PROCESS COSTING

Process Costing

Process costing is used where the production moves from one process or department to the next until its final completion and there is a continuous mass production of identical units through a series of processing operations. It is applied for a various industries like chemicals and drugs, oil refining, food processing, paints & varnish, plastics, soaps, textiles, paper etc.

CIMA defines process costing as, "The costing method applicable where goods or services result from a sequence of continuous or repetitive operations or processes. Costs are averaged over the units produced during the period."

Features: The distinctive features of process costing are as follows:

◆ The process cost centers are clearly defined and costs relating to each process cost center are accumulated.

◆ The stock records for each process cost center are maintained accurately. The records give clear picture of units introduced in the process or received from the preceding process cost center and also units passed to the next process.

◆ The total costs of each process are averaged over the total production of that process, including partly completed units.

◆ The cost of the output of one process is the raw materials input cost of the following process.

◆ Appropriate method is used in absorption of overheads to the process cost centers.

◆ The process loss may arise due to wastage, spoilage, evaporation etc.

◆ Since the production is continuous in nature, there will be closing work-in-progress which must be valued separately.

Normal Wastage, Abnormal Wastage & Abnormal Gains

In many process industries some loss or wastage is inevitable. Such a loss may be the result of an evaporation, shrinkage, chemical change, change in moisture content or spoilage. The process loss may be normal or abnormal.

(1) **Normal Loss:** This is the loss which is un-avoidable because of the nature of raw materials for the production technique and is inherent in the normal course of production. Such loss can be estimated in advance on the basis of past experience or chemical data.

The normal loss is recorded only in terms of quantity and the cost per unit of usable production is increased accordingly. Where the scrap possesses some value as a waste product or as raw material for an earlier process, the value there of is credited to the process account. This reduces the cost of normal output and process loss is shared by usable unit.

(2) **Abnormal Loss:** Any loss caused by unexpected or abnormal conditions such as sub-standard materials, carelessness, accident or loss in excess of the margin anticipated for normal process loss is regarded as abnormal process loss. Abnormal loss is not expected to arise, when operation are carried on efficiently according to norms relating to manufacturing operations. Cost of normal loss is shared by good units of production in the process, but the same cannot be given to abnormal loss.

Units representing abnormal loss are valued like good units produced and the value of units representing abnormal loss is debited to a separate account, which is known as abnormal loss account. The value of abnormal loss is calculated with the help of the following formula:

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of abnormal loss}$$

If the abnormal loss has got any scrap value, it should be credited to abnormal loss account and the balance is ultimately written off to the costing profit and loss account.

(3) Abnormal Gain: If the quantum of loss is less than the determined percentage of normal loss, the difference is called abnormal gain or effectives. The presence of abnormal effectives should not affect the cost of goods units in the normal circumstances. The value of abnormal effective is debited to the concerned process account. This value is calculated at the rate at which the effective output would have been valued if normal wastage had taken place according to expectation. The value of abnormal effective is calculated as follows:

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Units of abnormal gain}$$

Equivalent Production

Equivalent production represents the production of a process in terms of completed units. It means converting the incomplete production into its equivalent of completed units.

According to CIMA, London the term equivalent unit's means, "Notional whole units representing un-completed work. Used to apportion costs between work-in-progress and completed output." The principle applies when operation costs are being apportioned between work-in-progress and completed output. The formula for equivalent production is:

Equivalent units of work-in-progress = No. of Units × …..% of Work Completed

Total equivalent production will be equal to the sum of equivalent completed units of work-in-progress in the beginning plus units started and finished during the year plus equivalent completed units of work-in-progress at the end. The cost per unit of equivalent production will be equal to the total cost divided by effective production and the cost of work-in-progress will be equal to the equivalent units of work-in-progress multiplied by the cost per unit of effective production.

Procedure for valuation of work-in-process

The valuation of work-in-process can be made in the following three ways, depending up on the assumptions made regarding the flow of costs:

(1) FIFO Method: According to this method the units first entering the process are completed first. Thus the units completed during a period would consist partly of the units which were incomplete at the beginning of the period and partly of the units introduced during the period. The cost of completed units is affected by the value of the opening inventory, which is based on the cost of the previous period. The closing inventory of work-in-process is valued at its current cost.

(2) LIFO Method: According to this method units last entering the process are to be completed first. The completed units will be shown at their current cost and the closing cost and the closing-work-in-process will continue to appear at the cost of the opening inventory of work-in-progress along with current cost of work in progress if any.

(3) Average Cost Method: According to this method opening inventory of work-in-process and its costs are merged with the production and cost of the current period, respectively. An average cost per unit is determined by dividing the total cost by the total equivalent units, to ascertain the value of the units in process.

Inter Process Profit

In some process industries the output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. *The difference between cost and the transfer price is known as inter-process profits.* The advantages and disadvantages of using inter-process profits, in the case of process type industries are as follows:

Advantages:

◆ Comparison between the cost of output and its market price at the stage of completion is facilitated.

◆ Each process is made to stand by itself as to the profitability.

Disadvantages:

◆ The use of inter-process profits involves complications.

◆ The system shows profits which are not realised because of stock not sold out

Operation Costing

Operation costing is concerned with the determination of the cost of each operation rather than the process:

◆ In the industries where process consists of distinct operations, the operation costing method is applied.

◆ It offers better control and facilitates the computation of unit operation cost at the end of each operation.

Distinguish between: Job Costing & Process Costing

Points	Job Costing	Process Costing
Meaning	Job costing is form of specific order costing which applies where work is undertaken to customer's specific requirement. It is the process of assigning costs to products or services.	The costing method applicable where goods or services result from a sequence of continuous or repetitive operations or processes.
Costs	Costs are traced to individual jobs, and production overhead is allocated.	Costs are averaged over the units produced during the period.
Unit	It may be related to single unit or a batch of similar units.	It is applied to a large number of units.
Product	A job is carried out or a product is produced to meet the specific requirements of the order.	All the products are identical and there is a continuous flow of production.
Work-in-progress	Work-in-progress may or may not exist at the end of accounting period.	Normally, there will be opening and closing work-in-progress for the accounting period.
Control	Standardization of controls is comparatively difficult as each job differs and more detailed supervision and control is necessary.	Proper control is relatively easy as there are standard applied for costs, process loss, time of production, etc.

PROBLEMS & SOLUTIONS

PREPARATION OF PROCESS, NORMAL LOSS, ABNORMAL LOSS/GAIN A/C

Problem No. 1] In process, 100 units of raw materials were introduced at a cost of ₹ 1,000. The other expenditure incurred by the process was ₹ 600. Of the units introduced, 10% are normally lost in the course of manufacturing and they possess a scrap value of ₹ 3 each. The output of Process was only 75 units. Calculate the value of abnormal loss & final output.

Ans.:   Process A/c

Particulars	Units	₹	Particulars	Units	₹
To Materials	100	1,000	By Normal Loss	10	30
To Expenditure	-	600	By Abnormal Loss	15	262
			By Output	75	1,308
	100	1,600		100	1,600

Working Notes:

Cost per unit $= \dfrac{1,000 + 600 - 30}{100 - 10} = \dfrac{1,570}{90} = 17.4444$

Value of abnormal loss $= 15 \times 17.4444 = 262$

Value of output $= 75 \times 17.4444 = 1,308$

Problem No. 2] A product is completed in three consecutive processes. During a particular month the input to Process 1 of the basic raw material was 5,000 units at ₹ 2 per unit. Other information for the month was as follows:

		Process 1	*Process 2*	*Process 3*
Output	(Units)	4,700	4,300	4,050
Normal loss as % of input		5%	10%	5%
Scrap value per unit	(₹)	1	5	6
Direct wages	(₹)	3,000	5,000	8,000
Direct expenses	(₹)	9,750	9,910	15,560

Overhead ₹ 32,000 total, chargeable as percentage of direct wages. There were no opening or closing work-in-progress stocks. Compile three process and finished stock account with details of abnormal loss and gain, where applicable.

Ans.:

Process 1 A/c

Particulars	Units	₹	Particulars	Units	₹
To Raw material	5,000	10,000	By Normal Loss	250	250
To Direct wages	-	3,000	By Abnormal Loss	50	300
To Direct expenses	-	9,750	By Process 2 A/c	4,700	28,200
To Overheads	-	6,000			
(32,000 × 3,000/16,000)					
	5,000	28,750		5,000	28,750

Process 2 A/c

Particulars	Units	₹	Particulars	Units	₹
To Process 1 A/c	4,700	28,200	By Normal Loss	470	2,350
To Direct wages	-	5,000	By Process 3 A/c	4,300	51,600
To Direct expenses	-	9,910			
To Overheads	-	10,000			
(32,000 × 5,000/16,000)					
To Abnormal Gain	70	840			
	4,770	53,950		4,770	53,950

Process 3 A/c

Particulars	Units	₹	Particulars	Units	₹
To Process 2 A/c	4,300	51,600	By Normal Loss	215	1,290
To Direct wages	-	8,000	By Abnormal Loss	35	770
To Direct expenses	-	15,560	By Finished Stock A/c	4,050	89,100
To Overheads	-	16,000			
(32,000 × 8,000/16,000)					
	4,300	91,160		4,300	91,160

Normal Loss A/c

Particulars	Units	₹	Particulars	Units	₹
To Process 1 A/c	250	250	By Abnormal Gain A/c	70	350
To Process 2 A/c	470	2,350	By Bank A/c	250	250
To Process 3 A/c	215	1,290	By Bank A/c (470 – 70)	400	2,000
			By Bank A/c	215	1,290
	935	3,890		935	3,890

Abnormal Loss A/c

Particulars	Units	₹	Particulars	Units	₹
To Process 1 A/c	50	300	By Bank A/c	50	50
To Process 3 A/c	35	770	By Bank A/c	35	210
			By Costing P & L A/c	-	810
	85	1,070		85	1,070

Abnormal Gain A/c

Particulars	Units	₹	Particulars	Units	₹
To Normal Loss A/c	70	350	By Process 2 A/c	70	840
To Costing P & L A/c	-	490			
	70	840		70	840

Working Notes:

Process 1:

$$\text{Cost per unit} = \frac{10,000 + 3,000 + 9,750 + 6,000 - 250}{5,000 - 250} = \frac{28,500}{4,750} = 6$$

Value of abnormal loss = $50 \times 6 = 300$

Value of output = $4,700 \times 6 = 28,200$

Process 2:

$$\text{Cost per unit} = \frac{28,200 + 5,000 + 9,910 + 10,000 - 2,350}{4,700 - 470} = \frac{50,760}{4,230} = 12$$

Value of abnormal gain = $70 \times 12 = 840$

Value of output = $4,300 \times 12 = 51,600$

Process 3:

$$\text{Cost per unit} = \frac{51,600 + 8,000 + 15,560 + 16,000 - 1,290}{4,300 - 215} = \frac{89,870}{4,085} = 22$$

Value of abnormal loss = $35 \times 22 = 770$; Value of output = $4,050 \times 22 = 89,100$

Problem No. 3] A product passes through three processes – A, B and C. 10,000 units at a cost of ₹ 1.10 per unit were issued to Process A. The other direct expenses were as follows:

	Process A ₹	Process B ₹	Process C ₹
Sundry materials	1,500	1,500	1,500
Direct labour	4,500	8,000	6,500
Direct expenses	1,000	1,000	1,503

(*a*) The scrap of Process A was 5% & in Process B 4% on input.

(*b*) The scrap of Process A was sold at ₹ 0.25 per unit & that of Process B at ₹ 0.50 per unit and that of Process C at ₹ 1.00 per unit.

(*c*) The overhead charges were 160% of direct labour.

(*d*) The final products were sold at ₹ 10 per unit fetching a profit of 20% on sales.

Prepare three process accounts and find out the number of units of scrap in Process C.

Ans.:

Process A A/c

Particulars	Units	₹	Particulars	Units	₹
To Material	10,000	11,000	By Normal Loss	500	125
To Sundry materials	-	1,500	By Process B A/c	9,500	25,075
To Direct labour	-	4,500			
To Direct expenses	-	1,000			
To Overheads	-	7,200			
	10,000	25,200		10,000	25,200

Process B A/c

Particulars	Units	₹	Particulars	Units	₹
To Process A A/c	9,500	25,075	By Normal Loss	380	190
To Sundry materials	-	1,500	By Process C A/c	9,120	48,185
To Direct labour	-	8,000			
To Direct expenses	-	1,000			
To Overheads	-	12,800			
	9,500	48,375		9,500	48,375

Process C A/c

Particulars	Units	₹	Particulars	Units	₹
To Process B A/c	9,120	48,185	By Normal Loss	x	x
To Sundry materials	-	1,500	By Finished Stock	$(9,120 - x)$	$(68,088 - x)$
To Direct labour	-	6,500			
To Direct expenses	-	1,503			
To Overheads	-	10,400			
	9,120	68,088		9,120	68,088

Normal Loss % in Process C was not given so let it be 'x'. Its sale price is 1 so sale value will be 'x'. The final products were sold at ₹ 10 per unit fetching a profit of 20% on sales.

Cost + Profit = Sale

80% + 20% = 100%

Cost per unit $= 10 \times \dfrac{100}{80} = 8$

Value of finished stock $= (9,120 - x) \times 8 = (68,088 - x)$

$72,960 - 8x = 68,088 - x$

$4,872 = 7x$

Normal Loss $= \dfrac{4,872}{7} = 696$; Now Process C A/c will appear as follows: