses Variance A/c  
      Dr. 500  
      To Overhead Control Dept. B A/c  
      Dr. 12,500  

(viii) Work-in-Progress Dept. B A/c  
       To Work-in-Progress Dept. A A/c  
       Dr. 30,660  
       (Being the transfer at standard cost of finished  
        Production of Department A to Department B  
        for processing in Department B)  

(ix) Finished Stock control A/c  
     Dr. 58,660  
     To Work-in-Progress Dept. B A/c  
     Dr. 58,660
### Ledger Accounts:

#### Material Control A/c
- **Dr.**
  - To Creditors: Rs. 18,490
  - By Material usage variance A/c: Rs. 430
  
  **Rs. 18,490**

#### Wages Control A/c
- **Dr.**
  - To Cash: Rs. 9,800
  - By Wages payable A/c: Rs. 27,100
  - To Labour efficiency variance A/c: Rs. 1,200
  
  **Rs. 27,800**

#### Work-in-Progress (Dept. A) Control A/c
- **Dr.**
  - To Material Control A/c: Rs. 18,060
  - To Wages Control A/c: Rs. 9,800
  - To Overhead Control (Dept. A) A/c: Rs. 2,800
  
  **Rs. 30,660**

#### Work-in-Progress (Dept. B) Control A/c
- **Dr.**
  - To Work-in-Progress: Rs. 16,800
  - To Wages Control A/c: Rs. 16,800
  
  **Rs. 58,660**

#### Overhead Expense Control (Dept. A) A/c
- **Dr.**
  - To Cash: Rs. 3,000
  - To Overhead Efficiency Variance A/c: Rs. 200
  
  **Rs. 3,200**
Dr. Material Price Variance A/c Cr. Rs.
To Creditors 3,010 By Costing P & L A/c 3,010

Dr. Material Usage Variance A/c Cr. Rs.
To Material Control A/c 430 By Costing P & L A/c 430

Dr. Labour Efficiency Variance A/c Cr. Rs.
To Wages Control A/c 1,200 By Wages Control A/c (Efficiency of Dept. B) 700
By Costing P & L A/c 500

Dr. Overhead Efficiency Variance A/c Cr. Rs.
To Overhead Expenses By Overhead Exp. Control
Control (Dept. B) A/c 800 (Dept. A) A/c 200
By Costing P & L A/c 600

Dr. Overhead Capacity Variance A/c Cr. Rs.
To Overhead Expenses By Costing P & L A/c
Control (Dept. A) A/c 400

Dr. Overhead Expenses Variance A/c Cr. Rs.
To Overhead Expenses By Costing P & L A/c
Control (Dept. B) A/c 500

Dr. Creditors A/c Cr. Rs.
To Balance 21,500 By Material Control A/c 18,490
By Material Variance A/c 3,010

21,500
6.76 Advanced Management Accounting

<table>
<thead>
<tr>
<th>Dr.</th>
<th>Overhead Expenses Control (Dept ‘B’) A/c</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rs.</td>
</tr>
<tr>
<td></td>
<td>To Cash</td>
<td>12,500</td>
</tr>
<tr>
<td></td>
<td>By Work-in-Progress Dept. A/c</td>
<td>11,200</td>
</tr>
<tr>
<td></td>
<td>By Overhead Efficiency Variance (Dept. B) A/c</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>By Overhead Expenses Variance (Dept. B) A/c</td>
<td>500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rs.</th>
<th>12,500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dr.</th>
<th>Finished Stock Control A/c</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rs.</td>
</tr>
<tr>
<td></td>
<td>To Work-in-Progress</td>
<td>58,660</td>
</tr>
<tr>
<td>Dept. B A/c</td>
<td>By Balance c/d</td>
<td>58,660</td>
</tr>
</tbody>
</table>

Recapitulation:

(1) Current standards are used in both the systems.

(2) Under the partial plan, material stocks are carried at actual cost whereas the same are carried out at standard cost under the single plan.

(3) The work-in-progress and finished goods are valued at standard cost under both the methods.

(4) Computation of variances:

(a) In partial plan, material price variance is computed on material used in finished goods and work-in-progress whereas in single plan it is computed on the material quantity purchased.

(b) The partial plan is suitable where simple analysis of variance is sufficient at the end of the period whereas the single plan is preferred if frequent detailed analysis of variance is desired, as (a) the comparison of actual with standard cost of each operation or operator or (b) the daily reporting of standard cost of excess material used.

6.6 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.

**SELF-EXAMINATION QUESTIONS**

1. Fill in the banks:
   (a) Compilation of direct material and labour standards entails setting up of —— and —— standards.
   (b) Time and motion study is used to set .......... standard.
   (c) Overhead expense standards are based on the budgeted..................
(d) A standard hour is a .......... hour meant for..................
(e) Standard costing is necessary for jobbing industry to.........a price and .......... a profitable job.
(f) Standard costing works on the principle of .................
(g) The problem of price fluctuations can be overcome to some extent by the use of ............... techniques.
(h) The suitable type of standard for control purposes is ................

2. State whether the following statements are true or false:
   (a) The industrial engineering department is responsible for setting physical standards.
   (b) Constant shortage of a material of specified quality in a factory may pose a problem in setting physical standards.
   (c) If labour time standard is based on the maximum efficiency, the unit cost will be higher.
   (d) Setting of overhead expense standards involves the selection of a suitable level of output and budgeting of expense for that level of output.
   (e) Where products of different sizes, shapes and quality are manufactured in a factory, standard hours is the proper basis of comparison of the output.
   (f) Jobs differ from one another and hence it is not possible to use standard costing in jobbing industries.
   (g) Inventory of finished goods for financial accounting purposes should be based on standard costs adjusted for price or expenditure variances.
   (h) Standard costing does not help the manager in decision making. (i) Standard costs help price fixing when demand is elastic.
   (j) Standard costs reflect optimum operations by bringing economic and technical factors together.

3. Explain briefly how standards are compiled for material and labour costs for a product

4. Fill in the blanks:
   (a) Variance analysis involves the ............and ................................of variances.
   (b) Broadly variances may be of three types......................
   (c) Selling and distribution expenses can be analysed under ......................
   (d) Cost ratios may be useful to control .................. overheads.
5. State whether the following statements are true or false:

(a) Variances can be classified into controllable and uncontrollable.
(b) All price variances are uncontrollable.
(c) Operation cost method is not suitable for controlling administration overheads.
(d) Work units can be established for measuring the output in relation to cost, to control selling and distribution costs.

6. In group A, the names of variances are given and in group B, examples of the reasons for cost variances are given. Match them.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Material Price Variance.</td>
<td>(1) A non-standard mixture used</td>
</tr>
<tr>
<td>B. Labour Rate Variance.</td>
<td>(2) Changes in basic price of raw materials.</td>
</tr>
<tr>
<td>C. Overhead Volume Variance.</td>
<td>(3) Poor working conditions.</td>
</tr>
<tr>
<td>D. Materials Usage Variance.</td>
<td>(4) Using skilled labour in place of unskilled labour.</td>
</tr>
<tr>
<td>E. Labour Efficiency Variance.</td>
<td>(5) Slackness in production</td>
</tr>
</tbody>
</table>

7. Explain briefly the nature and purpose of material and labour variances.

8. Fill in the blanks:

(a) In a textile mill, different varieties of cotton are blended in different proportions. If the blend deviates from the standard blend, we get ........................................ variance.
(b) The relation between the finished product and the raw material input is known as...............
(c) If a skilled workman is used in place of an unskilled workman ...................variance arises.
(d) Volume variance arises because of ................. expenses.

9. Compute the material variances from the following data.

<table>
<thead>
<tr>
<th>Actual quantity consumed</th>
<th>100 Kgs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual price per kg.</td>
<td>Rs. 19</td>
</tr>
<tr>
<td>Standard price per kg.</td>
<td>Rs. 20</td>
</tr>
</tbody>
</table>

Production in standard units is 45 units; one standard unit requires 2 kg. of material.

10. The standard time per unit is 2 hours at Re. 1/- per hour. During a period, 500 units are made and the records showed the actual payment of wages of Rs. 1,800 for 1200 hours worked. Compute the labour cost variances.
11. Given the following data compute the overhead expense variances.

<table>
<thead>
<tr>
<th></th>
<th>Fixed</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual overheads per month</td>
<td>Rs.1,200</td>
<td>Rs.4,000</td>
</tr>
<tr>
<td>Budget for 10,000 hours</td>
<td>Rs.1,000</td>
<td>Rs.3,500</td>
</tr>
<tr>
<td>Standard hours produced</td>
<td>10,400</td>
<td></td>
</tr>
<tr>
<td>Actual hours worked</td>
<td>10,000</td>
<td></td>
</tr>
</tbody>
</table>

12. The income statement of XYZ Co. is presented below:

```
XYZ Company
Income statement
for the year ended Dec. 31, 1996
```

<table>
<thead>
<tr>
<th></th>
<th>Product AR-10</th>
<th>Product ZR-7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Budget</td>
<td>Actual</td>
<td>Budget</td>
</tr>
<tr>
<td>Sales (units)</td>
<td>2,000</td>
<td>2,800</td>
<td>6,000</td>
</tr>
<tr>
<td>Total sales of market (units)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sales revenue (Rs.)</td>
<td>6,000</td>
<td>7,560</td>
<td>12,000</td>
</tr>
<tr>
<td>Cost of goods sold (Rs.)</td>
<td>2,400</td>
<td>2,800</td>
<td>6,000</td>
</tr>
<tr>
<td>Fixed costs (Rs.)</td>
<td>1,800</td>
<td>1,900</td>
<td>2,400</td>
</tr>
<tr>
<td>Total costs (Rs.)</td>
<td>4,200</td>
<td>4,700</td>
<td>8,400</td>
</tr>
<tr>
<td>Net profit (Rs.)</td>
<td>1,800</td>
<td>2,860</td>
<td>3,600</td>
</tr>
</tbody>
</table>

Using the above information compute:
(a) Market size variance.
(b) Market share variance.

13. Fill in the blanks:
(a) The three plans of accounting for standards are ..................
(b) In partial system work-in-progress account is credited at ............ cost.
(c) In single plan system work-in-progress account is charged at .......... cost.
(d) Under dual plan standards are used ...........

14. State whether the following statements are true or false.
(a) In partial plan, the analysis is made at source.
(b) Dual plan helps to express the variances in the form of efficiency indices.
(c) Dual plan helps to convert standards into actuals by using the ratios.
(d) Single plan uses current standards.

15. The following are the two journal entries for the transaction noted below. State the plan to which these entries are applicable.
(a) Standard Clearing A/c Dr.
    To Material Control A/c
    For charging the actual quantity of material consumed at standard price.
(b) Material Control A/c Dr.
    Dr. or Cr. Material Control Variance A/c
    To Creditors
    (For charging the standard cost of material to material control account thereby transferring the price variance to price variance account.)

16. How are variances disposed off in a standard costing system? Explain.

17. “Calculation of variances in standard costing is not an end in itself, but a means to an end. “Discuss.

18. GLOBAL LTD. is engaged in marketing of wide range of consumer goods. A, B, C and D are the zonal sales officers for four zones. The company fixes annual sales target for them individually.

Your are furnished with the following:

(1) The standard costs of sales target in respect of A, B, C and D are Rs. 5,00,000, Rs. 3,75,000, Rs. 4,00,000 and Rs. 4,25,000 respectively.
(2) A, B, C and D respectively earned Rs. 29,900, Rs. 23,500, Rs. 24,500 and Rs. 25,800 as commission at 5% on actual sales effected by them during the previous year.
(3) The relevant variances as computed by a qualified cost accountant are as follows:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>Sales price variance</td>
<td>4,000 (F)</td>
<td>6,000 (A)</td>
<td>5,000 (A)</td>
<td>2,000 (A)</td>
</tr>
<tr>
<td>Sales volume variance</td>
<td>6,000 (A)</td>
<td>26,000 (F)</td>
<td>15,000 (F)</td>
<td>8,000 (F)</td>
</tr>
<tr>
<td>Sales margin mix variance</td>
<td>14,000 (A)</td>
<td>8,000 (F)</td>
<td>17,000 (F)</td>
<td>3,000 (A)</td>
</tr>
</tbody>
</table>

(A) = Adverse variance and (F) = Favourable variance
You are required to:

(i) Compute the amount of sales target fixed and the actual amount of contribution earned in case of each of the zonal sales officer.

(ii) Evaluate the overall performance of these zonal sales officers taking three relevant base factors and then recommend whose performance is the best.

**ANSWERS TO SELF - EXAMINATION QUESTIONS**

1. (a) quantity price (b) labour time (c) output (d) hypothetical, measuring output. (e) quote, choose (f) exception (g) forecasting (h) attainable level of good performance.

2. (a) True (b) True (c) False (d) True (e) True (f) False (g) True (h) False (i) True (j) True

3. (a) True (b) False (c) False (d) True

4. (a) Calculation, interpretation (b) efficiency, price and volume (c) order processing, warehousing, sales promotion and distribution (d) administration.

5. (a) True (b) False (c) False (d) True

6. A, 2 ; B, 4 ; C, 5 ; D, 1 ; E, 3.

8. (a) mix (b) yield (c) substitution (d) fixed.

9. Usage variance Rs. 200 (A) Price variance Rs. 100 (F)

10. Efficiency variance Rs. 200 (A)

    Rate of pay variance Rs. 600 (A)

11. Types of variances

    | Fixed | Variable |
    |-------|----------|
    | Efficiency variance Rs. 40 (F) | Capacity variance Nil |
    | Expense variance Rs. 200 (A) | Rs. 500 (A) |

12. (a) Market size variance; Rs. 1,357 (Favourable)

    (b) Market share variance; Rs. 877 (Adverse)

13. (a) Partial, single and dual (b) actual (c) standard (d) bogey

14. (a) False (b) True (c) True (d) True.

15. (a) Dual (b) Single

18. (i) Actual margin

    | A  | B  | C  | D |
    |----|----|----|---|
    | Rs. ’000 | 90 | 77 | 92 | 80 |

(ii) The performance of the officer C is best.