

## 4 TH. SEM. B. COM.(H & G)

### STANDARD COSTING

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## Standard Costing and Variance Analysis Problems & Solutions

### Standard Costing and Variance Analysis Formulas:

This is a collection of **variance formulas/equations** which can help you calculate variances for direct materials, direct labor, and factory overhead.

1. Direct materials variances formulas
2. Direct labor variances formulas
3. Factory overhead variances formulas

### Direct Materials Variances:

#### Materials purchase price variance Formula

Materials purchase price variance = (Actual quantity purchased x Actual price) – (Actual quantity purchased x Standard price)

#### Materials price usage variance formula:

Materials price usage variance = (Actual quantity used x Actual price) – (Actual quantity used x Standard price)

#### Materials quantity/usage variance formula:

Materials price usage variance = (Actual quantity used x Standard price) – (Standard quantity allowed x Standard price)

#### Materials mix variance formula:

(Actual quantities at individual standard materials costs) – (Actual quantities at weighted average of standard materials costs)

**Materials yield variance formula:**

(Actual quantities at weighted average of standard materials costs) – (Actual output quantity at standard materials cost)

**Direct Labor Variances:**

**Direct labor rate/price variance formula:**

(Actual hours worked x Actual rate) – (Actual hours worked x Standard rate)

**Direct labor efficiency/usage/quantity formula:**

(Actual hours worked x Standard rate) – (Standard hours allowed x Standard rate)

**Direct labor yield variance formula:**

(Standard hours allowed for expected output x Standard labor rate) – (Standard hours allowed for actual output x Standard labor rate)

**Factory Overhead Variances:**

**Factory overhead controllable variance formula:**

(Actual factory overhead) – (Budgeted allowance based on standard hours allowed\*)

**Factory overhead volume variance:**

(Budgeted allowance based on standard hours allowed\*) – (Factory overhead applied or charged to production\*\*)

**Factory overhead spending variance:**

(Actual factory overhead) – (Budgeted allowance based on actual hours worked\*\*\*)

**Factory overhead idle capacity variance formula:**

(Budgeted allowance based on actual hours worked\*\*\*) – (Actual hours worked x Standard overhead rate)

**Factory overhead efficiency variance formula:**

(Actual hours worked x Standard overhead rate) – (Standard hours allowed for expected output x Standard overhead rate)

**Variable overhead efficiency variance formula:**

(Actual hours worked x Standard variable overhead rate) – (Standard hours allowed x Standard variable overhead rate)

**Variable overhead efficiency variance formula:**

(Actual hours worked x Fixed overhead rate) – (Standard hours allowed x Fixed overhead rate)

**Factory overhead yield variance formula:**

(Standard hours allowed for expected output x Standard overhead rate) – (Standard hours allowed for actual output x Standard overhead rate)

\*Fixed overhead budgeted + Standard hours allowed x Standard variable overhead rate

\*\*Standard hours allowed for actual production x Standard overhead rate

\*\*\*Fixed overhead budgeted + Actual hours worked x Standard variable overhead rate

**Problem 1**

The standard cost card shows the following details relating to material needed to produce 1kg. of groundnut oil:

Quantity of groundnut oil required: 3kg

Price of groundnut oil: Rs.2.5/kg

**Actual production data:**

Production during the month: 1,000 kg

Quantity of material used: 3,500 kg

Price of groundnut oil: Rs.3/kg

**You are required to**

- (i). Calculate the material cost variance
- (ii). Calculate the material price variance
- (iii). Material usage variance

**Solution**

Standard Quantity (SQ) = 1,000 kg of production x 3kg = 3,000 kg

Standard Price (SP) = Rs.2.5/kg

Actual Quantity = 3,500 kg

Actual Price (AP) = Rs.3/kg

**Calculation of Variances**

$$\text{(a) Material Cost Variance} = \text{SC} - \text{AC}$$

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

$$= (3,000 \times 2.50) - (3,500 \times 3)$$

$$= \text{Rs.}3,000 \text{ (A)}$$

$$\text{(b) Material Price Variance} = (\text{SP}-\text{AP}) \times \text{AQ}$$

$$= (2.50 - 3) \times 3,500$$

$$= \text{Rs.}1,750 \text{ (A)}$$

$$\text{(c) Material Usage Variance} = (\text{SQ} - \text{AQ}) \times \text{SP}$$

$$= (3,000 - 3,500) \times 2.50 = 1,250 \text{ (A)}$$

### **Problem 2**

From the following particulars, compute (a) Material Cost Variances, (b) Material Price Variances and (c) Material Usage Variance:

Quantity of material purchased = 3,000 units

Value of material purchased = Rs.9,000

Also Check: Q. 6. What are the characteristics of Standard Costing

Standard quantity of material required per tonne of output = 30 units

Standard rate of material = Rs.2.50 per unit

Opening stock of materials = Nil

Closing stock of material = 500 units

Output during the period = 80 tons

### **Solution**

Actual quantity of material purchased = 3,000 units

Value of material purchased = Rs.9,000

Actual price per unit = Rs.9,000 / 3,000 units = Rs.3

Standard price per unit = Rs.2.50

Standard quantity = 80 tons x 30 units = 2,400 tons

Actual quantity = Opening stock + Purchase – Closing stock = Nil + 3,000 – 500 = 2,500 units

### Calculation of variances

(a) Material Cost Variance = (SC – AC)

= (SQ x SP) – (AQ x AP)

= (2,400 x 2.5) – (2,500 x 3) = Rs.1,500 (A)

(b) Material Price variance = (SP – AP) x AQ

= (SP – AP) x AQ

= (2.5 -3) x 2,500 = Rs.1,250 (A)

(c) Material Usage Variance = (SQ – AQ) x SP

= (2,400 – 2,500) x 2.5 = Rs.250 (A)

### Problem 3

Calculate various labor cost variances from the following data which are related to the month of January 2019:

	Budgeted data	Actual data
Production (units)	1,000	1,200
Units produce per hr.	8	6
Rate of wages per hr.	Rs.8	Rs.10
Hrs. of unbudgeted holidays	–	15
Idle time (hrs.)	5	8

**Solution**

(i) Labor Rate Variance

$$= (SR - AR) - AH$$

$$= (8 - 10) \times 223$$

$$= \text{Rs.}446 \text{ (A)}$$

(ii) Labor Time or Efficiency Variance

$$= (\text{Standard hours of production} - \text{Actual hrs for production}) \times \text{Standard Rate of Wages}$$

$$= (5 - 8) \times 8$$

$$= \text{Rs.}24 \text{ (A)}$$

(iv) Labor calendar variance

$$= (\text{Unbudgeted holidays hrs.} \times \text{standard rate of wages})$$

$$= 15 \times 8$$

$$= \text{Rs.}120 \text{ (A)}$$

$$\text{Total Labor Cost Variance} = \text{Rs.}1,190 \text{ (A)}$$

**Verification:**

Labor Cost Variance

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

$$= (130 \times 8) - (223 \times 10)$$

$$= \text{Rs.}1,990 \text{ (A)}$$

**Notes:**

**1. Standard hrs. is calculated as under:**

$$= (\text{Budget units} / \text{Budgeted unit per hr.}) + \text{Budgeted idle time}$$

$$= (1000 / 8) + 5 = 125 + 5 = 130 \text{ hrs.}$$

**2. Actual hours are calculated as follows:**

(Actual units produced / Actual units per hour) + Actual idle time + unbudgeted holidays per hour

$$= (1,200 / 6) + 8 + 15 = 200 + 8 + 15 = 223 \text{ hours}$$

**3. Standard hours for production are calculated as follows:**

Standard units / Standard units per hour

$$= 1,000 / 8 = 125 \text{ hours}$$

**4. Actual hours for actual production are calculated as follows:**

Actual units produced / Actual units per hour

$$= 1,200 / 6 = 200 \text{ hours}$$

**Problem - 4**

Calculate Labour cost variance from the information:

Standard production:	100units
Standard Hours:	500 hours
Wage rate per hour:	Rs.2
Actual production:	85 units
Actual time taken:	450 hours
Actual wage rate paid:	Rs. 2.10 per hour.

**Solution:**

Standard time for one unit = 500 hours ÷ 100 units = 5 hours

Standard hours for actual production 85 units = 85 x 5 = 425 hours

Labour cost Variance = (Std. Hours of Actual Production x Std. Rate) - (Actual Hours x Actual Rate) = (425 Hours x Rs. 2) - (450 Hours x Rs. 2.10) = (Rs.850 - Rs. 945) = RS. 95 (A)

**Problem – 5**

Standard wage rate is Rs.2 per hour and standard time is 10 hours. But actual wage rate is Rs. 2.25 per hour and actual hours used are 12 hours.

Calculate Labour cost variance.

**Solution:**

Labour cost variance = (Std. Rate x Std. Hours) - (Actual Rate x Actual Hours) = (Rs. 2 x 10) – (Rs. 2.25 x 12) = Rs. 20 – Rs. 27 =Rs.7 (A)

Here labour variance is adverse because actual labour cost exceeds standard cost by Rs.7.

**Problem –6**

India Ltd. Manufactures a particular product, the standard direct labour cost of which is Rs. 120 per unit whose manufacture involves the following:

Type of workers	Hours	Rate (Rs.)	Amount (Rs.)
A	30	2	60
B	20	3	60
Total	50	--	120

During a period, 100 units of the product were produced, the actual labour cost of which was as follows:

Type of workers	Hours	Rate (Rs.)	Amount (Rs.)
A	3,200	1.50	4,800
B	1,900	4.00	7,600
Total	5,100	--	12,400

Calculate: (1) Labour cost variance, (2) Labour Rate variance, (3) Labour Efficiency variance and (4) Labour mix variance.

**Solution:**



Type of Worker	Standard for 100 units			Actual for 100units		
	Hours	Rate (Rs.)	Amount (Rs.)	Hours	Rate (Rs.)	Amount (Rs.)
A	3,000	2.00	6,000	3,200	1.50	4,800
B	2,000	3.00	6,000	1,900	4.00	7,600
Total	5,000	--	12,000	5,100	--	12,400

(1) LCV: SC - AC

$$\text{LCV} = 12,000 - 12,400 = \text{Rs. } 400 \text{ (A)}$$

(2) LRV: (SR - AR) x AH

$$A = (2 - 1.50) \times 3,200 = \text{Rs. } 1,600 \text{ (F)}$$

$$B = (3 - 4) \times 1,900 = \text{Rs. } 1,900 \text{ (A)}$$

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$$= \text{Rs. } 300 \text{ (A)}$$

(3) LEV: (SH - AH) x SR

$$A = (3,000 - 3,200) \times 2 = \text{Rs. } 400 \text{ (A)}$$

$$B = (2,000 - 1,900) \times 3 = \text{Rs. } 300 \text{ (F)}$$

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$$= \text{Rs. } 100 \text{ (A)}$$

(4) LMV: (RSH - AH) x SR

$$A = (3,060 - 3,200) \times 2 = \text{Rs. } 280 \text{ (A)}$$

$$B = (2,040 - 1,900) \times 3 = \text{Rs. } 420 \text{ (F)}$$

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$$= \text{Rs. } 140 \text{ (F)}$$

**Working:**

Revised Standard Hours (RSH):

RSH = St. Hours of the type x Total actual hours / Total St. Hours

$$A = 3,000 \times 5,100 / 5,000 = 3,060 \text{ hrs.}$$

$$B = 2,000 \times 5,100 / 5,000 = 2,040 \text{ hrs.}$$

**Problem – 7**

XML Ltd. has furnished you the following information for the month of January:

	Budget	Actual
Outputs (units)	30,000	32,500
Hours	30,000	33,000
Fixed overhead	45,000	50,000
Variable overhead	60,000	68,000
Working days	25	26

Calculate overhead variances.

**Solution:**

Necessary calculations

$$\text{Standard hour per unit} = \frac{\text{Budgeted hours}}{\text{Budgeted units}} = \frac{30,000}{30,000} = 1 \text{ hr.}$$

$$\text{Standard hour for actual output} = 32,500 \text{ units} \times 1 \text{ hr.} = 32,500$$

$$\text{Standard overhead rate per hour} = \frac{\text{Budgeted Overhead}}{\text{Budgeted Hours}} =$$

$$\text{for Fixed Overhead} = \frac{45,000}{30,000} = \text{Rs. 1.50 per unit}$$

$$\text{For variable overhead} = \frac{60,000}{30,000} \text{ Rs. 2 per unit}$$

$$\text{Standard fixed overhead rate per day} = \text{Rs. } 45,000 \div 25 \text{ days} = \text{Rs. } 1,800$$

Recovered overhead = Standard hours for actual output x Standard Rate

For fixed overhead = 32,500 hours x Rs. 1.50 = Rs. 48,750

For variable overhead = 32,500 hours x Rs. 2 = Rs. 65,000

Standard overhead = Actual hours x Standard Rate

For fixed overhead = 33,000 x 1.50 = Rs. 49,500

For variable overhead = 33,000 x 2 = Rs. 66,000

Revised budgeted hours =  $\frac{\text{Budgeted hours}}{\text{Budgeted Days}} \times \text{Actual Days} = \frac{30,000}{25} \times 26 = 31,200$  hours

Revised budgeted overhead = 31,200 x 1.50 = Rs. 46,800

Calculation of Variances

Fixed Overhead Variances:

- Fixed Overhead Cost Variance = Recovered Overhead – Actual Overhead = 48,750 – 50,000 = Rs. 1,250 (A)

Fixed Overhead Expenditure Variance = Budgeted Overhead – Actual Overhead = 45,000 – 50,000 = Rs. 5,000 (A)

- Fixed Overhead Volume Variance = Recovered Overhead – Budgeted Overhead = 48,750 – 45,000 = Rs. 3,750 (F)
- Fixed Overhead Efficiency Variance = Recovered Overhead – Standard Overhead = 48,750 – 49,500 = Rs. 750 (A)
- Fixed Overhead Capacity Variance = Standard Overhead – Revised Budgeted Overhead = 49,500 – 46,800 = Rs. 2,700 (F)
- Calendar Variance = (Actual days – Budgeted days) x Standard rate per day = (26 – 25) x 1,800 = Rs. 1,800 (F)

Variable Overhead Variances:

- Variable Overhead Cost Variance = Recovered Overhead – Actual Overhead = 65,000 – 68,000 = Rs. 3,000 (A)
- Variable Overhead Expenditure Variance = Standard Overhead – Actual Overhead = 66,000 – 68,000 = Rs. 2,000 (A)
- Variable Overhead Efficiency Variance = Recovered Overhead – Actual Overhead = 65,000 – 66,000 = Rs. 1,000 (A)

