

# PROCESS COSTING FOR B.COM –SEMESTER IV –CBCS

COMPILED BY TAMAL BASU  
Assistant Professor of Commerce  
P.K.College, Contai

## PROCESS COSTING

Process costing is the method of costing applied in the industries engaged in continuous or mass production. Process costing is a method of costing used to ascertain the cost of a product at each process or stage of manufacturing.

According to ICMA terminology, “Process Costing is that form of operation costing which applies where standardized goods are produced”.

So it is a basic method to ascertain the cost at each stage of manufacturing. Separate accounts are maintained at each process to which expenditure incurred. At the end of each process the cost per unit is determined by dividing the total cost by the number of units produced at each stage. Hence, this costing is also called as “Average Costing” or “Continuous Costing”. Process Costing is used in the industries like manufacturing industries, chemical industries, mining works and public utility undertakings.

### Characteristics of Process Costing

1. Production is continuous
2. Products pass through two or more distinct processes of completion.
3. Products are standardized and homogeneous.
4. Products are not distinguishable in processing stage.
5. The finished product of one process becomes the raw material of the subsequent process.
6. Cost of material, labour and overheads are collected for each process and charged accordingly.

### Advantages of Process Costing

1. It is easy to compute average cost because the products are homogeneous in Process Costing.
2. It is possible to ascertain the process costs at short intervals.
3. Process Costing is simple and less expensive in relation to job costing.
4. By evaluating the performance of each process effective managerial control is possible.

### Disadvantages of Process Costing

1. Valuation of work in progress is difficult.
2. It is not easy to value losses, wastes, scraps etc.
3. The apportionment of total cost among joint products and by-products is difficult.
4. Process cost are not accurate, they are only average costs
5. Process costs are only historical.

### Principles of Process Costing

The following points are considered while determining the cost under Process Costing.

1. Production activity should be divided into different processes or departments.
2. A separate account is opened for each process.
3. Both direct and indirect costs are collected for each process.
4. The quantity of output and costs are recorded in the respective process accounts.
5. The cost per unit is determined by dividing the total cost at the end of each process by the number of output of each process.
6. Normal loss and abnormal loss are credited in the process account
7. The accumulated cost of each process is transferred to subsequent process along with

output. The output of the last process along with cost is transferred to the finished goods account.

8. In case of by-products and joint products their share in joint cost should be estimated and credited to the main process.
9. When there is work in progress at the end of the period the computation of inventory is made in terms of complete units.

#### **Difference between Process Costing and Job Costing**

##### **Process Costing**

1. Production is continuous
2. Production is for stock
3. All units produced are identical or homogeneous
4. There is regular transfer of cost of one process to subsequent processes
5. Work in progress always exists

##### **Job Costing**

1. Production is according to customers' orders
2. Production is not for stock
3. Each job is different from the other
4. There is no regular transfer of cost from one job to another
5. Work in progress may or may not exist

#### **Procedure for Process Costing**

1. Each process is separately identified. Separate process account is opened for each process.
2. Along with 'Particulars Column', two columns are provided on both sides of the process account – units (quantity) and amount (Rupees).
3. All the expenses are debited in the respective process account.

4. Wastage, sale of scrap, by-products etc are reentered on the credit side of the process account.
5. The difference between debit and credit side shows the cost of production and output of that particular process which is transferred to the next process.
6. The cost per unit in every process is calculated by dividing the net cost by the output.
7. The output of last process is transferred to the Finished Stock Account.
8. Incomplete units at the end of the each period in every process are converted in terms of completed units.

### Specimen of Process Account

#### Process Account

|                            | Units | Rs. |                                       | Units | Rs. |
|----------------------------|-------|-----|---------------------------------------|-------|-----|
| To Direct materials        |       |     | By Loss in weight<br>(Normal Loss)    |       |     |
| To Direct Wages            |       |     | By sale of Scrap                      |       |     |
| To Direct Expenses         |       |     | By Next Process<br>Account (Transfer) |       |     |
| To Indirect expenses       |       |     |                                       |       |     |
| To Other Expenses (if any) |       |     |                                       |       |     |

### Preparation of Process Accounts

The preparation of Process Account depends upon the following situations

1. Simple Process Account
2. Process costing with normal process loss
3. Process costing with abnormal process loss
4. Process costing with abnormal process gains
5. Inter – process profits.

#### Simple Process Account

Under this case it is very easy to prepare process account. A separate account is opened for each process. All costs are debited to the process account. The total cost of the process is transferred to the next process. At the end of each process the cost per unit is obtained by dividing the total cost by the number of units.

**Illustration 1:** Product A requires three distinct processes and after the third process the product is transferred to finished stock. Prepare various process accounts from the following information.

|                      | Total | P1   | P2   | P3  |
|----------------------|-------|------|------|-----|
| Direct Materials     | 5000  | 4000 | 600  | 400 |
| Direct Labour        | 4000  | 1500 | 1600 | 900 |
| Direct Expenses      | 800   | 500  | 300  |     |
| Production overheads | 6000  |      |      |     |

Production overheads to be allocated to different processes on the basis of 150% of direct wages. Production during the period was 200 units. Assume there is no opening or closing stock.

**Solution:**

| Process I Account       |       |      |                      |       |      |
|-------------------------|-------|------|----------------------|-------|------|
|                         | Units | Rs.  |                      | Units | Rs.  |
| To Direct materials     | 200   | 4000 | By Process II        |       |      |
| To Direct Wages         |       | 1500 | Account(Transfer)    | 200   | 8250 |
| To Direct Expenses      |       | 500  | Cost per unit 8250 = |       |      |
| To Production overheads |       | 2250 | 41.25                |       |      |
| (1500x150%)             | 200   | 8250 | 200                  | 200   | 8250 |

| Process II Account      |       |       |                       |       |       |
|-------------------------|-------|-------|-----------------------|-------|-------|
|                         | Units | Rs.   |                       | Units | Rs.   |
| To Process I A/c        | 200   | 8250  | By Process III        |       |       |
| To Direct materials     |       | 600   | Account(Transfer)     | 200   | 13150 |
| To Direct Wages         |       | 1600  | Cost per unit 13150 = |       |       |
| To Direct Expenses      |       | 300   | 65.75                 |       |       |
| To Production overheads |       | 2400  | 200                   |       |       |
| (1600x150%)             |       |       |                       |       |       |
|                         | 200   | 13150 |                       | 200   | 13150 |

| Process III Account     |       |       |                          |       |       |
|-------------------------|-------|-------|--------------------------|-------|-------|
|                         | Units | Rs.   |                          | Units | Rs.   |
| To Process II A/c       | 200   | 13150 | By Finished stock A/c    |       |       |
| To Direct materials     |       | 400   | (Output Transferred )    | 200   | 15800 |
| To Direct Wages         |       | 900   | Cost per unit 15800 = 79 |       |       |
| To Production overheads |       | 1350  | 200                      |       |       |
| (900x150%)              |       |       |                          |       |       |
|                         | 200   | 15800 |                          | 200   | 15800 |

**Process losses**

The process loss is classified into two- normal process loss and abnormal process loss.

**Normal process loss**

This is the loss which is unavoidable on account of inherent nature of production process. It arises under normal conditions. It is usually calculated as a certain percentage of input. Normal process loss includes either waste or scrap or both. Waste is unsalable and has no value. Loss in weight is an example of waste. Loss in weight should be credited to the concerned process account. It should be recorded only in terms of quantity.

Loss in weight = Opening Stock + output from the preceding process – (output of the Concerned process + closing stock)

Illustration 2: From the following figures, show the cost of three processes of manufacture. The production of each process is passed on to the next process immediately on completion.

|                                                      | Process<br>A | Process<br>B | Process<br>C |
|------------------------------------------------------|--------------|--------------|--------------|
| Wages and Materials                                  | 30400        | 12000        | 29250        |
| Works Overhead                                       | 5600         | 5250         | 6000         |
| Production ion units                                 | 36000        | 37500        | 48000        |
| Stock on 1 July 2012 (units from preceding process)  |              | 4000         | 16500        |
| Stock on 31 July 2012 (units from preceding process) |              | 1000         | 5500         |

Solution:

Process A Account

|                        | Units | Rs.   |                           | Units | Rs.   |
|------------------------|-------|-------|---------------------------|-------|-------|
| To Wages and Materials | 36000 | 30400 | By Process B A/c          |       |       |
| To Works Overhead      |       | 5600  | (Transfer )               | 36000 | 36000 |
|                        |       |       | Cost per unit $36000 = 1$ |       |       |
|                        |       |       | 36000                     |       |       |
|                        | 36000 | 36000 |                           | 36000 | 36000 |

Process B Account

|                             | Units | Rs.   |                              | Units | Rs.   |
|-----------------------------|-------|-------|------------------------------|-------|-------|
| To Opening Stock (Re.1 p.u) | 4000  | 4000  | By loss in weight (Bal. fig) | 1500  |       |
| To Process A A/c (transfer) | 36000 | 36000 | By Closing stock @ Re.1      | 1000  | 1000  |
| To Wages and Materials      |       | 12000 | p.u                          |       |       |
| To Works Overhead           |       | 5250  | By Process C A/c (Transfer ) | 37500 | 56250 |
|                             |       |       | Cost per unit $56250 = 1.50$ |       |       |
|                             |       |       | 37500                        |       |       |
|                             | 40000 | 57250 |                              | 40000 | 57250 |

Process C Account

|                                | Units | Rs.    |                                  | Units | Rs.    |
|--------------------------------|-------|--------|----------------------------------|-------|--------|
| To Opening Stock (Rs.1.50 p.u) | 16500 | 24750  | By loss in weight (Bal. fig)     | 500   |        |
|                                | 37500 | 56250  |                                  | 5500  | 8250   |
| To Process B A/c (transfer)    |       | 29250  | By Closing                       |       |        |
| To Wages and Materials         |       | 6000   | stock@Rs.1.5p.u                  | 48000 | 108000 |
| To Works Overhead              |       |        | By Finished stock A/c (Transfer) |       |        |
|                                |       |        | Cost per unit $108000 = 2.25$    |       |        |
|                                |       |        | 48000                            |       |        |
|                                | 54000 | 116250 |                                  | 54000 | 116250 |

Illustration 3: Bihar Chemicals Ltd produced three chemicals during the month of July 2019 by three consecutive processes. In each process 2% of the total weight put in is lost and 10 % is scrap which from process 1 and 2 realizes Rs.100 a ton and from process 3Rs.20 a ton.

The product of three processes is dealt with as follows:

|                               | Process 1 | Process 2 | Process 3 |
|-------------------------------|-----------|-----------|-----------|
| Passed on to the next process | 75%       | 50%       |           |
| Sent to warehouse for sale    | 25%       | 50%       | 100%      |

Expenses incurred:

|                     | Rs     | Tons | Rs    | Tons | Rs     | Tons |
|---------------------|--------|------|-------|------|--------|------|
| Raw materials       | 120000 | 1000 | 28000 | 140  | 107840 | 1348 |
| Manufacturing wages | 20500  |      | 18520 |      | 15000  |      |
| General expenses    | 10300  |      | 7240  |      | 3100   |      |

Prepare Process Cost Accounts showing the cost per ton of each product.

Solution:

Process 1 Account

|                        | Tons | Rs.    |                                   | Tons | Rs.    |
|------------------------|------|--------|-----------------------------------|------|--------|
| To Raw materials       | 1000 | 120000 | By loss in weight (2%)            | 20   |        |
| To Manufacturing wages |      | 20500  | By Sale of scrap (10%)            | 100  | 10000  |
| To General expenses    |      | 10300  | By Warehouse - transfer (880x25%) | 220  | 35200  |
|                        |      |        | By Process 2 A/c(Transfer )       | 660  | 105600 |
|                        |      |        | Cost per unit 140800 = 160        |      |        |
|                        | 1000 | 150800 | 880                               | 1000 | 150800 |

Process 2 Account

|                             | Tons | Rs.    |                                   | Tons | Rs.    |
|-----------------------------|------|--------|-----------------------------------|------|--------|
| To Process 1 A/c(Transfer ) | 660  | 105600 | By loss in weight (2%)            | 16   |        |
| To Raw materials            | 140  | 28000  | By Sale of scrap (10%)            | 80   | 8000   |
| To Manufacturing wages      |      | 18520  | By Warehouse - transfer (704x50%) | 352  | 75680  |
| To General expenses         |      | 7240   | By Process 2 A/c(Transfer )       | 352  | 75680  |
|                             |      |        | Cost per unit 151360 = 215        |      |        |
|                             | 800  | 159360 | 704                               | 800  | 159360 |

### Process 3 Account

|                             | Tons | Rs.    |                         | Tons | Rs.    |
|-----------------------------|------|--------|-------------------------|------|--------|
| To Process 2 A/c(Transfer ) | 352  | 75680  | By loss in weight (2%)  | 34   |        |
| To Raw materials            | 1348 | 107840 | By Sale of scrap (10%)  | 170  | 3400   |
| To Manufacturing wages      |      | 15000  | By Warehouse - transfer |      | 198220 |
| To General expenses         |      | 3100   | Cost p unit 198220      | 1496 |        |
|                             |      |        | =132.5                  |      |        |
|                             |      |        | 1496                    |      |        |
|                             | 1700 | 201620 |                         | 1700 | 201620 |

### Abnormal Process Loss

Any loss caused by unexpected or abnormal conditions such as plant break don, substandard materials, carelessness, accident etc. or loss in exceeds of the margin anticipated for normal process loss can be called as abnormal process loss. It is controllable and avoidable. When actual loss in the process is greater than the estimated normal loss, it is a case of abnormal loss. It may also be determined by comparing actual output with expected or normal output. If actual output is less than the normal output, the difference is abnormal loss.

$$\text{Value of Abnormal loss} = \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of Abnormal loss}$$

$$\text{Normal cost of normal output} = \text{Total expenditure (i.e., total debit of process A/c)} - \text{Sale Proceeds of scrap (i.e. Value of normal loss)}$$

$$\text{Normal output} = \text{Input} - \text{Units of normal loss}$$

Illustration 4: In process A 100 units of raw materials were introduced at a cost of Rs.1000. the other expenditure incurred by the process was Rs. 602. Of the units introduced 10% are normally lost in the course of manufacture and then possess a scrap value of Rs.3 each. The output of process A was only 75 units. Prepare Process A A/c and Abnormal loss A/c.

Solution:

### Process A A/c

|                   | Units | Rs.  |                                       | Units | Rs.  |
|-------------------|-------|------|---------------------------------------|-------|------|
| To Raw Materials  | 100   | 1000 | By Normal loss-<br>100x10% @Rs.3 each | 10    | 30   |
| To Other expenses |       | 602  | By Abnormal loss<br>(Bal.Fig)         | 15    | 262* |
|                   |       |      |                                       | 75    | 1310 |
|                   | 100   | 1602 | By Process B A/c<br>(transfer)        | 100   | 1602 |

Working Note:

$$\begin{aligned} \text{Normal cost of normal output} &= \text{Total expenditure} - \text{Sale Proceeds of scrap} \\ &= 1602 - 30 = \underline{1572} \end{aligned}$$

$$\begin{aligned} \text{Normal output} &= \text{Input} - \text{Units of normal loss} \\ &= 100 - 10 = \underline{90} \end{aligned}$$

$$\begin{aligned}\text{Value of Abnormal loss} &= \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of Abnormal loss} \\ &= \frac{1572}{90} \times 15 = \text{Rs. } 262\end{aligned}$$

#### Abnormal Loss A/c

|              | Units | Rs. |                                      | Units | Rs. |
|--------------|-------|-----|--------------------------------------|-------|-----|
| To Process A | 15    | 262 | By Cash (scrap value of loss @ Rs.3) | 15    | 45  |
|              |       |     | By Costing P&L A/c                   |       | 217 |
|              | 15    | 262 |                                      | 15    | 262 |

#### Abnormal Gain (or Abnormal Effective)

Sometimes actual loss or wastage in a process is less than expected normal loss. In this case the difference between actual loss and expected loss is known as abnormal gain or abnormal effective. It is the excess of actual production over normal output.

Abnormal gain is valued in the same manner as abnormal loss. The value of abnormal gain is debited to process A/c and credited to abnormal gain A/c. the value of scrap is debited to abnormal gain A/c and credited to normal loss A/c. finally abnormal loss A/c is closed by transferring the credit balance to Costing P&L A/c.

$$\text{Value of Abnormal Gain} = \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of Abnormal gain}$$

$$\text{Normal cost of normal output} = \text{Total expenditure} - \text{Sale Proceeds of scrap}$$

$$\text{Normal output} = \text{Input} - \text{Units of normal loss}$$

$$\text{Units of Abnormal gain} = \text{Normal loss} - \text{Actual loss}$$

$$\text{Or} = \text{Actual output} - \text{Normal output}$$

**Illustration 5:** Product X is obtained after it passes through three distinct processes. 2000 kg of materials at Rs.5 per kg were issued to the first process. Direct wages amounted to Rs.900 and production overhead incurred was Rs.500. Normal loss is estimated at 10% of input. This wastage is sold at Rs.3 per kg. The actual output is 1850 kg. Prepare process I A/c and Abnormal Gain/ Abnormal loss A/c as the case may be.

Solution:

|                         | Kg   | Rs.   |                                 | Kg   | Rs.   |
|-------------------------|------|-------|---------------------------------|------|-------|
| To Materials            | 2000 | 10000 | By Normal loss (Sale of scrap ) | 200  | 600   |
| To Direct wages         |      | 900   | By Process II - transfer        | 1850 | 11100 |
| To Production OH        |      | 500   |                                 |      |       |
| To Abnormal gain (Bal.) | 50   | 300   |                                 |      |       |
|                         | 2050 | 11700 |                                 | 2050 | 11700 |



### Abnormal Gain A/c

|                                 | Kg | Rs. |                  | Kg | Rs. |
|---------------------------------|----|-----|------------------|----|-----|
| To Normal loss (loss of income) | 50 | 150 | By Process I A/c | 50 | 300 |
| To Costing P&L A/c (Bal.)       |    | 150 |                  |    |     |
|                                 | 50 | 300 |                  | 50 | 300 |

Working note:

1.  $(200+1850)-2000=50$
2.  $\frac{(10000+900+500)-600}{1850-50} = \text{Rs.}6$   
 $1850 \times 6 = 11100$
3.  $50 \times 6 = 30$

**Illustration 6:** The product of a company passes through three distinct processes to completion – A, B and C. from the past experience it is ascertained that losses incurred in each process as – A-2%, B-5% and C-10%.

In each case the percentage of loss is computed on the number of units entering the process concerned. The loss of each process possesses a scrap value. The loss of processes A and B sold at Rs.5 per 100 units and that of C at Rs.20 per 100 units.

The output of each process passes immediately to the next process and the finished units are passed from process C into stock.

|                        | Process A | Process B | Process C |
|------------------------|-----------|-----------|-----------|
| Materials consumed     | 6000      | 4000      | 2000      |
| Direct labour          | 8000      | 6000      | 3000      |
| Manufacturing expenses | 1000      | 1000      | 1500      |

20000 units have been issued to process A at a cost of Rs.10000. the output of each process has been as under:

A-19500, B- 18800 and C - 16000.

There is no work in progress in any process. Prepare process accounts. Calculations should be made to the nearest rupee.

**Solution:**

### Process A Account

|                           | Units | Rs.   |                         | Units | Rs.   |
|---------------------------|-------|-------|-------------------------|-------|-------|
| To Units introduced       | 20000 | 10000 | By Normal loss          | 400   | 20    |
| To Materials              |       | 6000  | By Abnormal loss (Bal.) | 100   | 127   |
| To Direct labour          |       | 8000  | By Process B - transfer | 19500 | 24853 |
| To Manufacturing Expenses |       | 1000  |                         |       |       |
|                           | 20000 | 25000 |                         | 20000 | 25000 |

Process B Account

|                           | Units | Rs.   |                         | Units | Rs.   |
|---------------------------|-------|-------|-------------------------|-------|-------|
| To Process A A/c          | 19500 | 24853 | By Normal loss          | 975   | 49    |
| To Materials              |       | 4000  | By Process C - transfer | 18800 | 36336 |
| To Direct labour          |       | 6000  |                         |       |       |
| To Manufacturing Expenses |       | 1000  |                         |       |       |
| To abnormal gain          | 275   | 532   |                         |       |       |
|                           | 19775 | 36385 |                         | 19775 | 36385 |

Process C Account

|                           | Units | Rs.   |                         | Units | Rs.   |
|---------------------------|-------|-------|-------------------------|-------|-------|
| To Process B A/c          | 18800 | 36336 | By Normal loss          | 1880  | 376   |
| To Materials              |       | 2000  | By To abnormal loss     | 920   | 2309  |
| To Direct labour          |       | 3000  | By Finished stock A/c - | 16000 | 40151 |
| To Manufacturing Expenses |       | 1500  | transfer                |       |       |
|                           | 18800 | 42836 |                         | 18800 | 42836 |

Finished Stock A/c

|                  | Units | Rs.   |  | Units | Rs.   |
|------------------|-------|-------|--|-------|-------|
| To Process C A/c | 16000 | 40151 |  |       |       |
|                  | 16000 | 40151 |  | 16000 | 40151 |

Abnormal Loss A/c

|              | Units | Rs.  |                       | Units | Rs.  |
|--------------|-------|------|-----------------------|-------|------|
| To Process A | 100   | 127  | By Cash (100@Rs.5 per |       |      |
| To Process C | 920   | 2309 | 100+920@Rs.20per 100) | 1020  | 189  |
|              |       |      | By Costing P&L A/c    |       | 2247 |
|              | 1020  | 2436 |                       | 1020  | 2436 |

Normal loss A/c

|              | Units | Rs. |                     | Units | Rs. |
|--------------|-------|-----|---------------------|-------|-----|
| To Process A | 400   | 20  | By Abnormal Gain    | 275   | 14  |
| To Process B | 975   | 49  | By Cash/Debtors A/c | 2980  | 431 |
| To Process C | 1880  | 376 |                     |       |     |
|              | 3255  | 445 |                     | 3255  | 445 |

#### Abnormal Gain A/c

|                                 | Units | Rs. |                  | Units | Rs. |
|---------------------------------|-------|-----|------------------|-------|-----|
| To Normal loss (loss of income) | 275   | 14  | By Process C A/c | 275   | 532 |
| To Costing P&L A/c (Bal.)       |       | 538 |                  |       |     |
|                                 | 275   | 532 |                  | 275   | 532 |

Working note:

Process A:

Value of Abnormal loss = Rs.24980/19600 units x 100 units = Rs. 127.

Process B:

Value of Abnormal gain = Rs.35804/18525 units x 275 units = Rs. 532.

Process C:

Value of Abnormal loss = Rs.42460/16920 units x 920 units = Rs. 2309.

#### Work-in-Progress

In most of the firms manufacturing is on a continuous basis and the problem of work-in-progress is quite common. The work-in-progress consists of direct materials, direct wages and production overhead.

#### Equivalent Production

Equivalent production represents the production of a process in terms of completed units. In other words, it means converting the incomplete units into its equivalent of completed units. It is also known as effective production. For calculating equivalent production, work-in-progress needs to be inspected. Then an estimate is made of the degree of completion, usually on a percentage basis.

#### Steps and procedure of computation of Equivalent Production

1. Ascertain Equivalent Production in respect of opening work-in-progress, if any. In this case the Equivalent Production is computed by taking into consideration the percentage of work required to finish now in the process. The following formula is used.

Opening WIP (Units) x % of work needed to complete.

2. Find the units introduced and completed and add this to (1). It is calculated as follows:

Units completed and transferred – Opening work-in-progress.

3. Convert the equivalent production of closing work-in-progress and add to the above. The formula is:

Closing work-in-progress (units) x % of work completed.

4. Obtain the total Equivalent Production terms of materials, labour and overhead separately (if degree of completion is different). For this, 'Statement of Equivalent Production' is prepared.

5. Find out the net process costs, element wise- materials, labour and overheads.

6. Ascertain the cost per unit of Equivalent Production for each element of cost separately.

$$\begin{aligned}\text{Material cost per unit} &= \frac{\text{Material cost}}{\text{Equivalent Production in respect of materials}} \\ \text{Labour cost per unit} &= \frac{\text{Labour cost}}{\text{Equivalent Production in respect of labour}} \\ \text{Overhead cost per unit} &= \frac{\text{Overhead cost}}{\text{Equivalent Production in respect of overhead}}\end{aligned}$$

For this purpose 'Statement of Cost is prepared'

7. Find out the value of opening work-in-progress, finished units and closing work-in-progress. The formula is:

$$\begin{aligned}&\text{Equivalent Production in respect of materials} \times \text{Material cost per unit} \\ &\text{Equivalent Production in respect of labour} \times \text{Labour cost per unit} \\ &\text{Equivalent Production in respect of overhead} \times \text{Overhead cost per unit}\end{aligned}$$

For this purpose 'Statement of Evaluation or Apportionment' is prepared.

In short, the following three statements are to be prepared:

1. Statement of Equivalent Production
2. Statement of Cost
3. Statement of Evaluation.

I. When there is only closing work-in-progress but with no process losses

Under this case the closing work-in-progress is converted into equivalent units on the basis of estimate as regards degree of completion of materials, labour and production overhead.

Illustration 7: Input 3800 units, Output 3000 units and closing work-in-progress 800 units.

|           | Degree of completion | Process costs Rs. |
|-----------|----------------------|-------------------|
| Materials | 80%                  | 7280              |
| Labour    | 70%                  | 10680             |
| Overheads | 70%                  | 7120              |

Find out Equivalent Production, Cost per unit of equivalent production and prepare the Process A A/c assuming that there is no opening work-in-progress and process loss.

Solution:

Statement of Equivalent Production

| Input            |       | Output                                            |       | Equivalent Production |     |                   |     |
|------------------|-------|---------------------------------------------------|-------|-----------------------|-----|-------------------|-----|
| Items            | Units | Items                                             | Units | Materials             |     | Labour & Overhead |     |
|                  |       |                                                   |       | Units                 | %   | Units             | %   |
| Units introduced | 3800  | Units completed & transferred<br>Work in progress | 3000  | 3000                  | 100 | 3000              | 100 |
|                  |       |                                                   | 800   | 640                   | 80  | 560               | 70  |
|                  | 3800  |                                                   | 3800  | 3640                  |     | 3560              |     |

### Statement of Cost

| Elements of cost | Cost (Rs.) | Equivalent Production (units) | Cost per completed unit |
|------------------|------------|-------------------------------|-------------------------|
| Materials        | 7280       | 3640                          | 2.00                    |
| Labour           | 10680      | 3560                          | 3.00                    |
| Overheads        | 7120       | 3560                          | 2.00                    |
|                  | 25080      |                               | 7.00                    |

### Statement of Evaluation

|                       |      |       |
|-----------------------|------|-------|
| Finished goods 3000x7 |      | 21000 |
| Work-in-progress:     |      |       |
| Materials 640x2       | 1280 |       |
| Labour 560x3          | 1680 |       |
| Overhead 560x2        | 1120 |       |
|                       |      | 4080  |

#### Process A A/c

|              | Units | Rs.   |                         | Units | Rs.   |
|--------------|-------|-------|-------------------------|-------|-------|
| To Materials | 3800  | 7280  | By Finished stock A/c - |       |       |
| To Labour    |       | 10680 | transfer                | 3000  | 21000 |
| To Overhead  |       | 7120  | By Work-in-progress     | 800   | 4080  |
|              | 3800  | 25080 |                         | 3800  | 25080 |

### II. When there is only closing work-in-progress but with process losses

In case of normal loss, nothing should be added as equivalent production. However, abnormal loss should be considered as production of good units completed during the period.

**Illustration 8:** During January 2019 units were introduced into Process I. the normal loss was estimated at 5% on input. At the end of the month, 1400 units had been produce and transferred to the next process, 460 units were uncompleted and 140 units had been scrapped. It was estimated that uncompleted units had reached a stage in production as follows:

Material 75% completed  
Labour 50% completed  
Overheads 50% completed

The cost of 20000 units was Rs.5800

Direct material introduced during the process Rs.1440

Direct wages Rs.3340

Production overheads incurred were Rs. 1670

Units scrapped realized Re.1 each.

Units scrapped passed through the process, so were 100% completed as regards material, labour and overhead.

Find out Equivalent Production, Cost per unit and prepare the necessary accounts.

**Solution:**

Statement of Equivalent Production

| Input<br><br>Units | Output              | Units | Equivalent Production |     |                   |     |
|--------------------|---------------------|-------|-----------------------|-----|-------------------|-----|
|                    |                     |       | Materials             |     | Labour & Overhead |     |
|                    |                     |       | Units                 | %   | Units             | %   |
| 2000               | Normal loss         | 100   |                       |     |                   |     |
|                    | Abnormal loss       | 40    | 40                    | 100 | 40                | 100 |
|                    | Finished production | 1400  | 1400                  | 100 | 1400              | 100 |
|                    | Work in progress    | 460   | 345                   | 75  | 230               | 50  |
| 2000               |                     | 2000  | 1785                  |     | 1670              |     |

Statement of Cost

| Elements of cost                 | Cost (Rs.) | Equivalent Production (units) | Cost per completed unit |
|----------------------------------|------------|-------------------------------|-------------------------|
| Materials                        |            |                               |                         |
| Cost of units introduced         | 5800       |                               |                         |
| Direct Materials                 | 1440       |                               |                         |
|                                  | 7240       |                               |                         |
| Less: Scrap value of normal loss | 100        |                               |                         |
|                                  | 7140       | 1785                          | 4                       |
| Direct wages                     | 3340       | 1670                          | 2                       |
| Overheads                        | 1670       | 1670                          | 1                       |
| Total                            | 12150      | 5125                          | 7                       |

| Production          | Cost Elements | Equivalent Production | Cost per unit | Cost | Total Cost |
|---------------------|---------------|-----------------------|---------------|------|------------|
| Abnormal loss       | Material      | 40                    | 4             | 160  | 280        |
|                     | Labour        | 40                    | 2             | 80   |            |
|                     | Overheads     | 40                    | 1             | 40   |            |
| Finished production | Material      | 1400                  | 4             | 5600 | 9800       |
|                     | Labour        | 1400                  | 2             | 2800 |            |
|                     | Overheads     | 1400                  | 1             | 1400 |            |
| Work-in-progress    | Material      | 345                   | 4             | 1380 | 2070       |
|                     | Labour        | 230                   | 2             | 460  |            |
|                     | Overheads     | 230                   | 1             | 230  |            |
|                     |               |                       |               |      | 12150      |

| Process I A/c       |       |       |                                      |       |       |
|---------------------|-------|-------|--------------------------------------|-------|-------|
|                     | Units | Rs.   |                                      | Units | Rs.   |
| To Units introduced | 2000  | 5800  | By Normal loss                       | 100   | 100   |
| To Materials        |       | 1440  | By abnormal loss                     | 40    | 280   |
| To Labour           |       | 3340  | By Finished production               |       | 9800  |
| To Overhead         |       | 1670  | By Balance c/d<br>(Work-in-progress) | 1400  | 2070  |
|                     |       |       |                                      | 460   |       |
|                     | 2000  | 12250 |                                      | 2000  | 12250 |

  

| Finished Production A/c |       |      |  |       |     |
|-------------------------|-------|------|--|-------|-----|
|                         | Units | Rs.  |  | Units | Rs. |
| To Process I A/c        | 1400  | 9800 |  |       |     |

  

| Abnormal Loss A/c |       |     |                           |       |     |
|-------------------|-------|-----|---------------------------|-------|-----|
|                   | Units | Rs. |                           | Units | Rs. |
| To Process I A/c  | 40    | 280 | By Cash (sale @ Re.1 p.u) | 40    | 40  |
|                   |       |     | By Costing P&L A/c (loss) |       | 240 |
|                   | 40    | 280 |                           | 40    | 280 |

III. When there is opening as well as closing work in progress but with no process loss.

Sometimes in a continuous process there will be opening as well as closing work in progress which are to be converted into equivalent of completed units for apportionment of process costs. The procedure of conversion of opening work in progress will vary depending upon whether average cost or FIFO or LIFO method of apportionment of costs is followed.

**Illustration 9:** From the following details, prepare statement of equivalent production, statement of cost, statement of evaluation and process A/c by following FIFO method.

Opening work-in-progress (2000 units):

|                           |          |
|---------------------------|----------|
| Materials (100% complete) | Rs. 5000 |
| Labour (60% complete)     | Rs. 3000 |
| Overheads (60% complete)  | Rs. 1500 |

Units introduced into the process Rs. 8000

There are 2000 units in progress and the stage of completion is estimated to be:

|                                |      |
|--------------------------------|------|
| Materials                      | 100% |
| Labour Statement of Evaluation | 50%  |
| Overheads                      | 50%  |

8000 units are transferred to the next process:

The process costs for the period are:

|           |           |
|-----------|-----------|
| Materials | Rs.96000  |
| Labour    | Rs. 54600 |
| Overheads | Rs. 31200 |

Solution:

Statement of Equivalent Production

| Output                                           | Units | Equivalent Production |     |                   |     |
|--------------------------------------------------|-------|-----------------------|-----|-------------------|-----|
|                                                  |       | Materials             |     | Labour & Overhead |     |
|                                                  |       | Units                 | %   | Units             | %   |
| Opening WIP                                      | 2000  |                       |     | 800               | 40  |
| Completed processed during the period(8000-2000) | 6000  | 6000                  | 10  | 6000              | 100 |
| Closing WIP                                      | 2000  | 2000                  | 0   | 1000              | 50  |
| Total                                            | 10000 | 8000                  | 100 | 7800              | 100 |

Statement of Cost

| Elements of cost | Cost (Rs.) | Equivalent Production (units) | Cost per completed unit |
|------------------|------------|-------------------------------|-------------------------|
| Materials        | 96000      | 8000                          | 12                      |
| Labour           | 54600      | 7800                          | 7                       |
| Overheads        | 31200      | 7800                          | 4                       |
| Total            | 181800     |                               | 23                      |

Statement of Evaluation

|                                                      |       |        |
|------------------------------------------------------|-------|--------|
| Opening Work-in-progress (current cost)              |       |        |
| Materials                                            |       |        |
| Labour 800x7                                         | 5600  |        |
| Overhead 800x4                                       | 3200  | 8800   |
| Closing WIP                                          |       |        |
| Materials 2000x12                                    | 24000 |        |
| Labour 1000x7                                        | 7000  |        |
| Overhead 1000x4                                      | 4000  | 35000  |
| units completely processed during the period 6000@23 |       | 138000 |
|                                                      |       | 181800 |

Process A/c

|                | Units | Rs.    |                                               | Units | Rs.    |
|----------------|-------|--------|-----------------------------------------------|-------|--------|
| To Opening WIP | 2000  | 9500   | By Finished stock transferred to next process |       |        |
| To Materials   | 8000  | 96000  | (9500+8800+138000)                            | 8000  | 156300 |
| To Labour      |       | 54600  | By Closing WIP                                | 2000  | 35000  |
| To Overhead    |       | 31200  |                                               |       |        |
|                | 10000 | 191300 |                                               | 10000 | 191300 |



IV. When there is opening as well as closing work-in-progress but with losses.

Under this equivalent production units regarding opening and closing work in progress are to be calculated with due adjustment for process losses.

**Illustration 10:** Following data are relating Process A for March 2019.

Opening WIP – 1500 units for Rs.15000

Degree of completion:

Materials 100%, Labour and overheads 33 1/3%

Input of materials 18500 units at Rs.52000

Direct labour Rs. 14000

Overheads Rs. 28000

Closing WIP - 5000 units.

Degree of completion: Materials 90% and labour and overheads 30%.

Normal process loss is 10% of total input (opening WIP units + units put in)

Scrap value Rs. 2 per unit.

Unit transferred to the next process 15000 units.

Compute equivalent units of production, cost per equivalent unit for each cost element and cost of finished output and closing WIP. Also prepare Process and other accounts. Assume that FIFO method is used by the company and the cost of opening WIP is fully transferred to the next process.

Solution:

| Input<br>Units | Output                   | Units | Equivalent Production |     |        |        |          |        |
|----------------|--------------------------|-------|-----------------------|-----|--------|--------|----------|--------|
|                |                          |       | Materials             |     | Labour |        | Overhead |        |
|                |                          |       | Units                 | %   | Units  | %      | Units    | %      |
| 1500           | Opening WIP              | 1500  |                       |     | 1000   | 66 2/3 | 1000     | 66 2/3 |
| 18500          | Normal loss              | 2000  |                       |     |        |        |          |        |
|                | Finished goods           | 13500 | 13500                 | 100 | 13500  | 100    | 13500    | 100    |
|                | Closing WIP              | 5000  | 4500                  | 90  | 1500   | 30     | 1500     | 30     |
| 20000          |                          | 22000 | 18000                 |     | 16000  |        | 16000    |        |
|                | less: Abnormal gain      | 2000  | 2000                  | 100 | 2000   | 100    | 2000     | 100    |
|                |                          | 20000 | 16000                 |     | 14000  |        | 14000    |        |
|                |                          | 52000 |                       |     |        |        |          |        |
|                | Materials                | 4000  | 48000                 |     | 14000  |        | 28000    |        |
|                | less: scrap value        |       |                       |     |        |        |          |        |
|                | Cost per equivalent unit |       | Rs.3                  |     | Rs.1   |        | Rs.2     |        |

|                          |         |       |
|--------------------------|---------|-------|
| Opening Work-in-progress |         |       |
| Materials                |         |       |
| Labour                   | 1000x1  | 1000  |
| Overhead                 | 1000x2  | 2000  |
| Finished goods           | 13500x6 | 81000 |
| Abnormal gain            | 2000x6  | 12000 |
| Closing WIP              |         |       |
| Materials                | 4500x3  | 13500 |
| Labour                   | 1500x1  | 1500  |
| Overhead                 | 1500x2  | 3000  |
|                          |         | 18000 |

|                  | Units | Rs.    |                   | Units | Rs.    |
|------------------|-------|--------|-------------------|-------|--------|
| To Opening WIP   | 1500  | 15000  | By normal loss    | 2000  | 4000   |
| To Materials     | 18500 | 52000  | By Finished stock |       |        |
| To Labour        |       | 14000  | (18000+81000)     |       | 99000  |
| To Overhead      |       | 28000  | By Closing WIP    | 15000 | 18000  |
| To Abnormal gain | 2000  | 12000  |                   | 5000  |        |
|                  | 22000 | 121000 |                   | 22000 | 121000 |

|              | Units | Rs.  |                  | Units | Rs.  |
|--------------|-------|------|------------------|-------|------|
| To Process I | 2000  | 4000 | By Abnormal Gain | 2000  | 4000 |

|                                 | Units | Rs.   |                  | Units | Rs.   |
|---------------------------------|-------|-------|------------------|-------|-------|
| To Normal loss (loss of income) | 2000  | 4000  | By Process I A/c | 2000  | 12000 |
| To Costing P&L A/c (Bal.)       |       | 8000  |                  |       |       |
|                                 | 2000  | 12000 |                  | 2000  | 12000 |