SECTION-B

Methods of Costing

Methods of Costing 5

This Module Includes

5.1 Job Costing

5.2 Batch Costing

5.3 Contract Costing

5.4 Process Costing – Normal and Abnormal Losses, Equivalent Production, Inter- process Profit, Joint and By Products

5.5 Operating Costing – Transport, Hotel and Healthcare

Methods of Costing

SLOB Mapped against the Module:

To appreciate various cost accumulation processes designed with due consideration to the nature of output. (CMLO 3b)

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand cost assimilation in specific order costing
- Understand the cost assimilation process in industries where process costing is followed.
- Understand the cost assimilation process in service industries

Job Costing

5.1

Methods of Costing – An Introduction

The main purpose of costing is to ascertain the cost of production, control costs, and improve efficiency rates. In this regard, the methods of costing used are of critical importance. Different industries use different methods of costing depending on their nature of work. The methods of costing refer to the various techniques and approaches employed by businesses to determine the cost of producing goods or services. These methods are crucial for accurate financial analysis, decision-making, and pricing strategies. Several costing methods exist, each tailored to suit different industries and production processes. As such, there are two specific methods of costing; specific order costing and operation costing (this is also referred as process costing). Specific order costing can be classified either as job costing, batch costing or contract costing. Figure 5.1 shows the classification of the methods of costing.

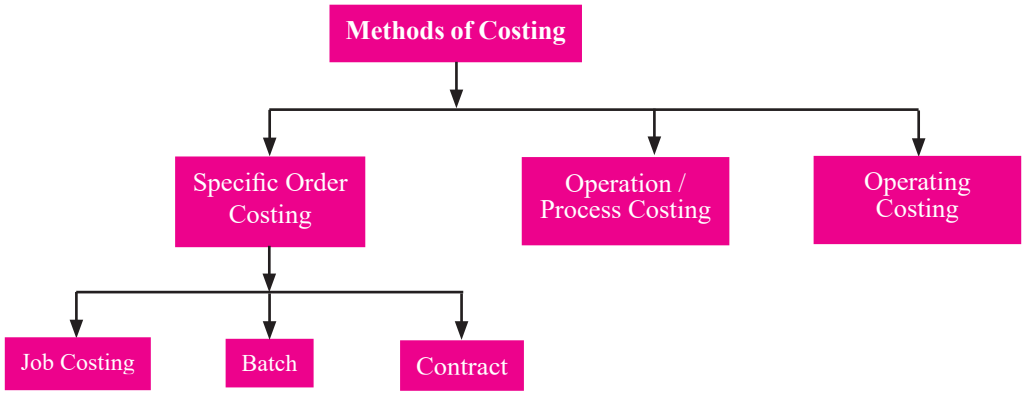

Figure 5.1: Methods of Costing

Specific Order Costing: Specific order costing is a cost accounting method used for unique, custom-made products or services, where costs are accumulated for each individual order or project. This approach ensures accurate cost tracking and pricing tailored to the specific requirements of each customer order.

CIMA official Terminology (2005) defines specific order costing as "the basic costing method applicable where work consists of separate contracts, jobs or batches, each of which is authorized by a special order or contract." Thus, if products are identified as individual units according to the terms of the Jobs, Contracts or Batches, Specific Order Costing is followed by the organisation concerned.

5.1.1 Job Costing

Job Costing is the accounting system that traces costs to individual units or to specific jobs, contracts, or batches of goods.The method is also known by various other names, such as specific order costing, production order costing, job lot costing or lot costing.

According to the terminology of CIMA London, Job Costing is "the basic costing method applicable where work consists of separate contracts, jobs or batches, each of which is authorized by a specific order or contract."

A job is simply a product or service that can be easily (in other words, at reasonable cost) distinguished from other products or services and for which the firm desires that a specific cost be recorded for the product or service. Firms that produce jobs are often called job shops. The record of the cost of the job kept in the accounting system is called job cost sheet or job cost cards.

> A job is a 'customer order or task of relatively short duration'.
>
> Job costing is a 'form of specific order costing where costs are attributed to individual jobs'.
>
> **CIMA Official Terminology**

Features of Job Costing

1. Each job maintains its separate identity throughout the production stage.
2. The job is meant for a specific customer and not meant for a mass market.
3. Production pattern is not repetitive and continuous.
4. Production begins only after getting order from the customer.
5. Each job is executed as per the requirement of the customer. Each job order is considered as a separate cost unit.
6. Duration of production cycle is usually short but a large order may extend beyond one year.
7. A Job Cost Sheet is prepared and Job Register is maintained to record particulars of the job like price, date of commencement, special requirement etc. Profit or Loss is calculated on the completion of the job.

Advantages of Job Costing

Job costing offers the following advantages:

(a) The cost of material, labour and overheads for every job or product in a department is available daily, weekly or as often as required while the job is still in progress.

(b) On completion of a job, the cost under each element is immediately ascertained. Costs may be compared with the selling prices of the products in order to determine their profitability and to decide which product lines should be pushed or discontinued.

(c) Historical costs for past periods for each product, compiled by orders, departments or machines, provide useful statistics for future production planning and for estimating the costs of similar jobs to be taken up in future. This assists in the prompt furnishing of price quotations for specific jobs.

(d) The adoption of predetermined overheads rates in job costing necessitates the application of a system of budgetary control of overheads with all its advantages.

(e) The actual overheads costs are compared with the overheads applied at predetermined rates; thus, at the end of an accounting period, overheads variances can be analysed.

(f) Spoilage and defective work can be easily identified with specific job or product

(g) Job costing is particularly suitable for cost plus and such other contracts where selling price is determined directly on the basis of costs.

Limitations of Job Costing

The limitations of job costing are:

(a) Job costing is comparatively more expensive as more clerical work is involved in identifying each element of cost with specific departments and jobs.

(b) With the increase in the clerical processes, chances of errors are enhanced.

(c) The cost as ascertained, even where they are compiled very promptly, are historical as they are compiled after incidence.

(d) The cost compiled under job costing system represents the cost incurred under actual conditions of operation. The system does not have any scientific basis.

5.1.2 Preparation of Job Cost Sheet

As discussed above, the objective of job costing is to ascertain the cost of a job that is produced as per the requirements of the customers. Hence it is necessary to identify the costs associated with the job and present it in the form of job cost sheet for showing various types of costs. The total cost of a job is recorded in the following manner.

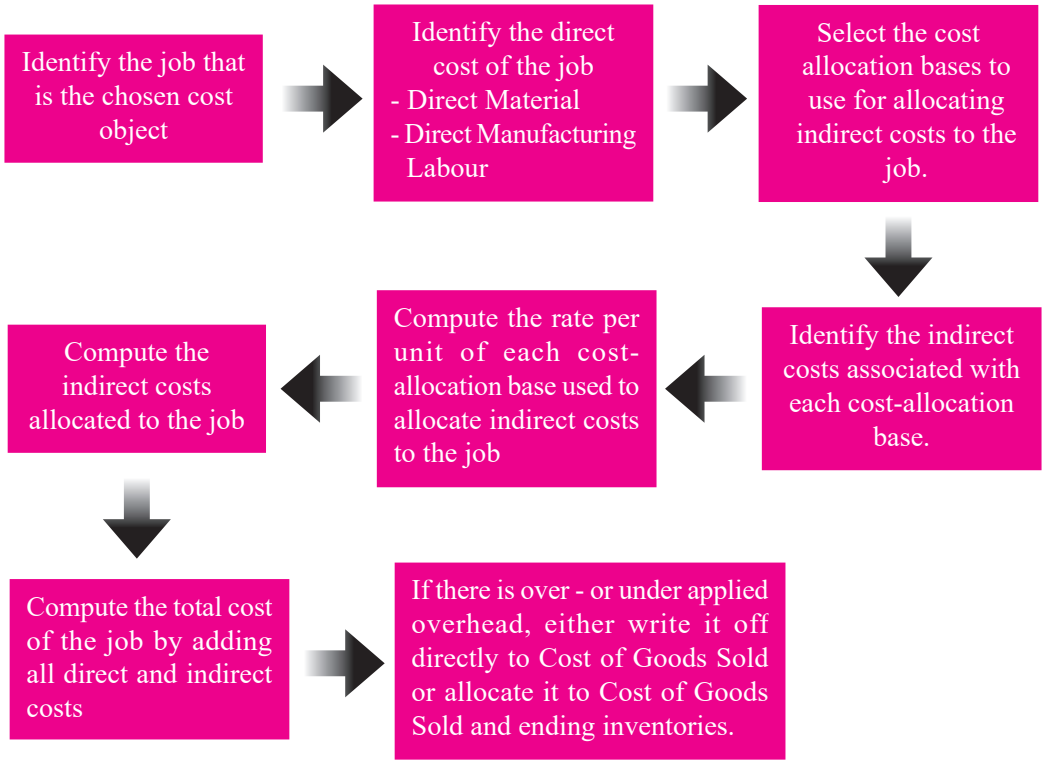

Figure 5.2: Steps in Preparation of Job Cost Sheet

The respective items of cost accumulation process in the job cost sheet are discussed below:

- **Direct Material Costs:** Material used during the production process of a job and identified with the job is the direct material. The cost of such material consumed is the direct material cost. Direct material cost is identifiable with the job and is charged directly. The source document for ascertaining this cost is the material requisition slip from which the quantity of material consumed can be worked out. Cost of the same can be worked out according to any method of pricing of the issues like first in first out (FIFO), last in first out (LIFO) or average method as per the policy of the organisation. The actual material cost can be compared with standard cost to find out any variations between the two. However, as each job may be different from the other, standardization is difficult but efforts can be made for the same.

- **Direct Labour Cost:** This cost is also identifiable with a particular job and can be worked out with the help of 'Job Time Tickets' which is a record of time spent by a worker on a particular job. The 'job time ticket' has the record of starting time and completion time of the job and the time required for the job can be worked out easily from the same. Calculation of wages can be done by multiplying the time spent by the hourly rate. Here also standards can be set for the time as well as the rate so that comparison between the standard cost and actual cost can be very useful.

- **Direct Expenses:** Direct expenses are chargeable directly to the concerned job. The invoices or any other document can be marked with the number of job and thus the amount of direct expenses can be ascertained.

- **Manufacturing Overheads:** This is really a challenging task as the overheads are all indirect expenses incurred for the job. Because of their nature, overheads cannot be identified with the job and so they are apportioned to a particular job on some suitable basis. Pre-determined rates of absorption of overheads are generally used for charging the overheads. This is done on the basis of the budgeted data. If the predetermined rates are used, under/over absorption of overheads is inevitable and hence rectification of the same becomes necessary.

$$\textbf{Budgeted manufacturing overheads rate} = \frac{\text{Budgeted manufacturing overheads}}{\text{Budgeted Quantity or cost for allocation}}$$

- **Work-in-progress:** On the completion of a job, the total cost is worked out by adding the overheads expenses in the direct cost. In other word, the overheads are added to the prime cost. The cost sheet is then marked as 'completed' and proper entries are made in the finished goods ledger. If a job remains incomplete at the end of an accounting period, the total cost incurred on the same becomes the cost of work-in-progress. The work-in-progress at the end of the accounting period becomes the closing work-in-progress and the same becomes the opening work-in-progress at the beginning of the next accounting period. A separate account for work-in-progress is maintained.

- **Completion of Jobs:** Postings of direct material, direct labour, direct expenses and manufacturing overheads costs to the cost sheet for a job or production order are made periodically throughout the run of the job or order. The completion report is an indication that the manufacturing operations are over and further

expenditure on the job should cease so as to ensure that the cost sheet is closed. On the completion of a particular job, total cost relating to the job as per job cost sheet is transferred to finished stock account by debiting finished stores control account and crediting work-in-progress control account.

- **Job Cost Card / Sheet:** Each job is dissimilar to other due to specific and customized requirements. In order to ascertain cost of a particular job, it is necessary to record all the expenditure related to a job separately. For this purpose, job cost card / sheet is used. Job cost card is a cost sheet, where the quantity of materials issued, hours spent by different class of employees, amount of other expenses and share of overheads are recorded. This is helpful in knowing the total cost, profitability etc. of a job. A format of job cost card / sheet is shown below.

Job Cost Sheet

Description: **Customer's No.:** **Reference No.:**				**Job No.:** **Quantity:** **Date of commencement:** **Date of delivery:** **Date of finishing:**							
Material				**Labour**				**Overheads**			
Date	**Deptt**	***MR No.**	**Amount (₹)**	**Date**	**Deptt**	***MR No.**	**Amount (₹)**	**Date**	**Deptt**	***MR No.**	**Amount (₹)**
Total				**Total**				**Total**			

Summary				
Cost	Estimated	Actuals	Variances	For the Job: Units Produced: Cost per Unit: Remarks: Prepared by: Checked by:
Direct Material				
Direct Wages				
Direct Expenses				
Prime Cost				
Factory Overheads				
Works Cost				
Administration Overheads				
Cost of Production				
Selling and Distribution Overheads				
Cost of Sales				

*MR No. – Material Requisition

Reports in Job Costing System - Basically, two types of reports are generated after preparation of the job cost sheet.

(i) Report on profits on completed jobs

A statement may be prepared monthly to indicate the gross profit earned on all jobs completed during the month. This statement is useful for the management for evaluating past performances. Net profit analysis may also be made in a similar manner if administration, selling and distribution overheads for the job are included in the statement.

(ii) Report on cost variances

If cost estimates are developed, a cost variance report showing the deviations of actual costs from the estimated costs may be prepared in order to indicate the significant differences and to carry out thorough investigation. The report may be prepared separately for a job, or for a department showing the variances in respect of all jobs undertaken by the department during a period.

Illustration 1

As a newly appointed Cost Accountant, you find that the selling price of Job No. 9669 has been calculated on the following basis:

Particulars	Amount (₹)
Materials	12.08
Direct Wages – 22 hours at 25 paise per hour	5.50
Department	
A – 10 hours	
B – 4 hours	
C – 8 hours	
Prime Cost	17.58
Plus 33% on Prime Cost	5.86
Total	23.44

An analysis of the previous year's Profit & Loss Account shows the following:

Particulars	Amount (₹)	Particulars	Amount (₹)
Materials Used	77,500	Factory Overheads:	
Direct Wages:		A	2,500
A	5,000	B	4,000
B	6,000	C	1,000
C	4,000	Selling Costs	30,000

You are required to:

(a) Calculate and enter the revised costs using the previous year's figures as a basis;

(b) Draw up a Job Cost Sheet;

(c) Add to the total job cost 10% for profit and give the final selling price.

Solution:

(a) In order to draw up Job Cost Sheet, the factory overheads rates of different departments and percentage of selling cost will have to be determined first on the basis of previous year's figures as follows:

Factory Overheads Recovery Rates based on Labour Hours

	Department A		Department B		Department C	
Direct Wages		₹ 5,000		₹ 6,000		₹ 4,000
∴ Labour Hours	$\frac{₹5,000}{₹0.25 \text{ per hour}}$	20,000	$\frac{₹ 6,000}{₹0.25 \text{ per hour}}$	24,000	$\frac{₹ 4,000}{₹0.25 \text{ per hour}}$	16,000
Factory Overheads		₹ 2,500		₹ 4,000		₹ 1,000
Factory Overheads Rate per Labour Hour	$\left(\frac{₹2,500}{20,000}\right)$	₹ 0.125	$\left(\frac{₹4,000}{24,000}\right)$	₹ 0.167	$\left(\frac{₹1,000}{16,000}\right)$	₹ 0.063

Cost Sheet of Previous Year

Particulars	Amount (₹)
Materials Used	77,500
Direct Wages (A = ₹ 5,000, B = ₹ 6,000, C = ₹ 4,000)	15,000
Prime Cost	92,500
Factory Overheads (A = ₹ 2,500, B = ₹ 4,000, C = ₹ 1,000)	7,500
Works Cost	1,00,000
Selling Cost	30,000
Cost of Sales	1,30,000

Percentage of Selling Cost on Works Cost = $\left(\frac{₹30,000}{₹1,00,0000}\right) \times 100 = 30\%$

(b) Job Cost Sheet of the Current Year (Job No. 9669) (Per unit)

Particulars	Workings	Amount (₹)
Materials		12.08
Direct Wages		
- Department A	10 hours × ₹ 0.25 = ₹ 2.50	
- Department B	4 hours × ₹ 0.25 = ₹ 1.00	
- Department C	8 hours × ₹ 0.25 = ₹ 2.00	5.50
Prime Cost		17.58
Factory Overheads		
- Department A	10 hours × ₹ 0.125 = ₹ 1.25	
- Department B	4 hours × ₹ 0.167 = ₹ 0.67	
- Department C	8 hours × ₹ 0.063 = ₹ 0.50	2.42

Particulars	Workings	Amount (₹)
Factory Cost		20.00
Selling Cost	₹ 20 × 30%	6.00
Cost of Sales		26.00
(c) Profit (10% × ₹ 26.00)		2.60
Selling Price		28.60

Illustration 2

A work order for 100 units of a commodity has to pass through four different machines of which the machine hour rates are:

Machine P - ₹ 1.25,

Machine Q - ₹ 2.50,

Machine R - ₹ 3 and

Machine S - ₹ 2.25.

Following expenses have been incurred on the work order – Materials ₹ 8,000 and Wages ₹ 500.

Machine – P has been engaged for 200 hours.

Machine – Q for 160 hours,

Machine – R for 240 hours and

Machine – S for 132 hours.

After the work order has been completed, materials worth ₹ 400 are found to be surplus and are returned to stores.

Office overheads used to be 40% of works costs, but on account of all round rise in the cost of administration, distribution and sale, there has been a 50% rise in the office overheads expenditure.

Moreover, it is known that 10% of production will have to be scrapped as not being upto the specification and the sale proceeds of the scrapped output will be only 5% of the cost of sale.

If the manufacturer wants to make a profit of 20% on the total cost of the work order, find out the selling price of a unit of commodity ready for sale.

Solution:

Computation of Selling Price per unit

Particulars	Workings	Amount (₹)
Material Used (₹ 8,000 - ₹ 400)		7,600
Direct Wages		500

Prime Cost		8,100
Works Overheads		
- Machine P	200 hours × ₹ 1.25 = ₹ 250	
- Machine Q	160 hours × ₹ 2.50 = ₹ 400	
- Machine R	240 hours × ₹ 3 = ₹ 720	
- Machine S	132 hours × ₹ 2.25 = ₹ 297	1,667
Works Cost		9,767
Office Overheads	60% × 9,767	5,860
Cost of Sale		15,627
Less: Sale proceeds of Scrap	5% × (10% × 15,627)	78
Total Cost of Work Order		15,549
Add: Profit	20% × 15,549	3,110
Selling Price		18,659
Selling Price per unit	₹ 18,659 / 100 units	186.59

Note: It was known before that 10% of production will have to be scrapped, therefore, inputs must have been made taking this factor into consideration. No other adjustment is necessary except deducting the value of scrap from the cost of production.

Illustration 3

The data pertaining to Heavy Engineering Ltd are as follows at the end of 31.3.2022. Direct material ₹ 9,00,000; Direct wages ₹ 7,50,000; Selling and Distribution overheads ₹ 5,25,000; Administration overheads ₹ 4,20,000; Factory overheads ₹ 4,50,000 and Profit ₹ 6,09,000.

(a) Prepare a Cost Sheet showing all the details.

(b) For 2022-23, the factory has received a work order. It is estimated that the direct materials would be ₹ 12,00,000 and direct labour cost ₹ 7,50,000. What would be the price of work order if the factory intends to earn the same rate of profit on sales, assuming that the selling and distribution overheads has gone up by 15%? The factory recovers factory overheads as a percentage of direct wages, administrative and selling and distribution overheads as a percentage of works cost, based on the cost rates prevalent in the previous year.

Solution:

(a) **Statement of Cost and Profit for the year 2021-2022**

Particulars	Amount (₹)
Direct Materials	9,00,000
Direct Wages	7,50,000
Prime Cost	16,50,000
Add: Factory Overheads	4,50,000
Works Cost	21,00,000
Add: Administration Overheads	4,20,000

Cost of Production / Cost of Goods Sold	25,20,000
Add: Selling & Distribution Overheads	5,25,000
Cost of Sales	30,45,000
Add: Profit	6,09,000
Sales	36,54,000

(b) **Estimated Cost Sheet for the Work Order**

Particulars		Amount (₹)
Direct Materials		12,00,000
Direct Wages		7,50,000
Prime Cost		19,50,000
Add: Factory Overheads	60% × 7,50,000	4,50,000
Works Cost		24,00,000
Add: Administration Overheads	20% × 24,00,000	4,80,000
Cost of Production / Cost of Goods Sold		28,80,000
Add: Selling & Distribution Overheads	40% × 24,00,000	9,60,000
Cost of Sales		38,40,000
Add: *Profit		7,68,000
Sales		46,08,000

Cost + Profit = Sales

or, 38,40,000 + $16\frac{2}{3}$ % × Sales = Sales

or, $83\frac{1}{3}$ % Sales = ₹ 38,40,000

or, Sales = $\frac{38,40,000}{83\frac{1}{3}\%}$ = ₹ 46,08,000

or, *Profit = ₹ 46,08,000 - ₹ 38,40,000 = ₹ 7,68,000

Workings:

(i) Percentage of Profit on Sales = $\frac{₹\ 6,09,000}{₹\ 36,54,000} \times 100 = 16\frac{2}{3}\%$

(ii) Percentage of Factory Overheads on Direct Wages = $\frac{₹\ 4,50,000}{₹\ 7,50,000} \times 100 = 60\%$

(iii) Percentage of Administration Overheads on Works Cost = $\frac{₹\ 4,20,000}{₹\ 21,00,000} \times 100 = 20\%$

(iv) Percentage of Selling and Distribution Overheads to Works Cost = $\frac{₹\ 5,25,000}{₹\ 21,00,000} \times 100 = 25\%$

∴ Revised Percentage of Selling and Distribution Overheads on Works Cost = 25% + 15% = 40%

Illustration 4

A manufacturing company is divided into three production departments – A, B and C. All production is against specific customers' orders only. All orders are dissimilar and they go through all the three departments.

Manufacturing Costs for a given period were as follows:

Particulars	Department A	Department B	Department C	Total
	(₹)	(₹)	(₹)	(₹)
Direct Material	-	-	-	1,80,000
Direct Labour	40,000	20,000	30,000	90,000
Indirect Manufacturing Costs	20,000	40,000	30,000	90,000

The cost of producing a particular order was determined as follows:

Particulars	Amount (₹)	Amount (₹)
Direct Material		1,000
Direct Labour:		
Department A	120	
Department B	280	
Department C	200	600
Indirect Manufacturing Costs		600
		2,200

The General Manager had a hazy idea that the jobs executed on orders of this nature are under - priced. So, the services of a firm of cost accountants, of which you are a member, have been acquired for a thorough investigation.

Can you identify, after carefully analysing the limited available information, the fundamental flaw in the company's method of assuming that direct labour cost is an acceptable basis for distributing indirect manufacturing costs?

Prepare a revised cost for order distributing indirect manufacturing costs in a manner you consider appropriate.

Solution:

The predominant fault is the adoption of a blanket rate for the distribution of the indirect manufacturing costs for all the three departments, i.e., 100% ($\frac{\text{Indirect Manufacturing Costs}}{\text{Direct Labour Cost}} \times 100$) of total direct labour cost. This has been done despite of the fact that there are glaring differences of the direct labour cost of three departments. For calculating the revised cost of jobs, departmental rates based on indirect manufacturing cost percentage to direct labour costs are calculated:

Particulars	Department A (₹)	Department B (₹)	Department C (₹)
Indirect Manufacturing Cost	20,000	40,000	30,000
Direct Labour	40,000	20,000	30,000
Percentage of Indirect Manufacturing Cost on Direct Labour	$\frac{20,000}{40,000} \times 100 = 50\%$	$\frac{40,000}{20,000} \times 100 = 200\%$	$\frac{30,000}{30,000} \times 100 = 100\%$

On the assumption that direct labour cost method is considered to be a reasonable method of absorption of overheads, it is quite possible that departmental application of overheads may be able to resolve the difficulty faced by the manager regarding the costing of the job given. On this basis the amended job cost sheet will be as under:

Revised Cost Sheet of Job

Particulars	Amount (₹)	Amount (₹)
Direct Materials		1,000
Direct Labour		
- Department A	120	
- Department B	280	
- Department C	200	600
Prime Cost		1,600
Add: Indirect Manufacturing Costs		
- Department A	50% × 120 = 60	
- Department B	200% × 280 = 560	
- Department C	100% × 200 = 200	820
Total Cost		**2,420**

Illustration 5

A shop floor supervisor of a small factory presented the following cost for Job no. 555 to determine selling price.

Particulars	(₹)
Materials	70
Direct Wages 18 hours @ ₹ 2.50 per hour	45
Department X – 8 hours	
Department Y – 6 hours	
Department Z – 4 hours	
Chargeable expenses (special stores items)	5
Prime Cost	120
Add: 33 ⅓ % for expenses	40
	160

Analysis of the Profit & Loss Account for 2022 shows the following:

Dr. **Cr.**

Particulars	(₹)	(₹)	Particulars	(₹)	(₹)
To Materials		1,50,000	To Sales		2,50,000
Direct Wages:					
Department X	10,000				
Department Y	12,000				
Department Z	8,000	30,000			
Special stores items		4,000			
Overheads:					
Department X	5,000				
Department Y	9,000				
Department Z	2,000	16,000			
Works Cost		2,00,000			
Gross Profit c/d		50,000			
		2,50,000			2,50,000
Selling expenses		20,000			
Net Profit c/d		30,000	Gross Profit b/d		50,000
		50,000			50,000

It is noted that average hourly rates for the 3 departments X, Y and Z are similar.

You are required to:

(a) Calculate Departmental Overheads Recovery Rates;

(b) Calculate the entire revised cost using 2022 actual figures as basis;

(c) Add 20% to total cost to determine selling price.

Solution:

(a) **Calculation of Departmental Overheads Recovery Rates**

Particulars	Department X	Department Y	Department Z
i. Direct Wages	₹ 10,000	₹ 12,000	₹ 8,000
ii. Rate of wages per hour	₹ 2.50	₹ 2.50	₹ 2.50
iii. Labour Hours	$\frac{₹10,000}{₹\ 2.50} = 4,000$	$\frac{₹12,000}{₹\ 2.50} = 4,800$	$\frac{₹8,000}{₹\ 2.50} = 3,200$
iv. Actual Overheads	₹ 5,000	₹ 9,000	₹ 2,000
iv. Overheads Recovery Rates per Labour Hour (iv/iii)	$\frac{₹5,000}{4,000 \text{ hours}} = ₹1.25$	$\frac{₹9,000}{4,800 \text{ hours}} = ₹1.875$	$\frac{₹2,000}{3,200 \text{ hours}} = ₹0.625$

(b) **Revised Job Cost Sheet**

Particulars	Workings	Amount (₹)
Materials		70.00
Direct Wages		
- Department X	8 hours × ₹ 2.5 = ₹ 20.00	
- Department Y	6 hours × ₹ 2.5 = ₹ 15.00	
- Department Z	4 hours × ₹ 2.5 = ₹ 10.00	45.00
Chargeable Expenses		5.00
Prime Cost		120.00
Add: Overheads		
- Department X	8 hours × ₹ 1.25 = ₹ 10.00	
- Department Y	6 hours × ₹ 1.875 = ₹ 11.25	
- Department Z	4 hours × ₹ 0.625 = ₹ 2.50	23.75
Works Cost		143.75
Selling Overheads (10% of Works Cost) [WN]		14.38
Total Cost		158.13
(c) Add: Profit	20% × 158.13	31.626
Selling Price		189.756

Working:

Selling Overheads are charged @ 10% on Works Cost as calculated below:

$$\frac{\text{Selling Overhead}}{\text{Works Cost}} = \frac{₹\ 20{,}000}{₹\ 2{,}00{,}000} \times 100 = 10\%$$

Illustration 6

In a factory, following the Job Costing Method, an abstract from the work in process as at 30th September, was prepared as under:

Job No.	Materials (₹)	Direct Labour (₹)	Factory Overheads Applied (₹)
115	1,325	400 hours@ ₹ 800	640
118	810	250 hours@ ₹ 500	400
120	765	300 hours@ ₹ 475	380
	2,900	1,775	1,420

Materials used in October were as follows:

Material requisitions No.	Job No.	Cost Amount (₹)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A summary of labour hours deployed during October is as under:

Job No.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	-
124	20	10
	275	75
Indirect Labour:		
Waiting for material	20	10
Machine breakdown	10	5
Idle time	5	6
Overtime premium	6	5
	316	101

A shop credit slip was issued in October, that material issued under requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is ₹ 3 while at shop B it is ₹ 2 per hour. The factory overheads is applied at the same rate as in September; Jobs 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs of both the months. It is practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the jobs to the customer on a total cost plus 20% basis. What would be the invoice price of these three jobs 115, 118 and 120?

Solution:

Calculation of Selling Price of the Job

Job No.	Job No. 115		Job No. 118		Job No. 120	
		Amount (₹)		Amount (₹)		Amount (₹)
Costs in September:						
Material		1,325		810		765
Labour		800		500		475
Overheads		640		400		380
Total Cost of September (A)		2,765		1,710		1,620
Costs in October:						
Material		-		515#		665
Labour	25×3+25×2	125	90×3+30×2	330	75×3+10×2	245
Overheads	125 × 80%	100	330 × 80%	264	245 × 80%	196
Total Cost of October (B)		225		1,109		1,106
Factory Cost (A+B)		2,990.00		2,819.00		2,726.00
Add: Administration Overheads @ 10% of Factory Cost	2,990×10%	299.00	2,819×10%	281.90	2,726×10%	272.60
Cost of Sales		3,289.00		3,100.90		2,998.60
Add: Profit @20% on Cost of Sales		657.80		620.18		599.72
Selling Price		**3,946.80**		**3,721.08**		**3,598.32**

Note:

MR No. 54 was returned and MR No. 55 was directed to Job 124.So, MR No. 56 is taken for material used in Job 118.

Overheads Recovery Rate in September

Job No. 115 $= \frac{640}{800} \times 100 = 80\%$

118 $= \frac{400}{500} \times 100 = 80\%$

120 $= \frac{380}{475} \times 100 = 80\%$

(As a percentage of Labour Cost)

Batch Costing

5.2

Batch costing is a costing method that involves grouping and allocating costs to a specific quantity of products produced in a single batch or production run. It aims to calculate the cost per unit by spreading the total cost of the batch over the number of units produced within that batch. It is a valuable costing method for businesses engaged in batch production, helping them understand the cost dynamics of each production run and make informed decisions to enhance overall operational efficiency and profitability.

Batch costing is commonly employed in industries where products are produced in batches rather than continuously. It provides a more accurate reflection of the costs associated with each specific production run.

> Batch costing is a 'form of specific order costing where costs are attributed to batches of product (unit costs can be calculated by dividing by the number of products in the batch)'. CIMA Official Terminology

Essential features of Batch Costing

(a) Each batch is treated as a cost unit.

(b) All costs are accumulated and ascertained for each batch.

(c) A separate Batch Cost Sheet is used for each batch and is assigned a certain number by which the batch is identified.

(d) The cost per unit is ascertained by dividing the total cost of a batch by the number of items produced in that batch.

Applications of Batch Costing

Batch Costing is applied in those industries where the similar articles are produced in definite batches for internal consumption in the production of finished products or for sale to customers generally. It is generally applied in –

(a) Readymade Garments Manufacturing Industries.

(b) Pharmaceutical / Drug Industries.

(c) Spare parts and Components Manufacturing Industries.

(d) Toys Manufacturing Industries.

(e) Tyres and Tubes Manufacturing Industries.

Illustration

Epitome Pen Inc. and has the following budgeted overheads for the year, based on normal activity levels.

Production Departments	Budgeted Overheads (₹)	Budgeted activity
Welding	12,000	3,000 labour hours
Assembly	20,000	2,000 labour hours

Selling and administrative overheads are 25% of factory cost. An order for 500 Brazils made as Batch 38, incurred the following costs.

Materials ₹ 24,000

Labour 200 hours in the Welding Department at ₹5 per hour

400 hours in the Welding Department at ₹10 per hour

₹1,000 was paid for the hire of x-ray equipment for testing the accuracy of the welds.

Required

Calculae the cost per unit for Batch 38.

Solution:

The first step is to calculate the overhead absorption rate for the production departments.

Welding $= \frac{₹\ 12,000}{3,000} = ₹\ 4$ per labour hour

Assembly $= \frac{₹\ 20,000}{2,000} = ₹\ 10$ per labour hour

Total Cost - Batch 38

	₹	₹
Direct material		24,000
Direct expenses 200 × ₹ 5 =	1,000	1,000
Direct labour 400 × ₹ 10 =	4,000	5,000
Prime Cost		**30,000**
Overheads 200 × ₹ 4 =	800	
400 × ₹ 10 =	4,000	4,800
Factory Cost		**34,800**
Selling and administrative Cost (25% of factory cost)		8,700
Total Cost		**43,500**

Cost per unit $= \frac{₹\ 43,500}{500} = ₹\ 87$

5.2.1 Economic Batch Quantity (EBQ)

Economic Batch Quantity (EBQ) is a measure used in batch costing to determine the quantity of units that can be produced at the minimum average cost in a given batch or product run. It is also known as Optimum Batch Quantity (OBQ) and is a refinement of the Economic Order Quantity (EOQ) model. EBQ takes into account the set-up cost, annual demand, production time, and the carrying charge rate per year to calculate the most cost-effective batch size.

The formula for calculating EBQ is similar to EOQ, but with a notable difference in the denominator. The assumptions made for calculating EBQ are that demand is known and constant within a certain period of time, unit cost of the inventory item is constant, production time is known and constant, and set-up cost and constant cost per piece are considered. The importance of EBQ lies in its ability to help companies achieve a balance leading to improved efficiency, reduced costs, and increased profitability.

Setting up and Processing Costs

The setting up and processing costs refer to the costs incurred for setting up and processing operations before the start of production of a batch. There is an inverse relationship between batch size and set up and processing costs.

Large the Batch size : Lower the set-up costs because of few batches.

Smaller the Batch size : Higher the set-up costs because of more batches.

Carrying Costs

The carrying costs refer to the costs incurred in maintaining a given level of inventory. There is positive relationship between batch size and carrying costs.

Large the Batch size : Higher the carrying costs because of high average inventory.

Smaller the Batch size : Lower the carrying costs because of low average inventory.

The trade off

The optimum quantity of batch which should be produced at a point of time determined after achieving a tradeoff between set up costs and carrying costs. Such batch size is known as EBQ because annual total cost of set up and carrying is minimum at this batch size.

Economic Batch Quantity = $\sqrt{\frac{2AS}{C}}$

where, A = Annual Demand

S = Set up Cost per batch

C = Carrying Cost per unit per year

Illustration 7

From the following information, calculate Economic Batch Quantity for a company using batch costing:

Annual Demand for the components	2,400 units
Setting up cost per batch	₹ 100
Manufacturing cost per unit	₹ 200
Carrying cost per unit	6% p.a.

Solution:

$$EBQ = \sqrt{\frac{2AS}{C}}$$

where, EBQ = Economic Batch Quantity

A = Annual Demand = 2,400 units

S = Set up cost per batch = ₹ 100

C = Carrying cost per unit per year = 200 × 6% = ₹12

$$\therefore EBQ = \sqrt{\frac{2 \times 2,400 \times 100}{12}} = 200 \text{ units}$$

Illustration 8

A customer has been ordering 90,000 special design metal columns at the rate of ₹18,000 per order during the past years. The production cost comprises ₹ 120 for material, ₹ 60 for labour and ₹ 20 for fixed overheads. It costs ₹ 1,500 to set up for one run of 18,000 column and inventory carrying cost is 15% since this customer may buy at least 5,000 columns this year, the company would like to avoid making five different production runs. Find the most economic production run.

Solution:

$$\text{Economic Production Run} = \sqrt{\frac{2 \times \text{Annual Output} \times \text{Setup Cost per Production Run}}{\text{Inventory Carrying Cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \times 90,000 \times 1,500}{15\% \times 200 \text{ (i.e. } 120 + 60 + 20)}} = 3,000 \text{ columns}$$

Illustration 9

AB Ltd is committed to supply 24,000 bearings per annum to CD Ltd on a steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is ₹ 324.

(a) What would be the optimum run size for bearing manufacture?

(b) What is the minimum inventory holding cost at optimum run size?

(c) Assuming that the company has a policy of manufacturing 6,000 bearing per run, how much extra costs would the company be incurring as compared to the optimum run suggested in (a)?

Solution:

(a) Optimum Production Run Size = $\sqrt{\frac{2AS}{C}}$

where, A = Number of units to be produced within one year = 24,000 bearings

S = Setup cost per production run = ₹ 324

C = Carrying cost per unit per annum = ₹ 0.10 × 12 months = ₹ 1.20

Optimum Production Run Size = $\sqrt{\frac{2 \times 24,000 \times 324}{1.20}}$ = 3,600 bearings

(b) Minimum Inventory holding cost at Optimum Production Run Size

= Average Inventory × Carrying Cost per unit per annum

= $\frac{3,600}{2}$ × 1.20 = ₹ 2,160

(c) **Statement showing Total Cost at Production Run size of 3,600 and 6,000 bearings**

Particulars	Production Run Size	
	3,600	6,000
i. Annual Requirements	24,000	24,000
ii. Number of Runs	$\frac{24,000}{3,600} \approx 7$ (approx)	$\frac{24,000}{6,000} = 4$
iii. Setup Cost per run	₹ 324	₹ 324
iv. Average Inventory	$\frac{3,600}{2} = 1,800$	$\frac{6,000}{2} = 3,000$
v. Carrying Cost per unit per annum	₹ 0.10 × 12months = ₹ 1.20	₹ 0.10 × 12 months = ₹ 1.20
	(₹)	(₹)
Total Set up Cost (ii × iii)	(7 × ₹ 324) = 2,268	(4 × ₹ 324) = 1,296
Total Carrying Cost (iv × v)	1,800 × 1.20 = 2,160	3,000 × 1.20 = 3,600
Total Cost	4,428	4,896

Extra Cost incurred, if run size is 6,000 bearings = ₹ 4,896 - ₹ 4,428 = ₹ 468

Illustration 10

Component 'Gold' is made entirely in cost centre 100. Material cost is 6 paise per component and each component takes 10 minutes to produce. The machine operator is paid 72 paise per hour, and machine hour rate is ₹ 1.50. The setting up of the machine to produce the component 'Gold' takes 2 hours 20 minutes.

On the basis of this information, prepare a cost sheet showing the production and setting up cost, both in total and per component, assuming that a batch of:

(a) 10 components,

(b) 100 components, and

(c) 1,000 components are produced.

Solution:

Cost Sheet of Component 'Gold'

Particulars	Batch Size					
	10 Components		100 Components		1,000 Components	
	p.u.	Total	p.u.	Total	p.u.	Total
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
A. Production Cost						
Material Cost	0.06	0.60	0.06	6.00	0.06	60.00
Machine Operators Wages (WN 1)	0.12	1.20	0.12	12.00	0.12	120.00
Overheads (WN 2)	0.25	2.50	0.25	25.00	0.25	250.00
Total Production Cost	**0.43**	**4.30**	**0.43**	**43.00**	**0.43**	**430.00**
B. Setting up Cost						
Machine Operator Wages (WN 3)	0.168	1.68	0.0168	1.68	0.00168	1.68
Overheads (WN 4)	0.350	3.50	0.035	3.50	0.0035	3.50
Total Setting up Cost	**0.518**	**5.18**	**0.0518**	**5.18**	**0.00518**	**5.18**
Total Cost	**0.948**	**9.48**	**0.4818**	**48.18**	**0.43518**	**435.18**

Working Notes:

Particulars	10 Components	100 Components	1,000 Components
Time taken to produce the Components @ 10 minutes per component	$(10 \times 10) = 100$ Minutes or, $\frac{100}{60}$ hours	$(100 \times 10) = 1{,}000$ Minutes or, $\frac{1{,}000}{60}$ hours	$(1000 \times 10) = 10{,}000$ Minutes or, $\frac{10{,}000}{60}$ hours
1. Machine Operators Wage @ ₹ 0.72 per hour	$\frac{100}{60} \times 0.72 =$ ₹ 1.20	$\frac{1{,}000}{60} \times 0.72 =$ ₹ 12	$\frac{10{,}000}{60} \times 0.72 =$ ₹ 120
2. Overheads @ ₹ 1.50 per hour	$\frac{100}{60} \times 1.50 =$ ₹ 2.50	$\frac{1{,}000}{60} \times 1.50 =$ ₹ 25	$\frac{10{,}000}{60} \times 1.50 =$ ₹ 250

Setting up Cost:

3. Machine Operators Wages = 2 hours 20 minutes × ₹ 0.72 = $2\frac{1}{3} \times 0.72 =$ ₹ 1.68

4. Overhead = 2 hours 20 minutes × ₹ 1.50 = $2\frac{1}{3} \times 1.50 =$ ₹ 3.50

Contract Costing

5.3

Contract costing is basically, a job costing system that is applied to relatively large cost units that take a considerable amount of time to complete, such as construction and civil engineering work.

It is a specific accounting method used to track and allocate costs associated with a particular contract or project. This method is particularly relevant in industries where work is undertaken on a project-by-project basis, such as construction, manufacturing, or consulting. The primary goal of contract costing is to determine the total cost of a specific contract and to allocate these costs appropriately. It provides a more accurate picture of the financial performance of individual contracts. It is particularly valuable in industries where each project varies significantly in terms of size, scope, and duration.

The key features of contract costing:

- Construction activities: Contract costing mainly consists of construction activities and is applied in industries such as building construction, shipbuilding, bridge construction etc.
- Identification of Contracts: Each project or contract is identified separately. This could be a construction project, the production of a specific product, or the provision of services for a particular client.
- Direct expenses: Most of the expenses in contract costing are direct nature, such as materials, labour, expenses, plant, and sub-contract charges. Only a small portion of the amount is charged as overheads, which are apportioned on a suitable basis
- Accumulation of Costs: All costs related to a specific contract are accumulated and recorded separately. These costs include direct materials, direct labour, and overheads costs that can be directly attributed to the contract.
- Cost Allocation: Costs are allocated to the contract based on a systematic and consistent method. Direct costs (those directly attributable to the contract) are easily identified, but indirect costs (overheads) may need to be allocated based on a predetermined rate or other allocation methods.
- Recording Revenue: Revenue recognition is aligned with the progress of the contract. In many cases, revenue is recognized as work on the contract is performed.
- Job Costing: Contract costing is a type of job costing where costs are tracked for a specific job or project (contract) instead of a particular product.
- Profit Measurement: The ultimate goal of contract costing is to determine the profitability of each contract. By comparing the total costs incurred with the revenue generated from the contract, businesses can assess the financial success of each project.
- Contracts may also include an escalation clause, under which the contractor is compensated for increases in costs due to inflation.
- Other features include part payments made depending on certificates issued by the architect, showing the value of work completed and retention money.

Types of contracts

There are three types of contracts

1. Fixed Price Contracts: In this type of contract, the contractor and the contractee agree upon a fixed price for the work to be undertaken. The agreed price is paid by the contractee to the contractor

   Example - a contractor quotes a fixed price of Rs10,000 for constructing a small building. The contractee agrees to this price, and both parties sign the contract. The contractor is then responsible for completing the construction work within the agreed price.

2. Contracts with Escalation Clause: These contracts have a provision that the fixed price may increase or decrease in certain situations. This is a safeguard against cost increases due to factors such as inflation or other unforeseen circumstances

   Example - a contractor and a contractee agree on a fixed price of Rs10,000 for a construction project (period of contract – One year). The contract includes an escalation clause that states the price will increase by 5% for every six months of delay in the project's completion. If the project takes 18 months to complete, the final price would be Rs11,500 (Rs 10,000 + 5% of Rs 10,000).

3. Cost Plus Contracts: Under a cost-plus contract, the value of the contract is ascertained by adding a fixed percentage of profit to the actual cost of the work. The contractor is assured of a certain percentage of profit in advance and is protected against the possibility of incurring any loss.

5.3.2 Accounting of Costs of Contract

The cost computation in case of a contract is done on the following basis.

(i) Material Cost: Direct Material required for a particular contract is debited to the Contract Account. There may be some quantity of material which is returned back to the store. In such cases, material returned note is prepared and is either credited to the Contract Account or deducted from the material debited to the Contract Account. Similar treatment is given to the material transferred from one contract to another one.

- All materials supplied from the stores or purchased directly for the contract are debited to the concerned contract account.

  Contract A/c (Contract No:) Dr

  To Stores Ledger Control A/c (issued from stores) or

  To Cost Ledger Control A/c (direct purchase)

- In the case of transfer of excess material from one contract to another, costs of these excess materials are adjusted on the basis of Material Transfer Note.

  Contract A/c (transferee contract no:) Dr

  To Contract A/c (transferor contract no:)

- In case the return of surplus materials appears uneconomical on account of high cost of transportation, the same is sold and the concerned contract account is credited with the price realized. Any loss or profit arising therefrom is transferred to the Costing Profit & Loss A/c.

  Cost Ledger Control A/c Dr

  Costing Profit & Loss A/c (loss) Dr

  To Contract A/c (cost of material)

  To Costing Profit & Loss A/c (profit)

- Any loss of materials due to theft or destruction etc. is transferred to the Costing Profit & Loss A/c.

  Costing Profit & Loss A/c Dr

  To Contract A/c

- If any stores items are used for manufacturing tools, the cost of such store items are charged to the Works Expenses A/c.

  Works Expenses A/c Dr

  To Stores Ledger Control A/c (with amount of stores used for works)

  Contract A/c Dr

  To Works Expenses A/c (with amount of works used in the contract)

- If the contractee has supplied some materials without affecting the contract price, no accounting entries will be made in the contract account, only a note may be given about it.

(ii) Employee (Labour) Cost: It is usual for direct labour on a contract site to be paid on an hourly basis. Employees who work on several contracts at the same time will have to record the time spent on each contract on time sheets. Each contract will then be charged with the cost of these recorded hours.

Contract A/c Dr

To Wages A/c

To Outstanding Wages A/c

(iii) Expenses: All expenses incurred for a particular contract should be charged to that contract. In case of any indirect expenses incurred for the organization as a whole, they should be charged to the contract on some suitable basis. Direct expenses can be charged directly to the contract.

- Direct expenses (such as architect's fees, hire charges of concrete mixer, electricity charges, cost of special tools etc) incurred and / or outstanding.

  Contract A/c Dr

  To Direct Expenses A/c

  To Outstanding Direct Expenses A/c

- Indirect expenses (such as expenses of engineers, surveyors, supervisors, corporate office etc.) may be distributed over several contracts on certain reasonable basis as overheads.

  Contract A/c Dr

  To Overheads A/c

(iv) Cost of Plant: A feature of most contract work is the amount of plant used. Plant used on a contract may be owned by the company, or hired from a plant hire firm.

(a) If the plant is hired, the cost will be a direct expense of the contract.

(b) If the plant is owned, a variety of accounting methods may be employed.

- The value of the plant may be either debited to contract account and the written down value thereof at the end of the year entered on the credit side for closing the contract account.

  Contract A/c.....Dr.

  To Plant and Machinery A/c (with cost)

  Plant and Machinery A/c (with WDV) .....Dr.

  To Contract A/c

  Or

- Only a charge (depreciation) for use of the plant may be debited to the contract account.

  Contract A/c.....Dr.

  To Depreciation on Plant and Machinery A/c

(v) Cost of supervision and sub-contractors: The cost of supervision, which is usually a production overheads in unit costing, job costing and so on, will be a direct cost of a contract. On large contracts, much work may be done by sub-contractors. The invoices of sub-contractors will be treated as a direct expense to the contract. Sub-contract costs are also debited to the Contract Account

Contract A/c.....Dr.

To Cost of Sub-Contract A/c

In contract costing, as each contract may take a long period for completion, the question of computing of profit is to be solved with the help of a well defined and accepted method.

(vi) Extra Work: The extra work amount payable by the contractee should be added to the contract price. If extra work is substantial, it is better to treat it as a separate contract. If it is not substantial, then the amount should be debited to the contract account as "Cost of Extra Work".

5.3.3 Important Terminologies

1. Work-in-Progress in contract costing refers to the work which is not complete on the reporting date.

Value of the work-in-progress = the cost of work completed,both certified and uncertified + the cost of work not yet completed + amount of estimated/ notional profit.

In the Balance Sheet (prepared for management), the work-in-progress is usually shown under two heads, viz., certified and uncertified. The cost of work completed and certified and the profit credited will appear under the head 'certified' work-in- progress, while the completed work not yet certified, cost of material, employee and other expenses which has not yet reached the stage of completion are shown under the head "uncertified" work-in-progress.

2. Cost of Work Certified or Value of Work Certified: A contract is a continuous process and to know the cost or value of the work completed as on a particular date; assessment of the completion of work is carried out by an expert (it may be any professional like surveyor, architect, engineer etc.). The expert, based on his assessment, certifies the work completion in terms of percentage of total work. The cost or value of certified portion is calculated and is known as Cost of work certified or Value of work certified respectively.

   - Value of Work Certified = Value of Contract × Work certified (%)
   - Cost of Work Certified = Cost of work to date – (Cost of work uncertified+ Material in hand + Plant at site)

3. Cost of Work Uncertified: It represents the cost of the work which has been carried out by the contractor but has not been certified by the expert. It is always shown at cost price.

4. Retention Money: To have a cushion against any defect or undesirable work, the contractee retains some money payable to contractor. This security money retained by the contractee is known as retention money.

   Retention money = Value of work certified- Payment made to contractor

5. Notional Profit: It represents the difference between the value of work certified and cost of work certified.

   Notional profit = Value of work certified - (Cost of work to date - Cost of work not yet certified)

6. Estimated Profit: It is the excess of the contract price over the estimated total cost of the contract. [can be calculated and feasible to calculate only in case of contracts whose end has neared].

7. Cost- plus contract is a contract where the value of the contract is determined by adding an agreed percentage of profit to the total cost. These types of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of factors that affect the cost of material, employees, etc.

8. Escalation clause in a contract empowers a contractor to revise the price of the contract in case of increase in the prices of inputs due to some macro-economic or other agreed reasons.

Profit on Incomplete contract - For the purpose of finding out the portion of the notional profit to be transferred to Profit and Loss Account, the contracts are divided in the following manner:

I. **Contracts which have just commenced:** In this case no portion of the notional profit shall be transferred to Profit and Loss Account and the entire amount is kept as reserve. There are no hard and fast rules to determine that a particular contract is just commenced or reasonably advanced or almost complete. However, as per general norms, the contracts in which less than 1/4th work is done are regarded as the contracts which have just commenced.

II. **Contracts which have reasonably advanced:** In this case the profit to be transferred to Profit and Loss Account out of notional profit is based on the degree of completion of the contract. The degree of completion of the contract can be found out by comparing work certified and the contract price.

   a. If the degree of completion of work is (> 1/4 and < 1/2), 1/3rd of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

b. If the degree of completion of work is more than or equal to 1/2, 2/3rd of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

The profit so arrived in the above manner shall further be reduced in the ratio of cash received to work certified. Thus, the formula is as follows:

$$(\text{Notional Profit} \times \frac{2}{3} \text{ or } \frac{1}{3} \text{ (as the case may be)} \times [\frac{\text{Cash received}}{\text{Work Certified}}]$$

III. Contracts which are almost complete: In this case the portion of the profit to be transferred to Profit and Loss Account is calculated by using the estimated total profit which is ascertained by subtracting the total cost to date and the additional estimated cost to complete the contract from the contract price. The different formulas for such computations of profit are as follows: -

(i) $\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract Price}}$

(ii) $\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract Price}} \times \frac{\text{Cash received}}{\text{Work Certified}}$

(iii) $\text{Estimated Profit} \times \frac{\text{Total cost to date}}{\text{Total Cost}}$

(iv) $\text{Estimated Profit} \times \frac{\text{Total cost to date}}{\text{Total Cost}} \times \frac{\text{Cash received}}{\text{Work Certified}}$

Illustration 11

A firm of Builders, carrying out large contracts kept in contract ledger, separate accounts for each contract on 30th June, 2022, the following were shown as being the expenditure in connection with Contract No. 555

	Amount (₹)
Materials purchased	1,16,126
Materials issued from stores	19,570
Plant, which has been used on other contracts	25,046
Additional Plant	7,220
Wages	1,47,268
Direct expenses	4,052
Proportionate establishment expenses	17,440

The contract which had commenced on 1st February, 2022 was for ₹ 6,00,000 and the amount certified by the architect, after deduction of 20% retention money, was ₹ 2,41,600 the work being certified on 30th June, 2022. The materials on site were ₹ 19,716. A contract plant ledger was also kept in which depreciation was dealt with monthly, the amount debited in respect of that account is ₹ 2,260. Prepare Contract Account showing Profit on the contract.

Solution:

Dr. **Contract A/c** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Materials Purchased A/c	1,16,126	By Materials at site c/d	19,716
To Materials Issued A/c	19,570	By Cost of Construction c/d (Bal. fig.)	2,87,000
To Depreciation A/c	2,260		
To Wages A/c	1,47,268		
To Direct Expenses A/c	4,052		
To Prop. Estab. Expenses A/c	17,440		
	3,06,716		**3,06,716**
To Cost of Construction b/d	2,87,000	By Work in Progress A/c	3,02,000
To Notional Profit c/d (Bal. fig.)	15,000	- Value of work certified [WN-1]	
	3,02,000		**3,02,000**
To Profit & Loss A/c [WN-2]	8,000	By Notional Profit b/d	15,000
To Work in progress A/c			
- Provision for Contingencies (Bal. fig.)	7,000		
	15,000		**15,000**

Working Notes:

1. Value of work certified = $\frac{₹\ 2,41,600}{(1\text{-}20\%)}$ = ₹ 3,02,000

2. Since, value of work certified is above 50% of contract value so amount transferred to

Profit & Loss A/c = $\frac{2}{3}$ × 15,000 × 80% = ₹ 8,000 ($\frac{2}{3}$ × Notional Profit × $\frac{\text{Cash Received}}{\text{Work Certified}}$)

Illustration 12

A contractor has undertaken a construction work at a price of ₹ 5,00,000 and begun the execution of work on 1st January 2022. The following are the particulars of the contract up to 31st December, 2022:

	(₹)		(₹)
Machinery	30,000	Overheads	8,252
Materials	1,70,698	Materials returned	1,098
Wages	1,48,750	Work certified	3,90,000
Direct expenses	6,334	Cash received	3,60,000
Uncertified work	9,000	Materials on 31.12.2021	3,766
Wages outstanding	5,380		
Value of Machinery on 31.12.2021	22,000		

It was decided that the profit made on the contract in the year should be arrived at by deducting the cost of work certified from the total value of the architect's certificate, that $\frac{1}{3}$rd of the profit so arrived at should be regarded as a provision against contingencies and that such provision should be increased by taking to the credit of Profit & Loss Account only such portion of the $\frac{2}{3}$rd profit, as the cash received to the work certified. Prepare the contract account for the year and show the amount taken to the credit of the Profit and Loss account.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Depreciation on Machinery A/c [WN-1]	8,000	By Materials (Returned) A/c	1,098
		By Materials at site c/d	3,766
To Materials A/c	1,70,698	By Cost of Construction c/d (Bal. fig.)	3,42,550
To Wages A/c	1,48,750		
To Outstanding Wages A/c	5,380		
To Direct Expenses A/c	6,334		
To Overheads A/c	8,252		
	3,47,414		**3,47,414**
To Cost of Construction b/d	3,42,550	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	56,450	- Value of work certified	3,90,000
		- Cost of uncertified work	9,000
	3,99,000		**3,99,000**
To Profit & Loss A/c [WN-2]	34,738	By Notional Profit b/d	56,450
To Work in progress A/c			
- Provision for Contingencies (Bal. fig.)	21,712		
	56,450		**56,450**

Working Notes

1. Depreciation on Machinery = ₹ 30,000 - ₹ 22,000 = ₹ 8,000

2. Since, degree of completion is above 50% so amount transferred to

Profit & Loss A/c = $\frac{2}{3} \times 56,450 \times \frac{3,60,000}{3,90,000}$ = ₹ 34,738

Illustration 13

A contractor commenced the work on a particular contract on 1st April, 2022. He usually closes his books of accounts for the year on 31st December of each year. The following information is revealed from his costing records on 31st December, 2022:

Particulars	Amount (₹)
Materials sent to site	43,000
Jr. Engineer	12,620
Labour	1,00,220

A machine costing ₹ 30,000 remained in use on site for $\frac{1}{5}$ th of year. Its working life was estimated at 5 years and scrap value at ₹ 2,000.

A supervisor is paid ₹ 2,000 per month and had devoted one half of his time on the contract.

All other expenses were ₹ 14,000, the materials on site were ₹ 2,500.

The contract price was ₹ 4,00,000. On 31st December, 2022 $\frac{2}{3}$rd of the contract was completed. However, the architect gave certificate only for ₹ 2,00,000. On which 80% was paid. Prepare Contract Account.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	43,000	By Materials at site c/d	2,500
To Jr. Engineer A/c	12,620	By Cost of Construction c/d (Bal. fig.)	1,77,460
To Labour A/c	1,00,220		
To Depreciation on Machine A/c [WN-1]	1,120		
To Supervisor A/c [WN-2]	9,000		
To Other Expenses A/c	14,000		
	1,79,960		**1,79,960**
To Cost of Construction b/d	1,77,460	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	66,905	- Value of work certified	2,00,000
		- Cost of uncertified work [WN-3]	44,365
	2,44,365		**2,44,365**
To Profit & Loss A/c [WN-4]	35,683	By Notional Profit b/d	66,905
To Work in progress c/d			
- Provision for Contingencies (Bal. fig.)	31,222		
	66,905		**66,905**

Working Notes:

1. Depreciation on Machine = $\frac{30,000 - 2,000}{5 \text{ years}} \times \frac{1}{5} = ₹ 1,120$

2. Amount paid to Supervisor = $\frac{₹2,000 \times 9 \text{ months}}{2} = ₹ 9,000$

3. Degree of Completion is $\frac{2}{3}$rd.

   So, Cost for Construction of $\frac{2}{3}$rd = ₹ 1,77,460

   Therefore, Expected Cost of Construction = $177,460 \times \frac{3}{2} = ₹ 2,66,190$

   Cost of Work Certified is 50% = 50% × 2,66,190= ₹ 1,33,095

   Cost of Work Uncertified = ₹ 1,77,460 - ₹ 1,33,095 = ₹ 44,365

4. Since, degree of completion is $\frac{2}{3}$rd, so amount transferred to

   Profit & Loss A/c = $\frac{2}{3} \times 66,905 \times 80\% = ₹ 35,683$

Illustration 14

The following figures are supplied to you by contractor for the year ending 31st December, 2021.

Particulars		Amount (₹)
Work in Progress on 31.12.2021	₹ 85,000	
Less: Cash received from Contractee	₹ 55,000	30,000
During the year 2022:		
Wages		8,500
Materials bought		6,000
Working expenses		1,500
Materials issued from stores		10,500
Administrative expenses (₹ 250 are chargeable to Profit & Loss Account)		1,250
Plant		2,500
Material returned to supplier		450
Material returned to stores		550
Work certified		15,000
Contracts finished		22,500
Profits taken upon contracts		11,500
Advances from contractee		40,000

Prepare Contract Account, the Contractee's Account and show the work in progress as it would appear in the Balance Sheet.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Work in Progress A/c	85,000	By Materials A/c (Returned to Supplier)	450
To Wages A/c	8,500	By Materials A/c (Returned to Stores)	550
To Materials A/c (Purchased)	6,000	By Cost of Construction c/d (Bal. fig.)	1,14,000
To Materials A/c (Issued)	10,500		
To Working Expenses A/c	1,500		
To Administrative Expenses A/c	1,000		
To Plant A/c	2,500		
	1,15,000		**1,15,000**
To Cost of Construction b/d	1,14,000	By Work in Progress A/c	
To Notional Profit c/d	11,500	- Value of work certified	15,000
		- Cost of uncertified work (Bal. fig.)	88,000
		By Contractee A/c	22,500
	1,25,500		**1,25,500**

Dr. Contractee Account Cr

Particulars	(₹)	Particulars	(₹)
To Contract A/c	22,500	By Balance b/d	55,000
To Balance c/d (Bal. fig.)	72,500	By Cash A/c	40,000
	95,000		**95,000**

Balance Sheet as on 31.12.2021 (Abstract)

Liabilities	(₹)	Assets		(₹)
		Work in Progress (15,000 + 88,000)	1,03,000	
		Less: Cash Received	72,500	30,500

Illustration 15

The information given under has been extracted from the books of a contractor relating to contract for ₹ 3,75,000.

	Year I	Year II	Year III
	Amount (₹)	Amount (₹)	Amount (₹)
Materials	45,000	55,000	31,500
Direct Expenses	1,750	6,250	2,250
Indirect expenses	750	1,000	-
Wages	42,500	57,500	42,500

	Year I	Year II	Year III
	Amount (₹)	Amount (₹)	Amount (₹)
Total work certified	87,500	2,82,500	3,75,000
Uncertified work	-	5,000	-
Plant	5,000	-	-

The value of plant at the end of Year I was ₹ 4,000 at the end of Year II ₹ 2,500 and at the end of Year III it was ₹ 1,000. It is customary to pay 90% in cash of the amount of work certified. Prepare the Contract Account and show how the figures would appear in the balance sheet.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
Year I		By Cost of Construction c/d (Bal. fig.)	91,000
To Materials A/c	45,000		
To Direct Expenses A/c	1,750		
To Indirect Expenses A/c	750		
To Wages A/c	42,500		
To Depreciation on Plant A/c [WN-1]	1,000		
	91,000		**91,000**
To Cost of Construction b/d	91,000	By Work in Progress c/d	
		- Value of Work Certified	87,500
		By Profit & Loss A/c	
		Less (Bal. fig.)	3,500
	91,000		**91,000**
Year II		By Cost of Construction c/d (Bal. fig.)	2,08,750
To Work in Progress b/d			
- Value of work certified	87,500		
To Materials A/c	55,000		
To Direct Expenses A/c	6,250		
To Indirect Expenses A/c	1,000		
To Wages A/c	57,500		
To Depreciation on Plant A/c [WN-1]	1,500		
	2,08,750		**2,08,750**

Particulars	(₹)	Particulars	(₹)
To Cost of Construction b/d	2,08,750	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig)	78,750	- Value of Work Certified	2,82,500
		- Cost of Uncertified Work	5,000
	2,87,500		**2,87,500**
To Profit & Loss A/c [WN-2]	47,250	By Notional Profit b/d	78,750
To Work in Progress c/d			
- Provision for Contingencies	31,500		
	78,750		**78,750**
Year III		By Work in Progress b/d	
To Work in Progress A/c		- Provision for Contingencies	31,500
- Value of work certified	2,82,500	By Cost of Construction c/d (Bal. fig)	3,33,750
- Cost of Uncertified Work	5,000		
To Materials A/c	31,500		
To Direct Expenses A/c	2,250		
To Wages A/c	42,500		
To Depreciation on Plant A/c [WN-1]	1,500		
	3,65,250		**3,65,250**
To Cost of Construction b/d	3,33,750	By Contractee's A/c	3,75,000
To Profit and Loss A/c	41,250		
	3,75,000		**3,75,000**

Working Notes:

1. Depreciation on Plant

   Year I = ₹ 5,000 – ₹ 4,000 = ₹ 1,000

   Year II = ₹ 4,000 – ₹ 2,500 = ₹ 1,500

   Year III = ₹ 2,500 – ₹ 1,000 = ₹ 1,500

2. Amount transferred to Profit & Loss A/c in

   Year I = Loss ₹ 3,500

   Year II = $\frac{2}{3} \times 78,750 \times 90\%$ = ₹ 47,250

   Year III = Profit ₹ 41,250

Illustration 16

A firm of engineers undertook three contracts beginning on 1st January, 1st May and 1st August 2022. Their accounts on 30th November, 2022 showed the following position:

Particulars	Contract I	Contract II	Contract III
	Amount (₹)	Amount (₹)	Amount (₹)
Contract Price	80,000	54,000	60,000
Materials	14,400	11,600	4,000
Wages	22,000	22,500	2,800
General expenses	800	550	200
Cash Received for Work Certified	30,000	24,000	5,400
Work certified	40,000	32,000	7,200
Work uncertified	1,200	1,600	400
Wages outstanding	700	750	350
General expenses outstanding	150	100	50
Plant installed	4,000	3,200	2,400
Materials on hand	800	800	800

On the respective dates of the contracts, the plant was installed, depreciation thereon being taken at 15% p.a. You are required to prepare accounts in the Contract Ledger.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	Contract I	Contract II	Contract III	Particulars	Contract I	Contract II	Contract III
	(₹)	(₹)	(₹)		(₹)	(₹)	(₹)
To Materials A/c	14,400	11,600	4,000	By Materials on hand c/d	800	800	800
To Wages A/c	22,000	22,500	2,800				
To O/s Wages A/c	700	750	350	By Cost of Construction c/d (Bal. fig)	37,800	34,980	6,720
To Gen. Exp. A/c	800	550	200				
To O/s Gen. Exp. A/c	150	100	50				
To Depreciation on Plant A/c [WN-1]	550	280	120				
	38,600	**35,780**	**7,520**		**38,600**	**35,780**	**7,520**

Particulars	Contract I	Contract II	Contract III	Particulars	Contract I	Contract II	Contract III
	(₹)	(₹)	(₹)		(₹)	(₹)	(₹)
To Cost of Construction b/d	37,800	34,980	6,720	By Work in progress c/d			
To Notional Profit c/d (Bal. fig)	3,400	-	880	- Value of Work Certified	40,000	32,000	7,200
				- Cost of Uncertified Work	1,200	1,600	400
				By Profit & Loss A/c (Bal. fig.)	-	1,380	-
	41,200	**34,980**	**7,600**		**41,200**	**34,980**	**7,600**
To Profit & Loss A/c [WN-2]	1,700	-	-	By Notional Profit b/d	3,400	-	880
To Work in Progress A/c							
- Provision for Contingencies	1,700		880				
	3,400	-	880		3,400	-	880

Working Notes:

1. Depreciation on Plant for

   Contract I = $4,000 \times 15\% \times \frac{11}{12} = ₹\ 550$

   Contract II = $3,200 \times 15\% \times \frac{7}{12} = ₹\ 280$

   Contract III = $2,400 \times 15\% \times \frac{4}{12} = ₹\ 120$

2. Amount transferred to Profit & Loss A/c

   Work done more than 50% Contract I = Profit = $\frac{2}{3} \times 3,400 \times \frac{30,000}{40,000} = ₹\ 1,700$

   Contract II = Loss = ₹ 1,380

   Work done less than 25% Contract III = Nil

Illustration 17

The following is the Trial Balance of Premier Construction Company, engaged on the execution of Contract No. 747, for the year ended 31st December, 2022.

Contractee's Account	Amount (₹)	Amount (₹)
Amount received		3,00,000
Buildings	1,60,000	

Contractee's Account	Amount (₹)	Amount (₹)
Creditors		72,000
Bank Balance	35,000	
Capital Account		5,00,000
Materials	2,00,000	
Wages	1,80,000	
Expenses	47,000	
Plant	2,50,000	
	8,72,000	**8,72,000**

The work on Contract No. 747 was commenced on 1st January, 2022. Materials costing ₹ 1,70,000 were sent to the site of the contract but those of ₹ 6,000 were destroyed in an accident. Wages of ₹ 1,80,000 were paid during the year. Plant costing ₹ 50,000 was used on the contract all through the year. Plant with a cost of ₹ 2 lakhs was used from 1st January to 30th September and was then returned to the stores. Materials of the cost of ₹ 4,000 were at site on 31st December, 2022.

The contract was for ₹ 6,00,000 and the contractee pays 75% of the work certified. Work certified was 80% of the total contract work at the end of 2022. Uncertified work was estimated at ₹ 15,000 on 31st December, 2022.

Expenses are charged to the contract at 25% of wages. Plant is to be depreciation at 10% for the entire year.

Prepare Contract Account for the year 2022 and Balance Sheet as on 31st December, 2022 in the books of Premier Construction Company.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	1,70,000	By Costing Profit & Loss A/c	6,000
To Wages A/c	1,80,000	(loss due to accident)	
To Depreciation on Plant A/c [WN-1]	20,000	By Materials at Site	4,000
To Expenses A/c	45,000	By Cost of Construction c/d (Bal. fig.)	4,05,000
	4,15,000		**4,15,000**
To Cost of Construction b/d	4,05,000	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig.)	90,000	- Value of Work Certified [WN-3]	4,80,000
		- Cost of Uncertified Work	15,000
	4,95,000		**4,95,000**
To Profit & Loss A/c	45,000	By Notional Profit b/d	90,000
To Work in Progress c/d			
- Provision for Contingencies (Bal. fig.)	45,000		
	90,000		**90,000**

Working Notes:

1. Depreciation on Plant = 2,00,000 × $\frac{10}{100}$ × $\frac{9}{12}$ + 50,000 × $\frac{10}{100}$ = 15,000 + 5,000 = ₹ 20,000
2. Expenses = 25% × 1,80,000 = ₹ 45,000
3. Value of Work Certified = 80% × 6,00,000 = ₹ 4,80,000
4. Amount to be transferred to Profit & Loss A/c = $\frac{2}{3}$ × 90,000 × 75% = ₹ 45,000

Dr. **Profit & Loss Account** **Cr**

Particulars	(₹)	Particulars	(₹)
To Contract A/c	6,000	By Contract A/c	45,000
To Depreciation on Plant A/c (2,00,000 × 10% × $\frac{3}{12}$)	5,000		
To Expenses A/c (47,000 – 45,000)	2,000		
To Net Profit c/d	32,000		
	45,000		**45,000**

Balance Sheet as on 31.12.2022

Liabilities	(₹)	Assets	(₹)	(₹)
Capital	5,00,000	Work in Progress		
Profit & Loss A/c	32,,000	- Value of Work Certified	4,80,000	
Creditors	72,000	- Cost of Uncertified Work	15,000	
			4,95,000	
		Less: Work in Progress		
		- Provision for Contingencies	45,000	
			4,50,000	
		Less: Cash Received	3,00,000	1,50,000
		Buildings		1,60,000
		Plant (2,50,000 – 25,000)		2,25,000
		Bank		35,000
		Stock of Materials (2,00,000 – 1,70,000) + 4,000		34,000
	6,04,000			**6,04,000**

Illustration 18

A company of builders took to a multi-storied structure for ₹ 40,00,000 estimating the cost to be ₹ 36,80,000. At the end of the year, the company had received ₹ 14,40,000 being 90% of the work certified; work done but not certified was ₹ 40,000. Following expenditure were incurred.

Particulars	(₹)
Materials	4,00,000
Labour	10,00,000
Plant	80,000

Materials costing ₹ 20,000 were damaged. Plant is considered as having depreciated at 25%.

Prepare Contract Account and show all the possible figures that can reasonably be credited to Profit & Loss Account. Estimated Profit being ₹ 3,20,000.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	4,00,000	By Costing Profit & Loss A/c	20,000
To Labour A/c	10,00,000	(loss due to damage)	
To Depreciation on Plant A/c [WN-1]	20,000	By Cost of Construction c/d (Bal. fig.)	14,00,000
	14,20,000		**14,20,000**
To Cost of Construction b/d	14,00,000	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	2,40,000	- Value of Work Certified [WN-2]	16,00,000
		- Cost of Uncertified Work	40,000
	16,40,000		**16,40,000**
To Profit & Loss A/c [WN-3]	72,000	By Notional Profit b/d	2,40,000
To Work in Progress			
- Provision for Contingencies (Bal. fig.)	1,68,000		
	2,40,000		**2,40,000**

Working Notes:

1. Depreciation on Plant = 80,000 × 25% = ₹ 20,000
2. Value of Work Certified = $\frac{14,40,000}{90\%}$ = ₹ 16,00,000
3. Amount to be credited to Profit & Loss Account = $\frac{1}{3}$ × 2,40,000 × 90% = ₹ 72,000

Amount that may be credited to Profit & Loss Account

1. Estimated Profit × $\frac{\text{Work Certified}}{\text{Contract Price}}$ = 3,20,000 × $\frac{16,00,000}{40,00,000}$ × = ₹ 1,28,000
2. Estimated Profit × $\frac{\text{Work Certified}}{\text{Contract Price}}$ × $\frac{\text{Cash Received}}{\text{Work Certified}}$ = 3,20,000 × $\frac{16,00,000}{40,00,000}$ × 90% = ₹ 1,15,200
3. Estimated Profit × $\frac{\text{Total Cost to date}}{\text{Total Cost}}$ = 3,20,000 × $\frac{14,20,000}{36,80,000}$ = ₹1,23,478
4. Estimated Profit × $\frac{\text{Total Cost to date}}{\text{Total Cost}}$ × $\frac{\text{Cash Received}}{\text{Work Certified}}$ = 3,20,000 × $\frac{14,20,000}{36,80,000}$ × 90% = ₹ 1,11,130

Illustration 19

The following Trial Balance was extracted on 31st December, 2022 from the books of Swastik Co. Ltd contractors:

Particulars	Dr	Cr
	Amount (₹)	Amount (₹)
Share Capital:		
Shares of ₹ 10 each		3,51,800
Profit & Loss Account as on 1.1.2021		25,000
Provision for Depreciation on Machinery		63,000
Cash Received on account Contract - 7		12,80,000
Creditors		81,200
Land and Buildings (Cost)	74,000	
Machinery (Cost)	52,000	
Bank	45,000	
Contract 7:		
Materials	6,00,000	
Direct Labour	8,30,000	
Expenses	40,000	
Machinery on site (cost)	1,60,000	
	18,01,000	**18,01,000**

Contract 7 was begun on 1st January, 2022. The contract price is ₹ 24,00,000 and the customer has so far paid ₹ 12,80,000 being 80% of the work certified.

The cost of the work done since certification is estimated at ₹ 16,000. On 31st December, 2022, after the Trial Balance was extracted, machinery costing ₹ 32,000 was returned to stores, and materials then on site were value at ₹ 27,000.

Provision is to be made for direct labour due ₹ 6,000 and for depreciation of all machinery at 12.5% on cost.

You are required to prepare:

(a) Contract Account;

(b) Statement of Profit, if any, to be properly credited to profit and loss account for 2022 and

(c) Balance Sheet of Swastik Co. Ltd as on 31st December, 2022.

Solution:

Dr. Contract Account Cr.

Particulars	(₹)	Particulars	(₹)
To Materials A/c	6,00,000	By Materials at Site c/d	27,000
To Wages A/c	8,30,000	By Cost of Construction c/d (Bal. fig.)	14,69,000
To Outstanding Wages A/c	6,000		
To Expenses A/c	40,000		
To Depreciation on Machinery A/c [WN-1]	20,000		
	14,96,000		**14,96,000**
To Cost of Construction b/d	14,69,000	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig.)	1,47,000	- Value of Work Certified [WN-2]	16,00,000
		- Cost of Uncertified Work	16,000
	16,16,000		**16,16,000**
To Profit & Loss A/c [WN-3]	78,400	By Notional Profit b/d	1,47,000
To Work in Progress c/d			
- Provision for Contingencies (Bal. fig.)	68,600		
	1,47,000		**1,47,000**

Working Notes:

1. Depreciation on Machinery charged to Contract A/c = 1,60,000 × 12.5% = ₹ 20,000
2. Value of Work Certified = $\frac{12,80,000}{80\%}$ = ₹ 16,00,000
3. Amount transferred to Profit & Loss A/c = $\frac{2}{3}$ × 1,47,000 × 80% = ₹ 78,400

Dr. Profit & Loss Account Cr

Particulars	(₹)	Particulars	(₹)
To Depreciation on Machinery A/c (52,000 × 12.5%)	6,500	By Balance b/d	25,000
To Net Profit (Bal. fig)	96,900	By Contract A/c	78,400
	1,03,400		**1,03,400**

Balance Sheet as on 31.12.2021

Liabilities	(₹)	Assets	(₹)	(₹)
Capital	3,51,800	Land & Buildings		74,000
Profit & Loss A/c	96,900	Machinery (at Cost) (1,60,000 + 52,000)	2,12,000	
Creditors	81,200	Less: Provision for Depreciation (63,000 + 26,500)	89,500	1,22,500
Outstanding Labour	6,000	Work in Progress		
		- Value of Work Certified	16,00,000	
		- Cost of Uncertified Work	16,000	
			16,16,000	

Liabilities	(₹)	Assets	(₹)	(₹)
		Less: Work in Progress		
		- Provision for Contingencies	68,600	
			15,47,400	
		Less: Cash Received	12,80,000	2,67,400
		Bank		45,000
		Stock of Materials		27,000
	5,35,900			**5,35,900**

Illustration 20

Kapur Engineering Company undertakes long term contract which involves the fabrication of pre stressed concrete block and the reaction of the same on consumer's life.

The following information is supplied regarding the contract which is incomplete on 31st March, 2022.

Cost Incurred	Amount (₹)
Fabrication cost to date:	
Direct Materials	2,80,000
Direct Labour	90,000
Overheads	75,000
	4,45,000
Erection cost to date	15,000
Total	4,60,000
Contract Price	8,19,000
Cash received on account	6,00,000
Technical estimate of work completed to date:	
Fabrication: Direct Materials	80%
Direct Labour and Overheads	75%
Erection	25%

You are required to prepare a statement for submission to the management indicating

(a) The estimated profit on the completion of the contract;

(b) The estimated profit to date on the contract.

Solution:

(a)

Statement showing computation of estimated profit on completion

Particulars	Cost incurred to date	Estimated cost to be incurred	Estimated total cost
	₹	₹	₹
Materials	2,80,000	$2,80,000 \times \frac{20\%}{80\%} = 70,000$	$\frac{2,80,000}{80\%} = 3,50,000$
Direct Labour	90,000	$90,000 \times \frac{25\%}{75\%} = 30,000$	$\frac{90,000}{75\%} = 1,20,000$
Overheads	75,000	$75,000 \times \frac{25\%}{75\%} = 25,000$	$\frac{75,000}{75\%} = 1,00,000$
Erection	15,000	$15,000 \times \frac{75\%}{25\%} = 45,000$	$\frac{15,000}{25\%} = 60,000$
Total Cost	**4,60,000**	**1,70,000**	**6,30,000**
Profit (Bal. fig.)			1,89,000
Contract Price			8,19,000

Therefore, Estimated Profit on completion = ₹ 1,89,000

(b) Estimated Profit to date = Estimated Profit on Completion $\times \frac{\text{Cash Received}}{\text{Contract Price}}$

$= 1,89,000 \times \frac{6,00,000}{8,19,000} = ₹\ 1,38,462$

Or

Estimated Profit to date = Estimated Profit on Completion $\times \frac{\text{Total Cost to Date}}{\text{Estimated Total Cost}}$

$= 1,89,000 \times \frac{4,60,000}{6,30,000} = ₹\ 1,38,000$

Illustration 21

The following particulars are obtained from the books of Vinay Construction Ltd as on March, 2022.

Plant and equipment at cost ₹ 4,90,000

Vehicles at cost ₹ 2,00,000

Details of contract remained incomplete as on 31.3.2022.

Particulars	Contract Nos		
	V.29	V.24	V.25
	₹ Lacs	₹ Lacs	₹ Lacs
Estimated final sales value	8.00	5.60	16.00
Estimated Cost	**6.40**	**7.00**	**12.00**
Wages	2.40	2.00	1.20
Materials	1.00	1.10	0.44
Overheads (excluding depreciation)	1.44	1.46	0.58

Particulars	Contract Nos		
	V.29	V.24	V.25
	₹ Lacs	₹ Lacs	₹ Lacs
	4.84	**4.56**	**2.22**
Value certified by architect	7.20	4.20	2.40
Progress payments received	5.00	3.20	2.00

Depreciation of plant and equipment and vehicles should be charged at 20% to the three contracts in proportion to work certified. You are required to prepare statements showing contract wise and total.

(a) Profit / Loss to be taken to the Profit & Loss Account for the year ended 31st March, 2022.

(b) Work in progress as would appear in the Balance Sheet as at 31.3.2022.

Solution

Dr. **Contract Account** **Cr.**

Particulars	V.29 ₹ in lacs	V.24 ₹ in lacs	V.25 ₹ in lacs	Particulars	V.29 ₹ in lacs	V.24 ₹ in lacs	V.25 ₹ in lacs
To Expenses other than Depreciation	4.84	4.56	2.22	By Cost of Construction c/d (Bal. fig.)	5.56	4.98	2.46
To Depreciation [WN-1]	0.72	0.42	0.24				
	5.56	4.98	2.46		5.56	4.98	2.46
To Cost of Construction b/d	5.56	4.98	2.46	By Work in Progress A/c			
To Notional Profit c/d (Bal. fig.)	1.64	-	-	- Value of Work Certified	7.20	4.20	2.40
				By Profit & Loss A/c (Bal. fig.)	-	0.78	0.06
	7.20	**4.98**	**2.46**		**7.20**	**4.98**	**2.46**
To Profit & Loss A/c [WN-2]	1.025	-	-	By Notional Profit b/d	1.64	-	-
To Work in Progress							
- Provision for contingencies	0.615	-	-				
	1.64	**-**	**-**		**1.64**	**-**	**-**

Working Notes:

1. Depreciation for Contract V.29 = (4,90,000+2,00,000) × 20% × $\frac{7.20}{7.20+4.20+2.40}$ = ₹ 72,000

   Contract V.24 = 6,90,000 × 20% × $\frac{4.20}{7.20+4.20+2.40}$ = ₹ 42,000

   Contract V.25 = 6,90,000 × 20% × $\frac{2.40}{7.20+4.20+2.40}$ = ₹ 24,000

2. Amount to be transferred to Profit & Loss = Estimated Profit × $\frac{\text{Cash Received}}{\text{Contract Price}}$ = 1.64 × $\frac{5.00}{8.00}$ = ₹ 1.025 lacs

Illustration 22

A company is manufacturing building bricks and fire bricks. Both the products require two processes-Brick forming and Heat treating. The requirements for the two types of bricks are:

	Building Bricks	Fire Bricks
Forming per 100 bricks	3 hrs	2 hrs
Heat treatment per 100 bricks	2 hrs	5 hrs

Total costs of two departments in one month were:

Forming	₹ 21,200
Heat Treatment	₹ 48,800

Production during the month was:

Building Bricks	1,30,000 Nos
Fire Bricks	70,000 Nos

Prepare statement of manufacturing costs for the two varieties of bricks.

Solution:

Statement Showing Number of Hours

Particulars	Building Bricks		Fire Bricks		Total
		Hours		Hours	Hours
Brick Forming	$\frac{1,30,000}{100} \times 3$	3,900	$\frac{70,000}{100} \times 2$	1,400	5,300
Heat Treatment	$\frac{1,30,000}{100} \times 2$	2,600	$\frac{70,000}{100} \times 5$	3,500	6,100

Cost of Forming per hour $= \frac{₹21,200}{5,300 \text{ hours}} = ₹ 4$ per hour

Cost of Heat Treatment $= \frac{₹48,800}{6,100 \text{ hours}} = ₹ 8$ per hour

Statement Showing Computation of Manufacturing Cost for two variety of Bricks

Particulars	Building Bricks		Fire Bricks		Total
		(₹)		(₹)	(₹)
Brick Forming	3,900 × 4	15,600	1,400 × 4	5,600	21,200
Heat Treatment	2,600 × 8	20,800	3,500 × 8	28,000	48,800
Total		**36,400**		**33,600**	**70,000**

Illustration 23

Deluxe Limited undertook a contract for ₹ 5,00,000 on 1st July 2021. On 30th June 2022, when the accounts were closed, the following details about the contract were gathered:

Particulars	Amount (₹)
Materials purchased	1,00,000
Wages paid	45,000
General expenses	10,000
Plant purchased	50,000
Materials on hand 30.6.2022	25,000
Wages accrued 30.6.2022	5,000
Work certified	2,00,000
Cash received	1,50,000
Depreciation of Plant	5,000
Work uncertified	15,000

The above contract contained an escalator clause which read as follows:

"In the event of prices of materials and rates of wages increase by more than 5% the contract price would be increased accordingly by 25% of the rise in the cost of materials and wages beyond 5% in each case".

It was found that since the date of signing the agreement the prices of materials and wage rates increased by 25%. The value of the work certified does not take into account the effect of the above clause.

Prepare the Contract Account.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Materials A/c (Purchased)	1,00,000	By Materials at Site c/d	25,000
To Wages A/c	45,000	By Cost of Construction c/d (Bal. fig.)	1,40,000
To Outstanding Wages A/c	5,000		
To General Expenses A/c	10,000		
To Depreciation on Plant A/c	5,000		
	1,65,000		**1,65,000**
To Cost of Construction b/d	1,40,000	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	80,000	- Value of Work Certified	2,00,000
		- Escalation [WN-1]	5,000
		- Cost of Uncertified Work	15,000
	2,20,000		**2,20,000**
To Profit & Loss A/c [WN-2]	20,000	By Notional Profit b/d	80,000
To Work in Progress A/c			
- Provision for Contingencies (Bal. fig.)	60,000		
	80,000		**80,000**

Working Notes:

1. Increase in Contract Price due to Escalation in the Prices of Materials and Labour

   Cost of Materials and Labour incurred = 1,00,000 + 45,000 + 5,000 – 25,000 = ₹ 1,25,000

   Increase in prices of Materials and Labour by 25%

   So, Cost of Materials and Labour before increase in Prices = $1,25,000 \times \frac{100}{125}$ = ₹ 1,00,000

   Increase in Contract Price (beyond 5% increase) = $\frac{25}{100} \times (1,25,000 - 1,00,000 \times \frac{105}{100})$

   = $\frac{25}{100} \times (1,25,000 - 1,05,000)$

   = ₹ 5,000

2. Amount to be transferred to Profit & Loss A/c = $\frac{1}{3} \times 80,000 \times \frac{1,50,000}{2,00,000}$ = ₹ 20,000

Process Costing – Normal and Abnormal Losses, Equivalent Production, Inter-process Profit, Joint and By Products

5.4

Process costing is a method of costing used mainly in manufacturing where units are continuously mass-produced through one or more processes. In process costing, it is the process that is costed (unlike job costing where each job is costed). The method used is to take the total cost of the process and average it over the units of production. It is a method used to determine the cost of producing a product in a continuous production process. It is used when large quantities of identical items are manufactured in a continuous first-out basis. Process costing involves recording product costs for each manufacturing department (or process) as items enter production in batches rather than individually.

> Process costing is a 'form of costing applicable to continuous processes where process costs are attributed to the number of units produced. This may involve estimating the number of equivalent units in stock at the start and end of the period under consideration.'
>
> **CIMA Official Terminology**

Process costing is used where there is a continuous flow of identical units. Process Costing is a method of Costing which is used in the following industry

- Oil refining
- The manufacture of soap
- Paint manufacture
- Food and drink manufacture

Process costing Vs Job/Batch costing

A comparison between process costing and job/batch costing is presented below;

Aspect	Process Costing	Job/Batch Costing
Nature of Production	Continuous and Mass Production	Intermittent and Customized Production
Identifiability of Units	Indistinguishable Units (Homogeneous Products)	Distinguishable Units (Heterogeneous Products)
Cost Accumulation	Accumulates costs by production process or stage	Accumulates costs by job or batch
Cost Assignment	Average Cost per Unit is calculated for each process	Actual Cost per Unit is calculated for each job
Application	Used in industries with standardized production	Commonly applied in industries with customization

Industries	Chemical manufacturing, food processing	Custom furniture manufacturing, construction
Timing of Costing	Applied throughout continuous production processes	Applied to specific, distinct jobs or batches
Calculation of Unit Cost	Total costs of a process divided by total units	Total costs of a job or batch divided by quantity

Features of Process Costing

1. The output of one process becomes the input to the next until the finished product is made in the final process.
2. The continuous nature of production in many processes means that there will usually be closing work in progress which must be valued. In process costing it is not possible to build up cost records of the cost per unit of output or the cost per unit of closing inventory because production in progress is an indistinguishable homogeneous mass.
3. There is often a loss in process due to spoilage, wastage, evaporation and so on.
4. Output from production may be a single product, but there may also be a by-product (or by-products) and/or joint products.

5.4.1 Preparation of Process Account

A process account has two sides, and on each side there are two columns – one for quantities (of raw materials, work in progress and finished goods) and one for costs.

(a) On the left-hand side of the process account i.e. Debit side, we record the inputs to the process and the cost of these inputs. So, we might show the quantity of material input to a process during the period and its cost, the cost of labour and the cost of overheads.

(b) On the right-hand side of the process account i.e. Credit side, we record what happens to the inputs by the end of the period.

  (i) Some of the input might be converted into finished goods, so we show the units of finished goods and the cost of these units.

  (ii) Some of the material input might evaporate or get spilled or damaged, so there would be losses. So, we record the loss units and the cost of the loss.

  (iii) At the end of a period, some units of input might be in the process of being turned into finished units so would be work in progress (WIP). We record the units of WIP and the cost of these units

The objective of process costing is to work out the cost of each process, transfer the same to the subsequent process and finally ascertain the total cost of production. Therefore, it is necessary to charge various costs to each process. For this, the factory is divided into distinct processes or operations and an account is kept of each process to which all the costs are debited.

Elements of Process Cost

The following are the elements of process cost, which are shown in the process accounts

- **Materials:** Raw materials required for each process is drawn from stores against material requisitions. Proper procedure like preparing and authorizing the requisition, pricing of the issues, return of materials to the stores, transfer of material from one process to another should be followed while issuing the materials. Cost of materials consumed should be computed as per the method employed for pricing of the issues and the cost should be debited to the process account.
- **Labour:** Wages paid to workers and supervisory staff should be charged to the particular process if they can be identified with it. If workers work on two or more processes, proper allocation should be made according to some basis like time spent on each process.
- **Direct Expenses:** If expenses are identifiable with a particular process, they should be charged to that process. For example, cost of electricity, depreciation may be charged directly to a process if they are identifiable with it.
- **Overheads:** By nature, overheads are indirect expenses and hence cannot be identified with a particular process. These expenses can be apportioned on some suitable basis and charged to the process.

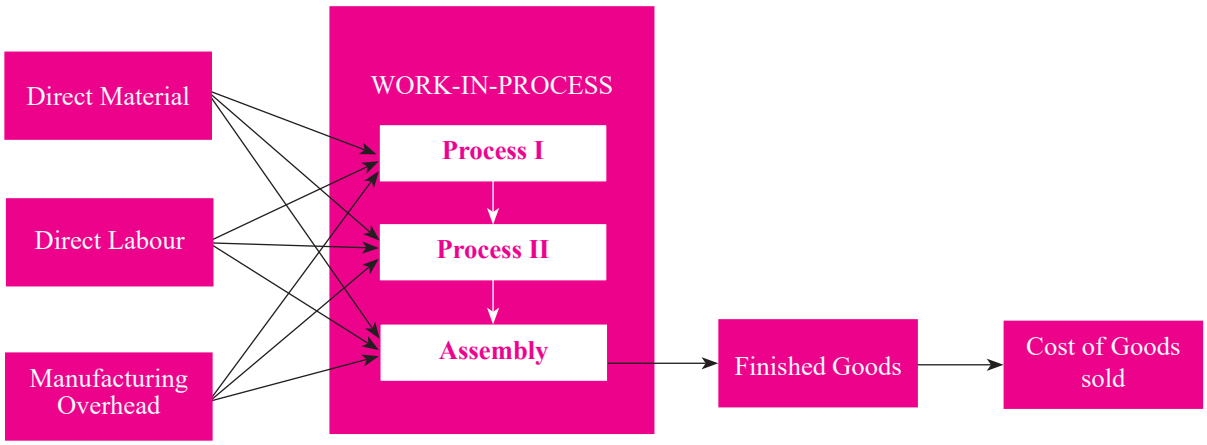

Figure 5.6: Preparation of Process Accounts

5.4.2 Losses in Process costing

Losses may occur in process. If a certain level of loss is expected, this is known as normal loss. If losses are greater than expected, the extra loss is abnormal loss. If losses are less than expected, the difference is known as abnormal gain. The following is one simple definition of the three important items

- Normal loss is the loss expected during a process.
- Abnormal loss is the extra loss resulting when actual loss is greater than normal or expected loss.
- Abnormal gain is the gain resulting when actual loss is less than the normal or expected loss.

[9] Normal loss has the effect of increasing the cost of the product as it is charged to the good units

Details of the above are given in the next few lines;

- **Losses:** During a production process, a loss may occur. If a certain level of loss is expected, this is known as normal loss. If losses are greater than expected, the extra loss is abnormal loss. If losses are less than expected, the difference is known as abnormal gain.
- **Normal Loss:** It is the loss which is unavoidable on account of inherent nature of production process. Such loss can be estimated in advance on the basis of past experience or available data. The normal process loss is recorded only in terms of quantity and the cost per unit of usable production is increased accordingly. Where scrap possesses some value as a waste product or as raw material for an earlier process, the value thereof is credited to the process account. This reduces the cost of normal output; process loss is shared by usable units.
- **Abnormal Loss:** Any loss caused by unexpected or abnormal conditions such as plants breakdown, sub-standard materials, carelessness, accident etc., or loss in excess of the margin anticipated for normal process loss should be regarded as abnormal process loss. Abnormal Loss Account is credited with realizable scrap value, if any. The balance is written off to Costing Profit and Loss Account.

  The units of abnormal loss or gain are calculated as under:

  $$\text{Abnormal loss (or gain)} = \text{Total Loss} - \text{Normal Loss}$$

  The valuation of abnormal loss should be done with the help of the formula below:

  Value of Abnormal Loss =

  $$\frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}} \times \text{Abnormal Loss Unit (ALU)}$$

> Abnormal loss is 'any loss in excess of the normal loss allowance'.
>
> CIMA Official Terminology

- **Abnormal Gain:** Normal loss is an estimate which is based on expectation in process industries in normal condition but slight differences are bound to occur between the actual and the anticipated losses of a process. These differences will not always represent increased loss, on occasions the actual loss will be less than that expected. Thus, when actual loss in a process is less than the expected, it results in an abnormal gain. The value of the gain will be calculated in similar manner to an abnormal loss. The Abnormal Gain Account is to be debited for the loss of income on account of less quantity of sale of scrap available as a result of Abnormal gain and Normal Process Loss Account credited accordingly. The balance is transferred to Costing Profit and Loss Account as abnormal gain.

  The valuation of abnormal gain should be done with the help of the formula below:

  Value of Abnormal Gain =

  $$\frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}} \times \text{Abnormal Gain Unit (AGU)}$$

> Abnormal gain is 'improvement on the accepted or normal loss associated with a production activity'.
>
> CIMA Official Terminology

Example: Abnormal Losses and Gains

Suppose the input to a process is 1,000 units at a cost of ₹4,500. Normal loss is 10% and there is no opening or closing inventories. Determine the accounting entries for the cost of output and the cost of the loss if actual output was

(i) 860 units (so that actual loss is 140 units)

(ii) 920 units (so that actual loss is 80 units)

Solution:

Before we demonstrate the use of the 'four-step framework' we will summarise the way that the losses are dealt with.

(a) Normal loss is given no share of cost.

(b) The cost of output is therefore based on the expected units of output, which in our example amount to 90% of 1,000 (Normal loss being 10%) = 900 units.

(c) Abnormal loss is given a cost, which is written off to the income statement via an abnormal loss/gain account.

(d) Abnormal gain is treated in the same way, except that being a gain rather than a loss, it appears as a debit entry in the process account (as it is a sort of input, being additional unexpected units), whereas a loss appears as a credit entry in this account (as it is a sort of output)

(i) Output is 860 units

Step 1 - Determine output and losses

If actual output is 860 units and the actual loss is 140 units:

	Units
Actual loss	140
Normal loss (10% of 1,000)	100
Abnormal loss	40

Step 2 - Calculate cost per unit of output and losses :

The cost per unit of output and the cost per unit of abnormal loss are based on expected output.

$$= \frac{\text{Cost Incurred}}{\text{Expected Output}} = \frac{₹\ 4,500}{900 \text{ units}} = ₹5 \text{ per unit}$$

Step 3 - Calculate total cost of output and losses

Normal loss is not assigned any cost.

	(₹)
Cost of output (860 × ₹ 5)	4,300
Normal loss	0
Abnormal loss (40 × ₹ 5)	200
Total Cost	4,500

Step 4 - Preparation of necessary accounts

Dr. Process Account Cr.

	Units	(₹)		Units	(₹)
To, Cost incurred	1,000	4,500	By Normal loss By Output (finished goods a/c) By Abnormal loss	100 860 40	0 4,300 200
	1,000	**4,500**		**1,000**	**4,500**

Dr. Abnormal Loss Account Cr.

	Units	(₹)		Units	(₹)
To, Process a/c	40	200	By P/L A/c	40	200

(ii) Output is 920 units

Step 1- Determine output and losses

If actual output is 920 units and the actual loss is 80 units:

	Units
Actual loss	80
Normal loss (10% of 1,000)	100
Abnormal gain	20

Step 2- Calculate cost per unit of output and losses:

The cost per unit of output and the cost per unit of abnormal gain are based on expected output.

$$= \frac{\text{Cost Incurred}}{\text{Expected Output}} = \frac{₹\ 4,500}{900\ \text{units}} = ₹5\ \text{per unit}$$

(Whether there is abnormal loss or gain does not affect the valuation of units of output. The figure of ₹ 5 per unit is exactly the same as in the previous paragraph, when there were 40 units of abnormal loss.)

Step 3- Calculate total cost of output and losses

	(₹)
Cost of output (920 × ₹ 5)	4,600
Normal loss	0
Abnormal gain (20 × ₹ 5)	(100)
	4,500

Step 4- Preparation of necessary accounts

Dr. Process Account Cr.

	Units	(₹)		Units	(₹)
To Cost incurred	1,000	4,500	By Normal loss	100	0
To Abnormal gain a/c	20	100	By Output (finished goods a/c)	920	4,600
	1,020	4,600		1,020	4,600

Dr. Abnormal Gain Account Cr.

	Units	(₹)		Units	(₹)
To P/L A/c	20	100	By Process a/c	20	100

Illustration: 24

A Product Passes through three Processes A, B and C. The details of expenses incurred on the three Processes during the year 2023 were as under:

Process	A	B	C
Unit issued / introduced	10,000		
Cost per unit ₹ 100	₹	₹	₹
Sundry Materials	10,000	15,000	5,000
Labour	30,000	80,000	65,000
Direct Expenses	6,000	18,150	27,200
Selling Price per unit of output	120	165	250

Management expenses during the year were ₹ 80,000 and selling expenses were ₹ 50,000. These are not allocable to the Processes.

Actual output of the three Processes was:

A – 9,3000 units, B – 5,400 units and C – 2,100 units. Two-thirds of the output of Process A and one-half of the output of process B was passed on to the next Process and the balance was sold. The entire output of Process C was sold.

The normal loss of the three Processes, calculated on the input of every Process was:

Process A – 5%; B – 15% and C – 20%.

The loss of Process A was sold at ₹2 per unit, that of B at ₹5 per unit and of Process C at ₹10 per unit.

Prepare the Three Process Accountants and the Profit and Loss Account.

Solution:

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Units introduced	10,000	100	10,00,000	By normal loss (5% of 10,000 units)	500	2	1,000
To Sundry Materials			10,000	By Abnormal Loss	200	110	22,000
To Labour			30,000	By Output transferred to Process B A/c	6,200	110	6,82,000
To Direct expenses			6,000	To P & L A/c	3,100	110	3,41,000
	10,000		10,46,000		10,000		10,46,000

$$\text{Cost per unit} = \frac{\text{Total Cost - Value of Normal Loss}}{\text{Input Quantity - Normal Loss Quantity}} = \frac{10,16,000 - 1000}{10,000 - 500} = ₹110$$

This rate is to be applied to abnormal loss and output.

Process B Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Output from A' A/c	6,200	110	6,82,000	By normal loss (15% of 6,200 units)	930	5	4,650
To Sundry Materials			15,000	By Output transferred to Process C A/c	2,700	150	4,05,000
To Labour			80,000	To P & L A/c	2,700	150	4,05,000
To Direct expenses			18,150				
	6,200		7,95,150				
To abnormal gain	130	150	19,500				
	6,330		8,14,650		6,330		8,14,650

$$\text{Cost per unit} = \frac{7,95,150 - 4,650}{6,200 - 930} = ₹150$$

This rate is to be applied to abnormal gain and output.

Process C Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Output from B	2,700	150	4,05,000	By normal loss (20% of 2,700 units)	540	10	5,400
To Sundry Materials			5,000	By Abnormal loss	60	230	13,800
To Labour			65,000	To P&L A/c	2,100	230	4,83,000
To Direct expenses			27,200				
	2,700		5,02,200		27,000		5,02,200

$$\text{Cost per unit} = \frac{5,02,200 - 5,400}{2,700 - 540} = \frac{4,96,800}{2,160} = ₹230$$

Profit and Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Process A	3,100	110	3,41,000	By Sales			
To Process B	2,700	150	4,05,000	Process A	3,100	120	3,72,000
To Process C	2,100	230	4,83,000	Process B	2,700	165	4,45,500
To Management Exp.			80,000	Process C	2,100	250	5,25,000
To Selling Expenses			50,000	By Abnormal gain (Note 2)			18,850
To Abnormal loss A/c (Note:1)			34,800	By Net loss			32,450
	7,900		13,93,800		7,900		13,93,800

Abnormal Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Process A	200	110	22,000	By Sales	200	2	400
To Process C	60	230	13,800	By Sales	60	10	600
				By P & L A/c			34,800
	260		35,800		260		35,800

Abnormal Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Normal Loss	130	5	650	By Process	130	150	19,500
To P & L A/c			18,850	By Sales			
	130		19,500		130		19,500

5.4.3 Inter Process Profits

The output of one process is transferred to the subsequent process at cost price. However sometimes, the transfer is made at cost plus certain percentage of profit. This is done when each process is treated as a profit center. In such case, the difference between the debit and credit side of the process account represents profit or loss and is transferred to the Profit and Loss Account. The stocks at the end and at the beginning contain an element of unrealized profits, which have to be written back in this method. If the profit element contained in the closing inventory is more than the profit element in the opening inventory, profit will be overstated and vice versa. Profit is realized only on the goods sold, thus to obtain the actual profit the main task would be to calculate the profit element contained in the inventories. In order to compute the profit element, in closing inventory and to obtain the net realized profit for a period, three columns have to be shown in the ledger for showing the cost, unrealized profit and the transfer price.

In certain instances, the output of a particular process is conveyed to the subsequent process by incorporating a specific percentage of profit, termed as inter-process profit. The fundamental rationale behind this approach is to bill the next process not at the transferor's cost but at its market selling price. This methodology aids in evaluating the profitability of each product. Conversely, it introduces challenges in assessing the value of closing stock and unrealized profit.

The determination of the provision for unrealized profit on closing stock for each process can be accomplished through a straightforward formula.

$$= \text{Value of Closing Stock} \times \frac{\text{Total Profit on the Process}}{\text{Total Cost to the Process}}$$

Illustration 25

The following illustration will be helpful to understand how to calculate the inter process profit.

A Product Passes through three Processes before it is transferred to Finished Stock. The following details for January 2023 are available:

Particulars	I	II	III	Finished Stock
Opening Stock	20,000	24,000	16,000	60,000
Direct Material	40,000	42,000	60,000	-
Direct Wages	30,000	30,000	32,000	-
Production Overheads	28,000	12,000	80,000	-
Closing Stock	10,000	12,000	8,000	30,000
Profit on Cost Sales	331/3%	25%	25%	-
Sales	-	-	-	7,00,000
Inter-Process Profit for Opening Stock	-	4,000	4,000	22,000

Stock in Process are valued at Prime Cost and Finished Stock at the Price at which it is received from Process III.

Find out the amount of Provision to be made to offset the inter-process profits added.

Solution:

Process I A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	20,000	-	20,000	By Process II A/c	1,08,000	36,000	1,44,000
To D/M	40,000	-	40,000				
To D/W	30,000	-	30,000				
	90,000		90,000				
Less: Closing Stock	10,000	-	10,000				
Prime cost	80,000	-	80,000				
To Production Overhead	28,000		28,000				
Total Cost	1,08,000		1,08,000				
Profit $33^{1}/_{3}$% on cost	-	36,000	36,000				
	1,08,000	36,000	1,44,000		1,08,000	36,000	1,44,000

Process II A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	20,000	4,000	24,000	By Process III A/c	2,02,000	98,000	3,00,000
To Process I	1,08,000	36,000	1,44,000				
To D/M	42,000	-	42,000				
To D/W	30,000	-	30,000				
	2,00,000	40,000	2,40,000				
Less: Closing Stock	10,000	2,000	12,000				
Prime Cost	1,90,000	38,000	2,28,000				
Production Overheads	12,000	-	12,000				
Total Cost	2,02,000	38,000	2,40,000				
Profit		60,000	60,000				
	2,02,000	98,000	3,00,000		2,02,000	98,000	3,00,000

Note: Profit on Closing Stock: $\frac{40,000}{2,40,000} \times 12,000 = 2,000$

Process III A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	12,000	4,000	16,000	By Process III A/c	3,80,000	2,20,000	6,00,000
To Process II	2,02,000	98,000	3,00,000				
To D/M	60,000	-	60,000				
To D/W	32,000	-	32,000				
	3,06,000	1,02,000	4,08,000				
Less: Closing Stock	6,000	2,000	8,000				
Prime Cost	3,00,000	1,00,000	4,00,000				
Production Overheads	80,000	-	80,000				
Total Cost	3,80,000	1,00,000	4,80,000				
Profit (25% on Cost)	-	1,20,000	1,20,000				
	3,80,000	2,20,000	6,00,000		3,80,000	2,20,000	6,00,000

Finished Stock A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	38,000	22,000	60,000	By Sales	3,99,000	3,01,000	7,00,000
To Process III	3,80,000	2,20,000	6,00,000				
	4,18,000	2,42,000	6,60,000				
Less: Closing Stock	19,000	11,000	30,000				
Total Cost	3,99,000	2,31,000	6,30,000				
Profit		70,000	70,000				
	3,99,000	3,01,000	7,00,000		3,99,000	3,01,000	7,00,000

Profit on Closing Stock = $\frac{2,42,000}{6,60,000} \times 30,000 = ₹11,000$

Statement showing the amount of provision to be made to offset the inter-process profits added

Process	Provision to be made
I	Nil
II	2,000
III	2,000
Finished stock	11,000
	15,000

Illustration 26

In a manufacturing unit, raw material passes through four processes, I, II, III, and IV and the output of each process is the input for the subsequent process. The losses in the four processes are 5%, 20%, 20% and 16 ⅔ % respectively. If the product at the end of the IV process is 40,000 kg, what is the quantity of raw material required at the beginning of Process I and the cost of the same is at ₹5 per kg?

Solution:

Suppose the output in Process I is 100 kg.

Statement of Production in Different Processes Based on Input of 100 kg in Process I

Particulars	Process I	Process II	Process III	Process IV
Input	100 Kg	75 Kg	60 Kg	48 Kg
Loss (%)	25	20	20	16 ⅔
Loss in kg	25	15	12	8
Output in kg (Input -Loss in kg)	75	60	48	40

If output in process IV is 40 kg, input in process I = 100 kg

If output in process IV is 40,000 kg, input in process I = [40,000 × 100]/40 = 1,00,000 kg

Cost of raw material required = 1,00,000 kg × ₹5 = ₹5,00, 000

Effect: The input is 2.5 times of the final output ($\frac{100\ kg}{40\ kg}$).

Therefore, for variation of every rupee in the cost of raw material the final effect will be ₹2.50

Equivalent Production:

Equivalent units are conceptual complete units that serve as a representation of unfinished work, facilitating the allocation of costs between work in progress and finished output. In other words, equivalent units are notional whole units which represent incomplete work, and which are used to apportion costs between work in process and completed output,

CIMA defines equivalent units as notional whole units representing uncompleted work. Used to apportion costs between work in progress and completed output, and in performance assessment.

The term 'equivalent production' represents a technique through which incomplete units are expressed (notionally) as completed units. As the incomplete units do not bear the same cost as completed units, it requires to be converted into their equivalent completed units for finding out the cost of process-both finished and unfinished units.

For example, if out of 3,000 units of closing stock, 1,000 units arc of 100% completion stage and the remaining 2.000 units are of 50% completion stage, the total closing stock should be calculated as:

Input (units)	Output	Units	Degree of completion	Equivalent Production (units)
(1)	(2)	(3)	(4)	(5) = (3) x (4)
3,000	Completely Processed	1,000	100%	1,000
	Incompleted units (i.e, W.I.P.)	2,000	50%	1,000
3,000	Total	3,000		2,000

Thus, though there are 3,000 incomplete units of closing stock, it should be treated as 2,000.

equivalent completed units for the purpose of evaluation. So, it represents the production of a process in terms of completed units.

Procedure of Evaluation

For transferring the number of units and its related cost the following steps are necessary:

- Step I. Ascertain the number of units introduced and finished.
- Step II. Convert the production into equivalent units after taking into consideration the process losses, opening/ closing work-in-progress with their degree of completion.
- Step III. Find out the total cost of material, labour and overheads.
- Step IV. Determine the cost per unit of equivalent production separately elementwise, by dividing each element of cost by its respective equivalent units.
- Step V. Finally, ascertain the cost of production including the cost of work-in-progress.

Thus, for solving the practical problem, three statements are required to be prepared

1. Statement of equivalent production.
2. Statement of Cost, and
3. Statement of Evaluation.

Methods of Calculation

To solve for equivalent production, the weighted average method or the first-in first-out method is generally used. The weighted average method does not take into account any inventory that might have been started in an earlier period and finished during the time period relevant to the calculations. The process involves several steps, including determining the number of units introduced and finished, converting the production into equivalent units, and ascertaining the cost of production, which includes the cost of work-in-progress. The equivalent units of production can be calculated by multiplying the total number of units to be produced by the percentage that has been produced. Additionally, the evaluation of equivalent production is usually made by preparing three statements: the statement of equivalent production, the statement of cost per equivalent unit, and the statement of evaluation.

- **Average Cost Method:** This approach combines the costs of opening inventory with the costs incurred in the current period, disregarding work completed in earlier periods. The objective is to treat all units finished during the period as if they were initiated and completed within the same timeframe. The cost of closing work-in-progress from the preceding period is added to the current period's cost, resulting in an average rate. This method is particularly useful when prices are fluctuating.

- **First-in-First-Out Method (FIFO):** According to this method, the work that commenced first is assumed to be completed first. It implies that the opening work-in-progress is completed and transferred before completing the current year's production. The cost of opening stock carried over from the previous period and the cost of units started and completed in the current period are calculated separately. This method distinguishes between work completed in the current and previous periods. Any closing stock of work-in-progress includes only units within the current year's production. To determine the total and unit costs for carried-over units at the beginning, the additional cost incurred to complete these units is added to the cost of the opening stock.

Illustration 27

From the following particulars, prepare the following in the books of X Ltd.

(i) Statement of equivalent production

(ii) Statement of apportionment of cost

(iii) Process Account

(a) Opening stock as on 1st August: 200 units @ ₹4 per unit

(b) Degree of completion: Materials 100%, Labour and Overheads: 40%

(c) Units introduced during August: 1,050 units & Output transferred to the next process: 1,100 units

(d) Closing stock: 150 units

(e) Degree of completion: Materials 100%, Labour and Overheads: 70%

(f) Other relevant information regarding the process,

(i) Materials: ₹3,150

(ii) Labour: ₹4,500

(iii) Overheads: ₹2,250

Solution:

Statement of Equivalent Production

Input Units	Particulars	Output Units	Material E. Units	% of Completion	Labor & Overheads E. Units	% of Completion
200	Opening Stock					
1,050	Units Introduced					
	Output					
	Completion of work on opening stock	200	-	-	120	60
	Units introduced and completed	900	900	100	900	100
	Closing stock	150	150	100	105	70
1,250		**1,250**	**1,050**		**1,125**	

*E. Units = Equivalent units

Statement of Cost of Each Element

Elements of Cost	Cost ₹	Equivalent Production	*Cost Per Unit ₹
Material	3,150	1,050	3
Labour	4,500	1,125	4
Overheads	2,250	1,125	2
Total	**9,900**		**9**

*Cost ÷ Equivalent units

Statement of Apportionment of Cost

Particulars	Elements	Equivalent Production	Cost Per Unit ₹	Cost ₹	Total ₹
1. Cost incurred to complete the work on Opening Stock	Material	-			
	Labour	120	4	480	720
	Overheads	120	2	240	
2. Units introduced and completed	Material	900	3	2,700	8,100
	Labour	900	4	3,600	
	Overheads	900	2	1,800	
3. Closing Stocks	Material	150	3	450	1,080
	Labour	105	4	420	
	Overheads	105	2	210	
					9,900

Dr. **Process Account** **Cr.**

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Opening Stock	200	800	By Transfer to next Process *	1,100	9,620

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
Units Introduced	1,050		Closing Stocks	150	1,080
Material		3,150			
Labour		4,500			
Overheads		2,250			
Total	**1,250**	**10,700**	**Total**	**1,250**	**10,700**

* Transfer to next process is calculated as shown under

- Cost incurred on opening stock already: ₹ 800
- Cost incurred to complete the opening work in progress [stock]: ₹ 720
- Cost of completion of units introduced in this process: ₹8,100. Total ₹ 9,620 (800 + 720 + 8100)

Illustration 28

The following particulars for Process II are given:

Particulars	Units	Amount (₹)
Transfer to Process II at cost	4,000	9,000
Direct Wages		2,000
Direct Material		3,000
Transfer to Finished Stock	3,240	

Factory overheads in process are absorbed at a rate of 400% of direct material. Allowance for Normal Loss is 20% of units worked. Scrap value of ₹ 5 per unit.

Evaluate the cost of transfer to finished stock. Using the information supplied above, show the amount of gain or loss in the process to be taken to Costing Profit and Loss Account.

Solution:

Dr. Process II Account Cr.

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	4,000	2.25	9,000	By Normal Loss A/c	800	5	4,000
To Direct Wages A/c			2,000	(4,000 × 20%)			
To Direct Materials A/c			3,000	By Balance c/d			
To Factor Overheads A/c (400% × ₹ 3,000)			12,000	($\frac{₹22,000}{3,200 \text{ units}}$ = ₹ 6.875)	3,200 (Bal. fig)	6.875	22,000
	4,000		**26,000**		**4,000**		**26,000**
To Balance b/d	3,200	6.875	22,000	By Finished Stock A/c	3,240	6.875	22,275
To Abnormal Gain A/c (Bal. fig)	40	6.875	275				
	3,240		**22,275**		**3,240**		**22,275**

Dr. **Abnormal Gain Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Normal Loss A/c	40	5	200	By Process II A/c	40	6.875	275
To Costing Profit & Loss A/c (Bal. fig)			75				
	40		**275**		**40**		**275**

Illustration 29

Product X is obtained after it passes through three distinct processes. You are required to prepare Process Account from the following information:

		Processes		
	Total	I	II	III
	Amount (₹)	Amount (₹)	Amount (₹)	Amount (₹)
Material	15,084	5,200	3,960	5,924
Direct Wages	18,000	4,000	6,000	8,000
Production Overheads	18,000	-	-	-

1,000 units @ ₹ 6 per unit was introduced in Process I. Production overheads to be distributed at 100% on direct wages.

Actual Output	Units	Normal Loss	Value of Scrap (₹ per unit)
Process I	950	5%	4
Process II	840	10%	8
Process III	750	15%	10

Prepare Process Account for I, II and III, Normal Loss Account, Abnormal Loss Account and Abnormal Gain Account

Solution:

Dr. **Process I Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material A/c (Introduced)	1,000	6	6,000	By Normal Loss A/c	50	4	200
To Material A/c			5,200	(1,000 × 5%)			
To Direct Wages A/c			4,000	By Process II A/c	950	20	19,000
To Production Overheads A/c (100% × Direct wages)			4,000	$(\frac{₹19,000}{950 \text{ units}} = ₹ 20)$ (Bal. fig.)			
	1,000		**19,200**		**1,000**		**19,200**

Dr. **Process II Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	950	20	19,000	By Normal Loss A/c	95	8	760
To Material A/c			3,960	(950 × 10%)			
To Direct Wages A/c			6,000	By Balance c/d	855	40	34,200
To Production Overheads A/c			6,000	(₹34,000 / 855 units = ₹ 40)			
	950		**34,960**		**950**		**34,960**
To Balance b/d	855	40	34,200	By Process III A/c	840	40	33,600
				By Abnormal Loss A/c (Bal. fig.)	15	40	600
	34,200		**34,200**		**855**		**34,200**

Dr. **Process III Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process II A/c	840	40	33,600	By Normal Loss A/c	126	10	1,260
To Material A/c			5,924	(840 × 15%)			
To Direct Wages A/c			8,000	By Balance c/d			
To Production Overheads A/c			8,000	(₹54,264 / 714 units = ₹ 76)	714	76	54,264
	840		**55,524**		**840**		**55,524**
To Balance b/d	714	76	54,264	By Finished Stock A/c	750	75	57,000
To Abnormal Gain A/c (Bal. fig.)	36	76	2,736				
	750		**57,000**		**750**		**57,000**

Dr. **Normal Loss Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	50	4	200	By Cash A/c	50	4	200
To Process II A/c	95	8	760	By Cash A/c	95	8	760
To Process III A/c	126	10	1,260	By Cash A/c (Bal. fig.)	90	10	900
				By Abnormal Gain A/c	36	10	360
	271		**2,220**		**271**		**2,220**

Dr. **Abnormal Loss Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process II A/c	15	40	600	By Cash A/c	15	8	120
				By Costing Profit & Loss A/c			480
	15		**600**		**15**		**600**

Dr. **Abnormal Gain Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Normal Loss A/c	36	10	360	By Process III A/c	36	76	2,736
To Costing Profit & Loss A/c (Bal. fig.)			2376				
	36		**2,736**		**36**		**2,736**

Illustration 30

A product passes through three Processes – A, B and C. 10,000 units at a cost of ₹ 1.10 were issued to Process A. The other direct expenses were as follows:

	Process – A Amount (₹)	Process – B Amount (₹)	Process – C Amount (₹)
Sundry materials	1,500	1,500	1,500
Direct Labour	4,500	8,000	6,500
Direct Expenses	1,000	1,000	1,503

The wastage of Process – A was 5% and in Process – B was 4%.

The wastage of Process A was sold at ₹ 0.25 per unit and that of Process B at ₹ 0.50 per unit and that of Process C at ₹ 1.00.

The overheads charges were 160% of direct labour. The final product was sold at ₹ 10 per unit fetching a profit of 20% on sales. Find out the percentage of wastage in Process C.

Solution:

Dr. **Process A Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	10,000	1.10	11,000	By Normal Loss A/c	500	0.25	125
To (Additional) Material A/c			1,500	(10,000 × 5%)			
To Direct Labour A/c			4,500	By Process B A/c	9,500	2.64	25,075
To Direct Expenses A/c			1,000	($\frac{₹25,075}{9,500 \text{ units}}$ =₹ 2.64)			
To Overheads A/c (160% × 4,500)			7,200	(Bal. fig.)			
	10,000		**25,200**				**25,200**

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process A A/c	9,500	2.64	25,075	By Normal Loss A/c	380	0.50	190
To Material A/c			1,500	(9,500 × 4%)			
To Direct Labour A/c			8,000	By Process C A/c	9,120	5.28	48,185
To Direct Expenses A/c			1,000	($\frac{₹48,185}{9,120 \text{ units}}$ =₹ 5.28)			
To Overheads A/c (160% × 8,000)			12,800	(Bal. fig.)			
	9,500		**48,375**		**9,500**		**48,375**

Dr. **Process C Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process B A/c	9,120	5.28	48,185	By Normal Loss A/c	696	1	696
To Material A/c			1,500	(WN 1) [9120×7.63%]			
To Direct Labour A/c			6,500	By Finished Stock A/c	8,424	8	67,392
To Direct Expenses A/c			1,503	($\frac{₹97,392}{8,424 \text{ units}}$ = ₹ 8) (Bal. fig.)			
To Overheads A/c (160% × 6,500)			10,400				
	9,120		**68,088**		**9,120**		**68,088**

Computation of percentage of waste in Process C

	(₹)
Sales Price per unit	10
Less: Profit @ 20%	2
Cost Price p.u	8

Let the number of units of normal loss in Process C be x

∴ Value of Scrap of Process C = x × 1 = ₹ x

or, Total Cost = Value of Scrap + Value of Finished Goods

or, Total Cost = Value of Scrap + (Units Introduced-Normal Loss in units) × 8

or, 68,088 = x + (9,120 - x) × 8

or, 68,088 = x + 72,960 - 8x

or, x = $\frac{4,872}{7}$ = 696

∴ Percentage of Normal Loss = $\frac{696}{9,120}$ × 100 = 7.63%

Illustration 31

	Degree of completion	
Opening stock	1,600 units	Material 70% Labour 60% Overheads 60%
Transfer from Process I Transfer to next process Units scrapped	10,200 units 9,200 units 800 units	
Normal Loss 10% of Input Closing stock	1,800 units	Material 60% Labour 40% Overheads 40%

Prepare a Statement of Equivalent Production.

Solution:

Statement of Equivalent Production.

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overheads	
				% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	1,600	Op. WIP	1,600	30	480	40	640	40	640
Units Introduced	10,200	Normal Loss	1,000	-	-	-	-	-	-
		Finished Goods (Introduced & Completed)	7,600	100	7,600	100	7,600	100	7,600
		Cl. WIP	1,800	60	1,080	40	720	40	720
			12,000		**9,160**		**8,960**		**8,960**
		Less: Abnormal Gain	200	100	200	100	200	100	200
	11,800		**11,800**		**8,960**		**8,760**		**8,760**

Normal Loss = $\frac{10}{100}$ × (Op.WIP + Units Introduced - Cl.WIP) = $\frac{10}{100}$ × (1,600 + 10,200 -1,800) = 1,000 units

Transfer to Next Process = 9,200 units (given)

Work done on Op. WIP and Completed = 1,600 units

Work done on units introduced and completed (9,200 – 1,600) = 7,600 units

Illustration 32

From the following information compute (i) Equivalent Production (ii) Statement of apportionment of cost, (iii) Prepare Process Account.

	Stage of completion
Work in progress (opening) 200 units @ ₹ 4 per unit	100% Material 40% Labour and Overheads
Units introduced 1,050 Transfer to next process 1,100 units Closing stock 150 units	100% Material 70% Labour and Overheads

Other information	Amount (₹)
Material Cost	1,050
Labour	2,250
Production Overheads	1,125
	4,425

Solution:

(i) Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overheads	
				% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	200	Op. WIP	200	-	-	60	120	60	120
Units Introduced	1,050	Finished Goods (Introduced & completed)	900	100	900	100	900	100	900
		Cl. WIP	150	100	150	70	105	70	105
	1,250		**1,250**		**1,050**		**1,125**		**1,125**

Transfer to Next Process = 1,100 units (given)

Work done on Op. WIP and Completed = 200 units

Work done on units introduced and completed (1,100 – 200) = 900 units

(ii) Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	1,050	1,050	1
Labour	2,250	1,125	2
Production Overheads	1,125	1,125	1

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	150	1	150
Labour	105	2	210
Production Overheads	105	1	105
			465

(iii) Dr. Process Account Cr.

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	200	4	800	By Closing Stock, A/c	150	$\frac{465}{150}$ =3.10	465
To Material A/c	1,050	1	1,050				
To Labour A/c			2,250			$\frac{4,760}{1,100}$ = 4.33	4,760
To Production Overheads A/c			1,125	By Finished Stock A/c	1,100		
	1,250		**5,225**		**1,250**		**5,225**

Working Note:

Checking the transfer value of the Finished Stock

Element	Units	Cost per unit (₹)	Total Cost (₹)
Op. Stock Material	200	4	800
Work done on Op. WIP			
Labour	120	2	240
Production Overheads	120	1	120
Units Introduced and Completed			
Material	900	1	900
Labour	900	2	1,800
Production Overheads	90	1	900
			4,760

Illustration 33

From the following information prepare Process Account.

Opening Stock		Degree of Completion
800 units @ ₹ 6 per unit	₹ 4,800	Material I – 100% Material II – 60% Labour and Overheads – 40%
Transfer from Process – I 12,000 units costing Transfer to next Process	 ₹ 16,350 9,700 units	
Normal Process Loss Closing stock	10% 1,800 units	

Degree of completion: For units scrapped: Material - 100%, Labour and Overheads – 50%.

For closing stock: Material I – 100%, Material II - 60%, Labour and Overheads – 50%

Scrap realized ₹ 1.00 per unit.

Other information: Material ₹ 10,500, Labour ₹ 20,760, Overheads ₹ 16,670.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material I		Material II		Labour & Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	800	Op. WIP	800	-	-	40	320	60	480
Units Introduced	12,000	Normal Loss	1,100	-	-	-	-	-	-
		Finished Goods (Introduced & Completed)	8,900	100	8,900	100	8,900	100	8,900
		Cl. WIP	1,800	100	1,800	60	1,080	50	900
			12,600		**10,700**		**10,300**		**10,280**
		Abnormal Loss (Bal. fig.)	200	100	200	100	200	50	100
	12,800		**12,800**		**10,900**		**10,500**		**10,380**

Normal Loss $= \frac{10}{100} \times$ (Op.WIP+Units Introduced - Cl.WIP) $= \frac{10}{100} \times$ (800+12,000 - 1,800)

= 1,100 units

Transfer to Next Process = 9,700 units (given)

Work done on Op. WIP and Completed = 800 units

Work done on units introduced and completed (9,700 – 800) = 8,900 units

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material I	16,350	10,900	1.50
Material II	10,500	10,500	1.00
Labour	20,760	10,380	2.00
Overheads (16,670 - 1,100)	15,570	10,380	1.50

Cost of Overheads	₹ 16,670
Less: Scrap Realised	₹ 1,100
	₹ 15,570

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material I	1,800	1.50	2,700
Material II	1,080	1.00	1,080
Labour	900	2.00	1,800
Overheads	900	1.50	1,350
			6,930

Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material I	200	1.50	300
Material II	200	1.00	200
Labour	100	2.00	200
Overheads	100	1.50	150
			850

Dr. **Process Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock	800	6	4,800	By Normal Loss A/c	1,100	1	1,100
To Material I A/c	12,000		16,350	By Closing Stock A/c	1,800	$\frac{6,930}{1,800} = 3.85$	6,930
To Material II A/c			10,500	By Abnormal Loss A/c	200	$\frac{850}{200} = 4.25$	850
To Labour A/c			20,760	By Finished Stock A/c	9,700	$\frac{60,200}{9,700} = 6.206$	60,200
To Overheads A/c			16,670				
	12,800		**69,080**		**12,800**		**69,080**

Illustration 34

SM Ltd., furnished you the following information relating to Process B for the month of October, 2021.

(i) Opening work in progress – Nil

(ii) Units introduced – 10,000 units @ ₹ 3 per unit

(iii) Expenses debited to the process: Direct Materials - ₹ 14,650; Labour - ₹ 21,148; Overheads - ₹ 42,000

(iv) Finished output – 9,500 units

(v) Closing work in progress – 350 units; Degree of completion: Material – 100%, Labour and Overheads – 50%

(vi) Normal Loss in process – One percent of input

(vii) Degree of completion of Abnormal Loss: Material – 100%, Labour and Overheads – 80%

(viii) Units scrapped as normal loss were sold at ₹ 1 per unit

(ix) All the units of abnormal loss were sold at ₹ 2.50 per unit

Prepare:

(a) Statement of Equivalent Production

(b) Statement of Cost

(c) Process B Account

(d) Abnormal Loss Account

Solution:

(a) Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material		Labour		Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Units Introduced	10,000	Normal Loss	100	-	-	-	-	-	-
		Finished Goods (Transferred)	9,500	100	9,500	100	9,500	100	9,500
		Cl. WIP	350	100	350	50	175	50	175
			9,950		**9,850**		**9,675**		**9,675**
		Abnormal Loss	50	100	50	80	40	80	40
	10,000		**10,000**		**9,900**		**9,715**		**9,715**

Normal Loss = 1% × 10,000 = 100 units

(b)

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	44,550	9,900	4.50
Labour	21,148	9,715	2.1768
Overheads	42,000	9,715	4.3232
			11

Particulars	Amount (₹)
Material Introduced (1,000 × 3)	30,000
Additional Material	14,650
	44,650
Less: Scrap Realised from Normal Loss (100 × 1)	100
	44,550

(c)

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	10,000	3	30,000	By Normal Loss A/c	100	1	100
To Material (Additional) A/c			14,650	By Closing Stock A/c	350	$\frac{2,713}{350} = 7.75$	2,713
To Labour A/c			21,148	By Abnormal Loss A/c	50	$\frac{485}{50} = 9.70$	485
To Overheads A/c			42,000	By Finished Stock A/c	9,500	$\frac{1,04,500}{9,500} = 11$	1,04,500
	10,000		**1,07,798**		**10,000**		**1,07,798**

Working Notes:

1. Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	350	4.50	1,575.00
Labour	175	2.1768	380.94
Overheads	175	4.3232	756.56
			2,712.50
			≈ 2,713

2. Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	50	4.50	225.000
Labour	40	2.1768	87.072
Overheads	40	4.3232	172.928
			485.000

Illustration 35

AB Ltd is engaged in process Engineering Industry. During the month of April, 2022, 2,000 units were introduced in Process X. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to Process Y. 460 incomplete units and 140 units after passing through fully the entire process, had to be scrapped. The incomplete units had reached the following stage of completion.

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

Following are the further information on the Process X

	Amount (₹)
Cost of the 2,000 units	58,000
Additional Direct Material	14,400
Direct Labour	33,400
Overheads	16,700

Units scrapped realized ₹ 10 each. Prepare Statement of Equivalent Production, Statement of Cost, Statement of Evaluation and the Process X Account.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material		Labour		Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Units Introduced	2,000	Normal Loss	100	-	-	-	-	-	-
		Finished Goods (Transferred)	1,400	100	1,400	100	1,400	100	1,400
		Cl. WIP	460	75	345	50	230	50	230
			1,960		**1,745**		**1,630**		**1,630**
		Abnormal Loss	40	100	40	80	40	100	40
	2,000		**2,000**		**1,785**		**1,670**		**1,670**

Normal Loss = 5% × 2,000 = 100 units

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	71,400	1,785	40
Labour	33,400	1,670	20
Overheads	16,700	1,670	10

Particulars	Amount (₹)
Material Introduced	58,000
Additional Material	14,400
	72,400
Less: Scrap Realised from Normal Loss (100 x 10)	1,000
	71,400

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	345	40	13,800
Labour	230	20	4,600
Overheads	230	10	2,300
			20,700

Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	40	40	1,600
Labour	40	20	800
Overheads	40	10	400
			2,800

Dr. **Process X Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material	2,000	29	58,000	By Normal Loss A/c	100	10	1,000
(Introduced) A/c				By Closing Stock A/c	460	$\frac{20,700}{460} = 45$	20,700
To Material			14,400				
(Additional) A/c				By Abnormal Loss A/c	40	$\frac{2,800}{40} = 70$	2,800
To Direct Labour			33,400	By Finished Stock A/c	1,400	$\frac{98,000}{1,400} = 70$	98,000
A/c							
To Overheads A/c			16,700				
	2,000		1,22,500		2,000		1,22,500

Illustration 36

The product of a manufacturing unit passes through two distinct processes. From the past experience the incidence of wastage is ascertained as under:

Process A 2%

Process B 10%

In each case the percentage of wastage is computed on the number of units entering the process concerned. The sales realisation of wastage in Process A and Process B are ₹ 25 per 100 units and ₹ 50 per 100 units respectively.

The following information is obtained for the month of April, 2022; 40,000 units of crude material were introduced in Process A at a cost of ₹ 16,000.

Particulars	Process A	Process B
	Amount (₹)	Amount (₹)
Other Materials	16,000	5,000
Direct Labour	9,000	8,000
Direct Expenses	8,200	1,500
	Units	**Units**
Output	39,000	36,500
Finished Product Stock:		
April 1	6,000	5,000
April 30	5,000	8,000
Value of stock per unit on April 1st	₹ 1.20	₹ 1.60

Stocks are valued and transferred to subsequent process at weighted average costs. Prepare respective Process Accounts and Stock Accounts.

Solution:

Dr. **Process A Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	40,000	0.40	16,000	By Normal Loss A/c	800	0.25	200
To Material (Additional) A/c			16,000	(40,000 × 2%)			
To Direct Labour A/c			9,000				
To Direct Expenses A/c			8,200	By Balance c/d	39,200	1.25	49,000
				$(\frac{₹49,000}{39,200} = ₹1.25)$			
	40,000		**49,200**				**49,200**
To Balance b/d	39,200	1.25	49,000	By Abnormal Loss A/c	200	1.25	250
				By Process A Finished Stock A/c	39,000	1.25	48,750
	39,200		**49,000**		**39,200**		**49,000**

Dr. **Process A Finished Stock Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	6,000	1.20	7,200	By Process B A/c	40,000	1.243	49,733
To Process A A/c	39,000	1.25	48,750	$(\frac{₹55,950}{45,000} = ₹1.243)$			
				By Closing Stock A/c	5,000	1.243	6,217
	45,000		55,950				55,950

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process A Finished Stock A/c	40,000	1.243	49,733	By Normal Loss A/c (40,000 × 10%)	4,000	0.50	2,000
To Other Material A/c			5,000				
To Direct Labour A/c			8,000				
To Direct Expenses A/c			1,500	By Balance c/d ($\frac{₹62,233}{36,000}$ = ₹1.7287)	36,000	1.7287	62,233
	40,000		**64,233**		**40,000**		**64,233**
To Balance b/d	36,000	1.7287	62,233	By Process B Finished Stock A/c	36,500	1.7287	63,097
To Abnormal Gain A/c	500	1.7287	864				
	36,500		**63,097**		**36,500**		**63,097**

Dr. **Process B Finished Stock Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	5,000	1.60	8,000	By Finished Stock A/c (or transfer to next process) ($\frac{₹71,097}{41,500 \text{ Units}}$ = ₹1.713)	33,500	1.713	57,392
To Process B A/c	36,500	1.7287	63,097				
				By Closing Stock A/c	8,000	1.713	13,705
	41,500		**71,097**		**41,500**		**71,097**

Illustration 37

The following information is obtained in respect of Process III of the month of August:

Opening Stock	1,000 units
Value	Direct Material I - ₹ 390; Direct Material II - ₹ 75;
	Direct Labour - ₹ 112; Production Overheads - ₹ 118
Process II transfer	6,000 units at ₹ 2,360
Process IV transfer	4,700 units
Direct Material added in process	₹ 520
Direct Labour employed	₹ 1,036
Production Overheads	₹ 1,541
Units scrapped	300 units
Degree of completion	Direct Material - 100%
	Direct Labour – 80%
	Production Overheads – 60%

Closing Stock	2,000 units
Degree of completion	Direct Material – I 100%
	Direct Material - II 60%
	Direct Labour - 50%
	Production Overheads - 40%

Normal Loss: 5% of Production; units scrap realized ₹ 0.20 each

Prepare Process Account on Weighted Average Method.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units							
Items	Units	Items	Units	Material I		Material II		Labour		Overheads	
Items	Units	Items	Units	%C	Units	% C	Units	%C	Units	%C	Units
Op. WIP	1,000	Normal Loss*	250	-	-	-	-	-	-	-	-
Transfer from		Transfer to Process IV	4,700	100	4,700	100	4,700	100	4,700	100	4,700
Process II	6,000	Cl. WIP	2,000	100	2,000	60	1,200	50	1,000	40	800
			6,950		**6,700**		**5,900**		**5,700**		**5,500**
		Abnormal Loss	50	100	50	100	50	80	40	60	30
	7,000		**7,000**		**6,750**		**5,950**		**5,740**		**5,530**

% C - % Completion

*Normal Loss = 5% × Production = 5% x (Op. WIP + Transfer from Process I – Cl. WIP)

= 5% × (1,000 + 6,000 – 2,000) = 5% × 5,000 = 250 units

Statement of Cost per unit

Particulars	Amount (₹) Op. WIP + Introduced	Equivalent Units	Cost per unit (₹)
Material – I	390 + 2,360 – 50 = 2,700	6,750	0.40
Material – II	75 + 520 = 595	5,950	0.10
Labour	112 + 1,036 = 1,148	5,740	0.20
Overheads	118 + 1,541 = 1,659	5,530	0.30

	₹
Material I (390 + 2,360)	2,750
Less: Scrap Realised from Normal Loss (250 × 0.20)	50
	2,700

Dr. **Valuation of Closing Stock** **Cr.**

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material – I	2,000	0.40	800
Material – II	1,200	0.10	120
Labour	1,000	0.20	200
Overheads	800	0.30	240
			1,360

Dr. **Valuation of Abnormal Loss** **Cr.**

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material – I	50	0.40	20
Material – II	50	0.10	5
Labour	40	0.20	8
Overheads	30	0.30	9
			42

Process III Account

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Op. Stock A/c (390 + 75+ 112+118)	1,000	0.695	695	By Normal Loss A/c	250	0.20	50
To Process II A/c (Transfer)	6,000	0.393	2,360	By Closing Stock A/c	2,000	$\frac{1,360}{2,000}$ = 0.68	1,360
To Material A/c			520	By Abnormal Loss A/c	50	$\frac{42}{50}$ = 0.84	42
To Labour A/c			1,036				
To Overheads A/c			1,541	By Finished Stock A/c or, (Transfer to Next process)	4,700	$\frac{4,700}{4,700}$ = 1	4,700
	7,000		**6,152**		**7,000**		**6,152**

5.4.4 Joint Product and By-Product

Joint products are two or more products separated in a process each of which has a significant value compared to the other.

Joint products are two or more products which are output from the same processing operation, but which are indistinguishable from each other up to their point of separation.

> Joint products are 'two or more products produced by the same process and separated in processing, each having a sufficiently high saleable value to merit recognition as a main product'.
>
> CIMA Official terminology

Joint products:

Joint products are two or more products that are simultaneously produced from a common input or set of inputs, and they typically share common production processes up to a certain point. These products emerge as distinct and

identifiable items during the manufacturing or processing of a particular raw material. The key features of joint products include:

- Common Inputs: Joint products arise from the same raw materials or inputs. These inputs undergo a common production process until a certain stage, after which they diverge into separate products.
- Simultaneous Production: Joint products are produced at the same time and within the same production process. They are not produced sequentially or separately.
- Independent Identity: Each joint product has its own independent identity and can be sold as a separate and distinct product.
- Separable and Marketable: Joint products must be separable from each other, meaning they can be identified and quantified independently. Additionally, each product must be marketable, meaning there is a demand for it in the market.
- Common Costs Up to Split-off Point: Joint products share common costs up to a specific point in the production process known as the "split-off point." Beyond this point, the products become distinct, and any further processing costs are specific to each product.

Example

In the refining process, crude oil is processed up to a certain point known as the split-off point, where the different products become identifiable and can be separated. Each of these products has its own distinct characteristics, uses, and market demand, making them separate and marketable entities. The costs incurred in the common refining process up to the split-off point are considered joint costs. The primary joint products, in this case, include:

- Gasoline: This is a fuel used in internal combustion engines, such as those found in cars and motorcycles.
- Diesel: Diesel fuel is used in diesel engines, commonly found in trucks, buses, and some cars.
- Jet Fuel: Used for powering aircraft.
- Lubricants: Oils and greases that are used for lubricating engines and machinery.
- Petroleum Gas (Propane and Butane): Used for heating, cooking, and as fuel for certain vehicles.

By-products:

A by-product is an incidental product from a process which has an insignificant value compared to the main product(s). It may be said to be a supplementary or secondary product (arising as the result of a process) whose value is small relative to that of the principal product.

> A by-product is 'output of some value produced incidentally while manufacturing the main product'.
>
> CIMA Official terminology

A by-product is a product which is similarly produced at the same time and from the same common process as the 'main product' or joint products. The distinguishing feature of a by-product is its relatively low sales value in comparison to the main product. In the timber industry, for example, by-products include sawdust, small offcuts and bark.

Joint product and By product – a contrast

Feature	Joint Product	By-Product
Definition	Two or more products derived from a common input or production process.	A secondary product that is produced alongside the main product but is not the primary focus of production.

Simultaneous Production	Produced at the same time within the same production process.	Produced concurrently but may not share the exact same production process.
Independence of Identity	Each product has its own independent identity and can be sold separately.	The primary product is the main focus, and the by-product is typically of lesser importance.
Separability	Products are separable and can be identified and quantified independently.	Main product is the primary focus, and the by-product may not be easily separable or marketable.
Value Independence	The value of one product is independent of the quantities of other products.	The value of the by-product may be dependent on the main product's production.
Examples	Products from oil refining (gasoline, diesel, jet fuel).	Sawdust from lumber milling, which is a by-product when producing lumber.

Accounting for joint products

The point at which joint and by-products become separately identifiable is known as the split-off point or separation point. Costs incurred up to this point are called common costs or joint costs. Common or joint costs need to be allocated (apportioned) in some manner to each of the joint products. In the following sketched example, there are two different split-off points. A pictorial representation is given below:

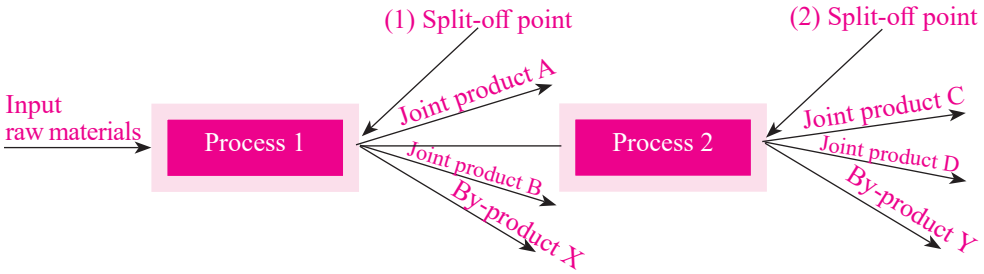

Figure 5.7: Joint Products & By-products

Methods for allocation of joint cost

In case of joint products, the main objective of accounting of the cost is to apportion the joint costs incurred up to the split off point. The manufacturing process is same up to a certain stage and after crossing that stage, each product has distinct manufacturing process. The total cost of production of the joint product will be cost incurred up to the split off point duly apportioned plus the cost incurred after the split off point. The cost after the split off point can be identified easily. The following methods are adopted for apportionment of joint cost:

(i) **Physical Quantity Method:** Under this method, cost apportionment is made in proportion to the volume of production. These physical measures may be units, pounds, litres, kilos, tonnes, gallons etc. The following example will clarify the point:

Product	Quantity – kg	Production to total	Cost allocated	Cost per kg
A	30,000	1/2	₹1,80,000	₹6
B	20,000	1/3	₹1,20,000	₹6
C	10,000	1/6	₹60,000	₹6
Total	**60,000**		**₹3,60,000**	**₹6**

(ii) Average Unit Cost Method: Under this method, the joint cost is apportioned to the joint products by computing the average unit cost of the product units. The average unit cost is computed by dividing the total manufacturing cost by the total number of units produced of all products. This method is useful where all the products produced are uniform with each other in all the respects. This method will not be useful if the production units are not similar with each other.

(iii) Weighted Average Method: Under this method, weights are assigned to each unit based upon size of the units, difference in type of labour employed, material consumption, market share, efforts of labour required and so on. The joint cost is apportioned on the basis of the weights assigned to each product. This method is highly useful if the weights assigned are on objective basis. If subjective element creeps in, the method may not give accurate results.

(iv) Selling Price Method: Under this method, the joint cost is apportioned on the basis of sales value at the split off point. The logic is that a product should bear the share of the joint cost according to its sale price. If sales price is higher than that of the other products, more share of joint cost should be charged to that product and if it is comparatively less than that of other products, less share of joint cost should be charged to the same. Though logically this method seems to be sound, in practice, charging higher share of joint cost to the product with higher sales value may not be justified due to the fact that lesser efforts are required for manufacturing of the same.

Accounting for by-products

Despite the fact that the by-product has a small value relative to that of the main product, it does have some commercial value and its accounting treatment usually consists of one of the following:

(a) Income (minus any post-separation further processing or selling costs) from the sale of the by-product may be added to sales of the main product, thereby increasing sales revenue for the period.

(b) The sales of the by-product may be treated as a separate, incidental source of income against which are set only post-separation costs (if any) of the by-product. The revenue would be recorded in the income statement as 'other income'.

(c) The sales income of the by-product may be deducted from the cost of production or cost of sales of the main product.

(d) The net realisable value of the by-product may be deducted from the cost of production of the main product. The net realisable value is the final saleable value of the by-product minus any post-separation costs.

The choice of method will be influenced by the circumstances of production and ease of calculation, as much as by conceptual correctness. The most common method is Net Realisable Value. Notice that this method is the same as the accounting treatment of a normal loss which is sold for scrap.

Illustration 38

XY Ltd manufacturers Product A which yields two By-Products B and C. The actual joint expenses of manufacturing for a period were ₹ 8,200. The profits on each product as a percentage of sales are $33\frac{1}{3}$%, 25% and 15% respectively. Subsequent expenses are as follows:

Particulars	Products		
	'A' Amount (₹)	'B' Amount (₹)	'C' Amount (₹)
Material	100	75	25
Direct Labour	200	125	50
Overheads	150	125	75
	450	**325**	**150**
Sales	6,000	4,000	2,500

Apportion the joint expenses.

Solution:

Statement Showing Apportionment of Joint Expenses

Particulars	'A' Amount (₹)	'B' Amount (₹)	'C' Amount (₹)	Total ₹
	Products	By Products	By Products	
Sales	6,000	4,000	2,500	12,500
Less: Profit	$33\frac{1}{3}\% \times 6,000 = 2,000$	$25\% \times 4,000 = 1,000$	$15\% \times 2,500 = 375$	3,375
Total Cost	4,000	3,000	2,125	9,125
Less: Separate Expenses	450	325	150	925
Share of Joint Cost	**3,550**	**2,675**	**1,975**	**8,200**

Illustration 39

A chemical process yields 60% of the material introduced as main Product A and By-Product B - 15%, By-Product C - 20% and 5% being the wastage.

The ratio of absorption of Raw Material and Labour in the process products is as follows:

(i) One unit of Product C requires half the raw material required for one unit of Product B; one unit of Product A requires $1\frac{1}{2}$ time the raw material required for Product B.

(ii) Product A requires double the time needed for the production of one unit of Product B and one unit of Product C.

(iii) Product C requires half the time required for the production of one unit of Product B.

(iv) Overheads are to be absorbed in the ratio of 6 : 1 : 1.

(v) Cost Data: Input 1,000 units of cost ₹ 4,600
Direct Labour ₹ 4,100
Overheads ₹ 6,000

Calculate cost of distribution between the above products.

Solution:

Production of Main Product A = 1,000 × 60% = 600 units

Production of By-Product B = 1,000 × 15% = 150 units

Production of By-Product C = 1,000 × 20% = 200 units

Wastage = 1,000 × 5% = 50 units

Statement Showing Apportionment of Joint Cost

Element of Cost	Basis of Apportionment	Total	Main Product A	By-Product B	By-Product C
Material	*18 : 3 : 2	4,600	3,600	600	400
Labour	#36 : 3 : 2	4,100	3,600	300	200
Overheads	6 : 1 : 1	6,000	4,500	750	750

Working Note:

***Basis of Apportionment of Material**

Let By-Product B requires x units of material

then Main Product A requires 1.5x units of material

and By-Product C requires 0.5x units of material

∴ Ratio of apportionment for each unit = 1.5x : x : 0.5x or,3:2:1

∴ Ratio of apportionment for total units of production = 600 × 3 : 150 × 2 : 200 × 1

= 1,800 : 300 : 200 or, 18 : 3 : 2

#Basis of Apportionment of Labour

Let By-Product B requires y hours of labour

then By-Product C requires 0.5y hours of labour

and Main Product A requires 2 × (y + 0.5y) = 3y

∴ Ratio of apportionment for each unit = 3y:y:0.5y

or,6:2:1

∴ Ratio of apportionment for total units of production = 600 × 6 : 150 × 2 : 200 × 1

= 3,600 : 300 : 200 or, 36 : 3 : 2

Illustration 40

The following data have been extracted from the books of M/s. Southern Coke Co. Ltd

Joint Products	Yield in kg of Recovered Products Per Tonne of Coal
Coke	1,420
Coal Tar	120
Benzol	22
Sulphate of Ammonia	26
Gas	412
	2,000

The price of coal is ₹ 80 per tonne. The direct labour and overheads costs to the point of split-off are ₹ 40 and ₹ 60 respectively per tonne of coal. Calculate the material, labour and total cost of each product on the basis of weight.

Solution:

Statement Showing Calculation of Material, Labour and Overheads Cost of Each Product

Element	Total ₹ / tonne	Coke = $\frac{1,420}{2,000}\times100$ =71%	Coal Tar = $\frac{120}{2,000}\times100$ = 6%	Benzol = $\frac{22}{2,000}\times100$ = 1.1%	Sulphate = $\frac{26}{2,000}\times100$ = 1.3%	Gas = $\frac{412}{2,000}\times100$ = 20.6%
Material	80.00	56.80	4.80	0.88	1.04	16.48
Labour	40.00	28.40	2.40	0.44	0.52	8.24
Overheads	60.00	42.60	3.60	0.66	0.78	12.36
Total	**180.00**	**127.80**	**10.80**	**1.98**	**2.34**	**37.08**

Illustration 41

A factory engaged in the production of Chemical X and in the course of manufacture in a By-Product – Y is produced which after a separate process has a commercial value. Following are the information for the month of March:

	Joint Expenses	Separate Expenses	
	₹	X ₹	Y ₹
Materials	10,000	2,000	2,800
Labour	4,000	2,500	2,500
Overheads	2,500	1,400	1,000

The output for the month was 150 quintals of X and 50 quintals of Y. the selling price of product Y is ₹ 200 per quintal. The profit on product Y is $33\frac{1}{3}\%$ on cost price. Prepare an Account to show the cost of X per quintal.

Solution:

	Joint Expenses	Separate Expenses	
	₹	X ₹	Y ₹
Materials	10,000	2,000	2,800
Labour	4,000	2,500	2,500
Overheads	2,500	1,400	1,000
	16,500	5,900	6,300
			₹
Sales Price of Product Y (50 quintals × ₹ 200)			10,000
Less: Profit $\left(10,000 \times \frac{33\frac{1}{3}\%}{133\frac{1}{3}\%}\right)$			2,500
Cost			7,500
Less: Separate Expense of Y			6,300
Share of Joint Expense of Y			1,200

∴ Share of Joint Expense of Product X = ₹ 16,500 - ₹ 1,200 = ₹ 15,300

Dr. **Joint Expense Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	10,000	By Product X A/c	15,300
To Labour A/c	4,000	By Product Y A/c	1,200
To Overheads A/c	2,500		
	16,500		16,500

Dr. **Product X Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	2,000	By Cost of Production A/c	21,200
To Labour A/c	2,500	(@ ₹ 21,200 / 150 quintals = ₹ 141.33)	
To Overheads A/c	1,400		
To Joint Expense A/c	15,300		
	21,200		21,200

Dr. **Product Y Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	2,800	By Cost of Production A/c	7,500
To Labour A/c	2,500	(@ ₹ 7,500 / 50 quintals = ₹ 150)	
To Overheads A/c	1,000		
To Joint Expense A/c	1,200		
	7,500		7,500

Illustration 42

In manufacturing the main Product 'A', a company processes the resulting waste material into two By-Products B and C. Using reversal cost method of By-Products, prepare a comparative profit and loss statement of the three products from the following data:

(i) Total cost up to separation point was ₹ 68,000

	A	B	C
(ii) Sales (all production)	₹ 1,64,000	₹ 16,000	₹ 24,000
(iii) Estimated net profit % to Sale Value	-	20%	30%
(iv) Estimated Selling Expenses as % of Sales Value	20%	20%	20%
(v) Costs after separation	-	₹ 4,800	₹ 7,200

Solution:

Allocation of Joint Cost to Product B and Product C

	Product B (₹)	Product C (₹)
Sales	16,000	24,000
Less: Profit	20% × 16,000 = 3,200	30% × 24,000 = 7,200
Total Cost	12,800	16,800
Less: Selling Expenses	20% × 16,000 = 3,200	20 % × 24,000 = 4,800
	9,600	**12,000**
Less: Cost after Separation	4,800	7,200
Share in Joint Cost	**4,800**	**4,800**

∴ Share in Joint Cost of Product A = 68,000 – (4,800 + 4,800) = ₹ 58,400

Comparative Profit and Loss Statement

Particulars	Product A (₹)	Product B (₹)	Product C (₹)	Total (₹)
Sales (A)	1,64,000	16,000	24,000	2,04,000
Joint Cost	58,400	4,800	4,800	68,000
Cost After Separation	-	4,800	7,200	12,000
Selling Expenses	32,800	3,200	4,800	40,800
Total Cost (B)	91,200	12,800	16,800	1,20,800
Profit (A – B)	72,800	3,200	7,200	83,200

Selling Expense of Product A = 20% × 1,64,000 = ₹ 32,800

Illustration 43

The progressive manufacturing company manufactures one main product and two By-Products. Data for a month are shown below:

Particulars	Main Product	By-Product A	By-Product B
Sales	1,50,000	12,000	7,000
Manufacturing Cost:			
(a) Before separation	75,000	-	-
(b) After separation	23,000	2,200	1,800
Administration Cost	12,000	1,500	1,000
Ratio of Distribution of Selling Cost	85%	10%	5%
Net Profit in Sales	20%	15%	10%

Assuming no beginning and ending inventories, apportion the joint cost among Main Product and the By-Products.

Solution:

Calculation of Selling Expenses

Particulars		₹
Total Sales (1,50,000+12,000+7,000)		1,69,000
Less: Profit (1,50,000 × 20%+12,000 × 15%+7,000 × 10) (30,000 + 1,800 + 700)		32,500
Total Cost		1,36,500
Less: Administration Cost (12,000 + 1,500 + 1,000)	14,500	
After Separation (23,000 + 2,200 + 1,800)	27,000	
Joint Cost (Before seperation)	75,000	1,16,500
Selling Expenses		20,000

Selling Expenses of Product A $= \frac{85}{100} \times 20{,}000 =$ ₹ 17,000

Selling Expenses of By-Product B $= \frac{10}{100} \times 20{,}000 =$ ₹ 2,000

Selling Expenses of By-Product C $= \frac{5}{100} \times 20,000 = ₹\ 1,000$

Statement Showing Apportionment of Joint Cost

Particulars	Main Product (₹)	By-Product A (₹)	By-Product B (₹)	Total (₹)
Sales	1,50,000	12,000	7,000	1,69,000
Less: Profit	30,000	1,800	700	32,500
Total Cost	1,20,000	10,200	6,300	1,36,500
Less: Administration Cost	12,000	1,500	1,000	14,500
Selling Expenses	17,000	2,000	1,000	20,000
Cost after Separation	23,000	2,200	1,800	27.000
Share of Joint Cost	68,000	4,500	2,500	75,000

Illustration 44

In a factory producing joint products of two varieties, the following data are extracted from the books:

	Total (₹)
Sales of products X and Y	7,50,000
Direct Material	2,25,000
Direct Labour	1,10,000
Variable Overheads (150% on Labour)	1,65,000
Fixed Overheads	2,00,000

The analysis of sales reveals that the percentage of sale of product X is $66\frac{2}{3}\%$. Management contemplates to process further joint products so that they could be sold at higher rates. Facilities for this are available. The additional expenditure for the further process and total sales anticipated at higher selling prices are given below. Make recommendations presenting the effect of the proposal.

Particulars	Product X Amount (₹)	Product Y Amount (₹)	Total Amount (₹)
Sales after further processing	6,00,000	3,00,000	9,00,000
Additional Material	50,000	20,000	70,000
Additional Direct Labour	20,000	8,000	28,000

Solution:

Particulars	Product X Amount (₹)	Product Y Amount (₹)	Total Amount (₹)
Sales after further processing	6,00,000	3,00,000	9,00,000
Sales at split off point	$66\frac{2}{3}\% \times 7,50,000 = 5,00,000$	$33\frac{1}{3}\% \times 7,50,000 = 2,50,000$	7,50,000
Incremental Sales (A)	1,00,000	50,000	1,50,000

Incremental Cost			
Material	50,000	20,000	70,000
Labour	20,000	8,000	28,000
Variable Overheads (150% on Labour)	30,000	12,000	42,000
Total Incremental Cost (B)	1,00,000	40,000	1,40,000
Incremental Profit (A – B)	Nil	10,000	10,000

It is recommended to further process Product Y because there is incremental profit of ₹ 10,000 whereas Product X need not be further processed because there is no incremental profit.

Product Y sales $= 100\% - 66\frac{2}{3}\%$

$= 33\frac{1}{3}\%$

Illustration 45

A vegetable oil refining company obtains four products whose cost details are:

Joint costs of the four products: ₹ 8,29,600

Outputs: A – 5,00,000 litres; B – 10,000 litres; C – 5,000 litres and D – 9,000 kgs

Further processing costs: A - ₹ 2,40,000; B - ₹ 48,000; C – Nil and D - ₹ 8,030.

The products can be sold as intermediates i.e., at split-off point without further processing. The sale prices are:

	As Finished Product	As Intermediate
A ₹ per litre	1.84	1.20
B ₹ per litre	8.00	4.00
C ₹ per litre	6.40	6.40
D ₹ per kg	26.67	24.00

(a) Calculate the product-wise profit allocating joint costs on Net Realisable Value (NRV)

(b) Compare the profitability in selling the products with and without further processing.

Solution:

(a) Statement showing Computation of Profit after further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 litres	10,000 litres	5,000 litres	9,000 kg	
Selling Price p.u.	₹ 1.84	₹ 8.00	₹ 6.40	₹ 26.67	
Sales after further Processing (₹)	9,20,000	80,000	32,000	2,40,030	12,72,030
Less: Post Separation Cost	2,40,000	48,000	Nil	8,030	2,96,030
Net Realisable Value (NRV)	6,80,000	32,000	32,000	2,32,000	9,76,000
Less: Joint Cost (WN 1)	5,78,000	27,200	27,200	1,97,200	8,29,600
Profit	1,02,000	4,800	4,800	34,800	1,46,400

(b) Statement Showing Computation of Profit before further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 litres	10,000 litres	5,000 litres	9,000 kg	
Selling Price p.u.	₹ 1.20	₹ 4.00	₹ 6.40	₹ 24.00	
Sales before further Processing (₹)	6,00,000	40,000	32,000	2,16,000	8,88,000
Less: Joint Cost (WN 1) (₹)	5,78,000	27,200	27,200	1,97,200	8,29,600
Profit (₹)	22,000	12,800	4,800	18,800	58,400

Statement of the profitability in selling the products with and without further processing.

	Particulars	A	B	C	D	Total
i.	Profit after further Processing (₹)	1,02,000	4,800	4,800	34,800	1,46,400
ii.	Profit before further Processing (₹)	22,000	12,800	4,800	18,800	58,400
iii.	Incremental Profit / (Loss) (i. – ii.) (₹)	80,000	(8,000)	Nil	16,000	88,000

Product A and Product D should be further processed, because there is incremental profit whereas Product B and Product C should not be further processed.

Working Note

1. Allocation of Joint Cost on NRV basis

$$\text{Share of Joint Cost for Product A} = \frac{6,80,000}{9,76,000} \times 8,29,600 = ₹\ 5,78,000$$

$$\text{Share of Joint Cost for Product B} = \frac{32,000}{9,76,000} \times 8,29,600 = ₹\ 27,200$$

$$\text{Share of Joint Cost for Product C} = \frac{32,000}{9,76,000} \times 8,29,600 = ₹\ 27,200$$

$$\text{Share of Joint Cost for Product D} = \frac{2,32,000}{9,76,000} \times 8,29,600 = ₹\ 1,97,200$$

Illustration 46

T Ltd., in the course of refining crude oil obtains four joints products A, B, C and D. The total cost till the split off point was ₹ 97,600. The output and sales in the year 2021 were as follows:

Product	Output (units)	Sales Amount (₹)	Separate Costs Amount (₹)
A	5,00,000	1,15,000	30,000
B	10,000	10,000	6,000
C	5,000	4,000	-
D	9,000	30,000	1,000

You are required:

(a) Calculate the net income for each of the products if the joint costs are apportioned on the basis of net realisable value of the different products.

(b) What would be the net income of the company from each product if it decides to sell the products at the spit off point itself A @ 15 paise, B @ 50 paise, C @ 80 paise and D @ 3 per unit.

(c) In case the company expects to operate at the same level of production and sales in the year 2022 could the company increase the net income by altering its processing decision? If so, what would be the expected overall net income? Which product should be sold at split off? Assume that all costs incurred after split off are variable.

Solution:

(a) Statement showing Computation of Profit after further Processing

Particulars	A	B	C	D	Total
Sales after further Processing (₹)	1,15,000	10,000	4,000	30,000	1,59,000
Less: Post Separation Cost	30,000	6,000	Nil	1,000	37,000
Net Realisable Value (NRV)	85,000	4,000	4,000	29,000	1,22,000
Less: Joint Cost (WN 1)	68,000	3,200	3,200	23,200	97,600
Profit / (Loss)	17,000	800	800	5,800	24,400

(b) Statement Showing Computation of Profit before further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 units	10,000 units	5,000 units	9,000 units	
Selling Price p.u.	₹ 0.15	₹ 0.50	₹ 0.80	₹ 3.00	
Sales before further Processing (₹)	75,000	5,000	4,000	27,000	1,11,000
Less: Joint Cost (WN 1)	68,000	3,200	3,200	23,200	97,600
Profit / (Loss)	7,000	1,800	800	3,800	13,400

Statement of the profitability in selling the products with and without further processing.

	Particulars	A	B	C	D	Total
i.	Profit after further Processing (₹)	17,000	800	800	5,800	24,400
ii.	Profit before further Processing (₹)	7,000	1,800	800	3,800	13,400
iii.	Incremental Profit / (Loss) (i. – ii.)	10,000	(1,000)	Nil	2,000	11,000

Product A and Product D should be further processed, because there is incremental profit whereas Product B and Product C should not be further processed.

(c) Computation of Profit after implementing the decision

	(₹)
Product A (Profit after further processing)	17,000
Product B (Profit before further processing)	1,800
Product C (Profit before further processing)	800
Product D (Profit after further processing)	5,800
Overall Profit	25,400

Working Note

1. Allocation of Joint Cost based on Net Realisable Value

$$\text{Share of Joint Cost for Product A} = \frac{85,000}{1,22,000} \times 97,600 = ₹\ 68,000$$

$$\text{Share of Joint Cost for Product B} = \frac{4,000}{1,22,000} \times 97,600 = ₹\ 3,200$$

$$\text{Share of Joint Cost for Product C} = \frac{4,000}{1,22,000} \times 97,600 = ₹\ 3,200$$

$$\text{Share of Joint Cost for Product D} = \frac{29,000}{1,22,000} \times 97,600 = ₹\ 23,200$$

Illustration 47

Beauty soap, company manufactures four different brands of soaps namely Komal, Lovely, Makeup and Nice. The data on production and sale of these brands during 2022 is reproduced below:

Brand Name	Komal	Lovely	Makeup	Nice
Production & Sales (units)	3,00,000	5,00,000	70,000	40,000
Sale Value (₹) in lakhs	15	31	2.8	1.2

All the above soaps are manufactured jointly up to a particular process. At split off point they are formed into cake-sand packed. The annual cost data were as under.

Direct Material Cost ₹ 30 lakhs

Value added ₹ 20 lakhs

(Sales includes profit at 25% on total cost)

Out of the above brands, Makeup is sold in unpacked condition without further processing while the other 3 brands further processed at an additional cost as follows:

Komal ₹ 1,20,000

Lovely ₹ 1,30,000

Nice ₹ 50,000

You are required to:

(a) Work out the profit and cost of each brand of soap after allocating joint cost on the basis of Net Realisable value at split up point. (per unit cost not required).

(b) Find out revised cost and profit on each brand if the company decides to sell all soaps at split up point at following prices; Komal ₹ 4.50; Lovely ₹ 6.00; Makeup ₹ 4.00 and Nice ₹ 1.50 per unit.

Assume that for allocation of joint cost Net Realisable Value Method is used.

(c) With the working results in (a) and (b) above, advice Beauty Soap Company about the processing decision as to which soap to be sold at split off point and which to be processed further so as to maximise profit. Substantiate your decision with suitable costing technique.

Solution:

Calculation of Joint Cost

Particulars	Amount (₹)
Sales	
- Komal	15,00,000
- Lovely	31,00,000
- Makeup	2,80,000
- Nice	1,20,000
Total Sales	50,00,000
Less: Profit = $50,00,000 \times \frac{25}{125}$	*10,00,000
Total Cost	40,00,000
Less: Post Separation Cost (1,20,000 + 1,30,000 + 50,000)	3,00,000
Joint Cost	37,00,000

or, *Cost + Profit = Sales

or, Cost + $\frac{25}{125}$ × Cost = 50,00,000

or, $\frac{100 \text{ Cost} + 25 \text{ Cost}}{100} = 50,00,000$

or, Cost = $50,00,000 \times \frac{100}{125}$ = ₹ 40,00,000

and, Profit = 50,00,000 – 40,00,000 = ₹ 10,00,000

(a) Statement showing Computation of Profit after further Processing

Particulars	Komal	Lovely	Makeup	Nice	Total
Sales after further Processing (₹)	15,00,000	31,00,000	2,80,000	1,20,000	50,00,000
Less: Post Separation Cost	1,20,000	1,30,000	-	50,000	3,00,000

Net Realisable Value (NRV)	13,80,000	29,70,000	2,80,000	70,000	47,00,000
Less: Joint Cost (WN 1)	10,86,383	23,38,085	2,20,426	55,106	37,00,000
Profit	2,93,617	6,31,915	59,574	14,894	10,00,000

(b) Statement Showing Computation of Profit before further Processing

Particulars	Komal	Lovely	Makeup	Nice	Total
Output	3,00,000 units	5,00,000 units	70,000 units	40,000 units	
Selling Price p.u.	₹ 4.50	₹ 6.00	₹ 4.00	₹ 1.50	
Sales before further Processing (₹)	13,50,000	30,00,000	2,80,000	60,000	46,90,000
Less: Joint Cost (WN 1)	10,86,383	23,38,085	2,20,426	55,106	37,00,000
Profit	2,63,617	6,61,915	59,574	4,894	9,90,000

(c) Statement of the profitability in selling the products with and without further processing.

	Particulars	Komal	Lovely	Makeup	Nice	Total
i.	Profit after further Processing (₹)	2,93,617	6,31,915	59,574	14,894	10,00,000
ii.	Profit before further Processing (₹)	2,63,617	6,61,915	59,574	4,894	9,90,000
iii.	Incremental Profit / (Loss) (i. – ii.)	30,000	(30,000)	Nil	10,000	10,000

Product Komal and Product Nice should be further processed, because there is incremental profit whereas Product Lovely and Product Makeup should not be further processed.

Working Note

1. Allocation of Joint Cost based on Net Realisable Value

$$\text{Share of Joint Cost for Product Komal} = \frac{13,80,000}{47,00,000} \times 37,00,000 = ₹\ 10,86,383$$

$$\text{Share of Joint Cost for Product Lovely} = \frac{29,70,000}{47,00,000} \times 37,00,000 = ₹\ 23,38,085$$

$$\text{Share of Joint Cost for Product Makeup} = \frac{2,80,000}{47,00,000} \times 37,00,000 = ₹\ 2,20,426$$

$$\text{Share of Joint Cost for Product Nice} = \frac{70,000}{47,00,000} \times 37,00,000 = ₹\ 55,106$$

Illustration 48

In the course of manufacture of the Main Product 'P' By-Products 'A' and 'B' also emerge. The joint expenses of manufacture amount to ₹ 1,19,550. All the three products are processed further after separation and sold as per details given below:

	Main Product	By-Products	
	P	A	B
Sales	₹ 90,000	₹ 60,000	₹ 40,000
Cost incurred after separation	₹ 6,000	₹ 5,000	₹ 4,000
Profit as percentage of sales (%)	25	20	15

Total fixed selling expenses are 10% of total cost of sales which are apportioned to the three products in the ratio of 20 : 40 : 40.

(a) Prepare a statement showing the apportionment of joint costs to the Main Product and the two By-Products.

(b) If the By-Product A is not subjected to further processing and is sold at the point of separation for which there is a market, at ₹ 58,500 without incurring any selling expenses. Would you advise its disposal at this stage? Show the workings.

Solution:

(a) Statement showing apportionment of Joint Costs

Particulars	Main Product 'P'	By-Product 'A'	By-Product 'B'	Total
	(₹)	(₹)	(₹)	(₹)
Sales	90,000	60,000	40,000	1,90,000
Less: Profit (WN – 1)	22,500	12,000	6,000	40,500
Cost of Sales	67,500	48,000	34,000	1,49,500
Less: Selling Expenses (WN – 2)	2,990	5,980	5,980	14,950
Post Separation Cost	6,000	5,000	4,000	15,000
Share of Joint Cost	58,510	37,020	24,020	1,19,550

(b) Statement showing Profit of By-Product 'A' if sold at split of point

	(₹)
Sale Price of By-Product 'A' at split off point	58,500
Less: Share of Joint Cost of By-Product A	37,020
Profit of By-Product 'A' if sold at spit off point	21,480

Profit of By-Product 'A' if sold at split off point ₹ 21,480

Profit of By-Product 'A' if sold after further processing ₹ 12,000

It is better to sell By-Product 'A' at split off point because it gives more profit ₹ 21,480 against profit after processing ₹ 12,000.

Working Notes:

1. Calculation of Profit

Particulars	Main Product 'P'	By-Product 'A'	By-Product 'B'
	(₹)	(₹)	(₹)
Profit	25% × 90,000 = 22,500	20% × 60,000 = 12,000	15% × 40,000 = 6,000

2. Calculation of Selling Expense

Total Selling Expense = 10% × Cost of Sales = 10% × 1,49,500 = ₹ 14,950

$\therefore$ Selling Expense of Main Product 'P' = $\frac{20}{100}$ × 14,950 = ₹ 2,990

Selling Expense of By-Product 'A' = $\frac{40}{100}$ × 14,950 = ₹ 5,980

Selling Expense of By-Product 'B' = $\frac{40}{100}$ × 14,950 = ₹ 5,980

Illustration 49

"If the products are truly joint products the cost of the process can be applied to these products".

(i) On the basis of the weight or other physical quantity of each product.

(ii) In respect of the marginal cost of the process on the basis of physical quantities and in respect of fixed costs of the process on the basis of the contribution made by the various products.

(iii) On the basis of selling values of the different products.

Illustrate the above statement by using the following figures in respect of joint production of A and B for a month.

Total Cost:	Direct Material			₹ 5,000
	Direct Labour			₹ 3,000
	Variable Overheads			₹ 2,000
	Fixed Overheads			₹ 2,000
	Sales	A	100 Quintals	@ ₹ 80 per quintal
	Sales	B	150 Quintals	@ ₹ 40 per quintal

Solution:

(i)

Computation of Profit after distributing Joint Cost on the basis of weight

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Joint Cost	$\frac{100 \text{ Qtls}}{250 \text{ Qtls}}$ × ₹12,000 = 4,800	$\frac{150 \text{ Qtls}}{250 \text{ Qtls}}$ × ₹12,000 = 7,200	12,000
Profit / (Loss)	3,200	(1,200)	2,000

(ii)

Computation of Profit after distributing Marginal Cost on the basis of Weight and Fixed Cost on the basis of Contribution

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Variable Cost ₹ (5,000+3,000+2,000)	$\frac{100\ Qtls}{250\ Qtls} \times 10,000 = 4,000$	$\frac{150\ Qtls}{250\ Qtls} \times 10,000 = 6,000$	10,000
Contribution	4,000	Nil	4,000
Less: Fi × ed Cost	$\frac{4000}{4000} \times 2000 = 2,000$	$\frac{0}{4000} \times 2000 = 0$	2,000
Profit	2,000	Nil	2,000

(iii)

Computation of Profit after distributing Joint Cost on the basis of Sales

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Joint Cost	$\frac{8,000}{14,000} \times 12,000 = 6,857$	$\frac{6,000}{14,000} \times 12,000 = 5,143$	12,000
Profit	1,143	857	2,000

Operating Costing – Transport, Hotel and Healthcare

5.5

Through Cost Accounting is traditionally associated with manufacturing companies, it is applicable for service companies as well. In the modern competitive market, with the increased importance of service sector[1], the need for cost accounting has also increased. The costing method applied in these (service) industries is known as 'Operating Costing'.

The term service costing or operating costing refers to the computation of the total operational cost incurred per unit unit of the intangible product. These intangible products or services can be either in the form of internal services that are carried out by industries as supporting activities for the manufacturing of goods, or in the way of external services that are offered as a significant product to the customers by the service sector companies.

> Operating costing is that form of operation costing which applies where standardized services are provided either by an undertaking or by a service cost centre within an undertaking.
>
> CIMA Terminology

5.5.1 What are service organisations?

Service organizations are entities that primarily engage in the delivery of intangible products or services rather than tangible goods. Unlike manufacturing or product-oriented businesses, service organizations focus on providing services to meet the needs and demands of their clients or customers. These organizations play a crucial role in various sectors of the economy, including finance, healthcare, education, hospitality, consulting, and more.

Examples of service organizations include banks, insurance companies, healthcare, schools, consulting firms, hotels, and transportation services. The success of service organizations often depends on the quality of the customer experience, effective communication, and the ability to meet or exceed customer expectations.

Key characteristics of service organizations:

The following are the peculiar characteristics of service costing.

1. Intangibility: Services are intangible, meaning they cannot be touched, felt, or seen before they are consumed. This characteristic poses challenges in terms of marketing and quality assurance.
2. Inseparability: Services are often produced and consumed simultaneously. In many cases, the customer is involved in the service delivery process, making the provider and the consumer inseparable during the service encounter.
3. Perishability: Unlike physical goods, services cannot be stored or inventoried for future use. They are perishable in the sense that they must be consumed at the time of production.

1 Within a short span of 50 years since independence, the contribution of the service sector in India to the country's GDP is a lion's share of over 60%. Service Sector in India – Statistics and Overview | Invest India

4. Heterogeneity: Services are variable and can differ from one service encounter to another. Factors such as the service provider, the customer, and the context can influence the quality and nature of the service.
5. Lack of Ownership: Customers do not own services; they are essentially purchasing the benefits or outcomes of the service. This lack of ownership distinguishes services from tangible products.

Service costing Vs job/batch/contract/process costing

This table provides a concise overview of the key differences between service costing and job/batch/contract/process costing in terms of the nature of output, unit of measurement, costing method, and customization. The key differences between service costing and job/batch/contract/process costing are presented below;

Aspect	Service Costing	Job/Batch/Contract/Process Costing
Nature of Output	Intangible services	Tangible goods
Unit of Measurement	Time (e.g., per hour, per consultation)	Physical units (e.g., products, batches, contracts)
Costing Method	Focuses on costs of providing services	Allocates costs to specific jobs, batches, contracts, or processes
Customization	Services are often customized	Goods may be standardized or customized

Unit Cost Measure

Service costing involves determining unit costs for different business elements in the service industry. The primary challenge associated with service costing lies in the complexity of defining a practical cost unit that accurately reflects the value of the service rendered. Often, the adoption of a composite cost unit may be considered more suitable. These cost units can range from "Per Bed-Day" for hospitals to "Per Passenger-Kilometer" for passenger transport. The unique and specialized nature of services offered by different organizations contributes to the complexity of ascertaining the cost per unit in service costing.

The following table summarizes the difference between cost unit and composite cost unit.

Cost Unit: A cost unit is a standard measure used in cost accounting to quantify and analyze costs associated with a specific product, service, or activity. It represents the basis for calculating the cost of production or delivery. The choice of a cost unit depends on the nature of the business and the specific context of cost analysis.

Example of Cost Unit:

- In a manufacturing setting, the cost unit could be the cost per unit of a product, the cost per batch, or the cost per production run.
- In a service industry, the cost unit might be the cost per service hour, cost per transaction, or cost per project. The following table specifies various cost unit in various service organisations

Service	Cost Unit
Road, rail and air transport services	Passenger/mile or kilometer, ton/mile, tonne/kilometer
Hotels	Occupied bed-night
Education	Full-time student
Hospitals	Patient
Catering establishment	Meal served

Composite Cost Unit:

A composite cost unit is an aggregate measure that combines various cost elements into a single unit for comprehensive cost analysis. It provides a holistic view by incorporating all relevant costs associated with a particular product, service, or activity.

- In manufacturing, a composite cost unit for a product might include direct materials, direct labor, and overheads costs.
- In a service industry, a composite cost unit might involve combining labor costs, material costs, and overheads costs associated with providing a specific service. (in the above table, the cost unit in respect of transport and hotels are composite cost unit).

Examples of composite cost units used in service costing are as follows:

- The cost per room per day. This is a useful unit cost in the hotel services industry.
- The cost per passenger mile or the cost per passenger kilometer (= the average cost of transporting a passenger for one mile or one kilometer). This unit measure of cost is used by transport companies that provide bus or train services.

  This may be computed in two ways.
  - Absolute (Weighted Average) basis
  - Commercial (Simple Average) basis

In both bases of computation of service cost unit, weightage is also given to qualitative factors rather quantitative (which are directly related with variable cost elements) factors alone.

Weighted Average or Absolute basis – It is summation of the products of qualitative and quantitative factors.

Examples

- The cost per patient/day (= the average cost of treating one patient for one day) or the cost per hospital bed/day (= the cost of maintaining one hospital bed in a hospital for one day). These costs are used by health service providers.
- The cost per man day. This unit cost is widely used in professional services, such as auditing, legal services and consultancy services

Simple Average or Commercial basis –It is the product of average qualitative and total quantitative factors.

For example, in case of goods transport, Commercial Ton-Km is arrived at by multiplying total distance km., by average load quantity.

The formula to compute cost unit under service costing is:

$$\text{Average cost per unit of service} = \frac{\text{Total costs incurred in the period}}{\text{Number of service units supplied in the period}}$$

Example

Lorry starts with a load of 20 MT of Goods from Station 'A'. It unloads 8 MT in Station 'B' and balance goods in Station 'C'. On return trip, it reaches Station 'A' with a load of 16 MT, loaded at Station 'C'. The distance between A to B, B to C and C to A are 80 Kms, 120 Kms and 160 Kms, respectively. Compute "Absolute MT- Kilometer" and "Commercial MT – Kilometer"

Solution

- Absolute basis: MT-Kilometer: = (20MT × 80 Kms) + (12 MT× 120 Kms) + (16 MT×160 Kms)
  = 1,600 + 1,440 + 2,560
  = 5,600 MT-Kilometer
- Commercial basis: MT-Kilometer: = [{(20+12+16)/3} MT × {(80+120+160) Kms]
  = 16 MT×360 Kms
  = 5,760 MT–Kilometer

Calculating the cost per unit of service

The cost of a service unit is (or composite cost unit) is calculated as follows.

$$\text{Cost per unit of service} = \frac{\text{Total costs of the service}}{\text{Number of units of service}}$$

Total costs are the costs of direct materials, direct labour and direct expenses, plus a charge for overheads (unless marginal costing is used to cost the services). This is summed as

a. Fixed or standing charges

b. Variable or running charges

c. Semi variable charges (this is to be segregated into fixed or standing charges and variable or running charges)

Example

A hotel has 80 standard twin-bedded rooms. The hotel is fully-occupied for each of the 350 days in each year that it is open. The total costs of running the hotel each year are ₹ 33,60,000. What would be a useful measure of the cost of providing the hotel services?

Answer

A useful unit cost is the cost per room/day. This is the average cost of maintaining one room in the hotel for one day.

Rooms per day per year = 80 rooms × 350 days = 28,000

$$\text{Cost per room per day} = \frac{₹\ 33,60,000}{28000} = ₹\ 120.$$

Example

A train company operates a service between two cities, Kolkata and Siliguri. The distance between the cities is 400 Kilometer. During the previous year, the company transported 200,000 passengers from Kolkata to Siliguri and 175,000 passengers from Siliguri to Kolkata. The total costs of operating the service were ₹ 60 million.

What would be a useful measure of the cost of providing the train service between the two cities?

Answer

A useful unit cost is the cost per passenger/mile. This is the average cost of transporting one passenger for one kilometer.

Passenger per Kilometre per year = (2,00,000 × 400) + (1,75,000 × 400) = 150 million.

$$\text{Cost per passenger per kilometre} = \frac{₹\ 6,00,00,000}{150000000} = ₹\ 0.40.$$

The methods of computing costs in service organisations is discussed here with special reference to Transport, Hotel and Hospital Sectors:

5.5.2 Transport Sector

Transport undertakings include goods transport organisations as well as passenger transport organisations. The cost unit is either ton kilometer or passenger kilometer. The meaning is cost of carrying one ton over a distance of one kilometer or cost of carrying one passenger for a distance of one kilometer. The costs are shown under the following heads:

I. **Standing Charges or Fixed Costs:** These are the fixed costs, which remain constant irrespective of the distance travelled. These costs include the following costs:

(a) License fees and insurance
(b) Salaries of drivers, cleaners and conductors
(c) Garage costs which include garage rent and other relevant expenses
(d) Depreciation of the vehicle and other assets
(e) Taxes applicable
(f) Any other fixed charge like administrative expenses etc.

II. **Variable Costs or Running Costs:** These costs include:
(a) Petrol and diesel
(b) Lubricating oil
(c) Grease
(d) Any other variable costs

III. **Maintenance Charges:** These charges include expenses like repairs and maintenance, tyre, and other charges connected with maintenance like servicing of the vehicles etc.

Illustration 50

A transport service company is running five buses between two towns, which are 50 kilometers apart. Seating capacity of each bus is 50 passengers. The following particulars are obtained from their books for April 2022.

Particulars	Amounts ₹
Wage of drivers, conductors and cleaners	2,40,000
Salaries of office staff	1,00,000
Diesel oil and other oil	3,50,000
Repairs and maintenance	80,000
Taxation, insurance etc.	1,60,000
Depreciation	2,60,000
Interest and other expenses	2,00,000
Total	13,90,000

Actually, passengers carried were 75% of seating capacity. All buses ran on all day of the month. Each bus made one round trip per day. Find out the cost per passenger kilometer.

Solution:

Operating Cost Statement for the month of April 2022

Particulars	Amounts ₹	Amounts ₹
A. Standing Charges		
• Wages of drivers, conductors and cleaners.	2,40,000	
• Salaries of office staff	1,00,000	
• Taxation, insurance etc.	1,60,000	
• Interest and other expenses	2,00,000	
• Depreciation	2,60,000	
• Total standing charges		9,60,000

B. Running and Maintenance Charges		
• Repairs and maintenance	80,000	
• Diesel oil and other oil	3,50,000	
• Total running and maintenance charges		4,30,000
C. Total cost [A+B]		13,90,000
D. Cost per passenger kilometre* ₹13,90,000 / 5,62,500 passenger kilometers		2.471

Working:

* Passenger kilometers are computed as below:

= Number of buses × Distance in one round trip × Seating capacity available × Percentage of seating capacity actually used × Number of days in a month × No. of trips

= 5 buses × 50 kilometers × 2 × 50 passengers × 75% × 30 days = 5,62,500 passenger-kms

5.5.3 Hotel Sector

Service costing is an effective tool in respect of hotel industry which run on commercial basis. Hence, it is necessary to compute the cost in order to determine the price of various services by the hotel and to find out the profit or loss at the end of a particular period.

In this case, the costs associated with different services offered may be identified and cost per unit may be worked out. The cost unit may be Guest - day or Room – day. For calculation of cost per guest day or room day, estimated occupancy rates at different point of time are taken into account, for example, peak season or lean season.

Illustration 51

A lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March 2022. [Assume a month to be of 30 days].

1. Occupancy during the season is 80% while in the off- season it is 40% only.
2. Expenses:
   - Staff salary [Excluding room attendants] ₹ 2,75,000
   - Repairs to building ₹ 1,30,500
   - Laundry and linen: ₹ 40,000
   - Interior and tapestry: ₹ 87,500
   - Sundry expenses: ₹ 95,400
3. Annual depreciation is to be provided for buildings @ 5% and on furniture and equipments @ 15% on straight-line basis.
4. Room attendants are paid ₹5 per room day on the basis of occupancy of the rooms in a month.
5. Monthly lighting charges are ₹120 per room, except in four months in winter when it is ₹30 per room and this cost is on the basis of full occupancy for a month.
6. Total investment in the home is ₹100 lakhs of which ₹80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution:

Computation of Estimated Cost for the year Ending 31st March 2022

Particulars	Amounts ₹
Salary	2,75,000
Repairs	1,30,500
Laundry and linen	40,000
Interior decoration	87,500
Depreciation: 5% on ₹80 lakhs: ₹4,00,000 15% on ₹20lakhs: ₹3,00,000	7,00,000
Miscellaneous Expenses	95,400
Total costs	13,28,400

Workings:

1. Number of room days in a year:
   - Occupancy during season for 6 months @ 80% = [50×0.80×6×30] = 7200
   - Off-season occupancy for 6 months @ 40% = [50×0.4×6×30] = 3600
   - Total number of room days during a year = 10,800
2. Attendant's salary
   - For 10,800 room days @ ₹5 per day = ₹54,000
3. Light charges for 8 months @ ₹120 per month i.e. ₹120/30 = ₹4 per room day Light charges for 4 months @ ₹30 per month, i.e. ₹30/30 = ₹1 per room day
   - Total lighting charges:
     - During season @ ₹4 for 7200 days = ₹28,800
     - During off season 2 months @ ₹4 for 1200 days [2/6 × 3600 × 4] = ₹4,800
     - During 4 months of winter @ ₹1 for 2, 400 days [4/6 × 3600 × 1] = ₹2,400
     - Total lighting charges: ₹36,000 [28,800 + 4,800 + 2,400)

Note: It is given in the example that during four months of winter, the lighting is ₹30 per room, which is 1/4th of the lighting charges during the remaining period of the year. Hence the rate of room day which is ₹4 will also be 1/4th for winter period and so it is taken as ₹1 per room day.

Statement of Total Estimated Cost

Particulars	Amounts ₹
Expenses as shown in I above	13,28,400
Attendant's salary as shown in III above	54,000
Lighting charges as shown in IV above	36,000
Total cost	14,18,400

Computation of Total Full Room Days

- During season: 7,200
- During off-season: 1,800 [Equivalent to 50% rate of 3,600 days]
- Total Full Room Days: 7,200 + 1,800 = 9,000

Computation of Room Rent

- Cost per room day: ₹14,18,400 /9,000 = ₹157.60
- Add: Profit margin at 20% of rent or 25% of cost = ₹39.40
- Room Rent = ₹197.00

Thus, during season, room rent of ₹197 is to be charged while in the off-season room rent of ₹ 98.50 is to be charged.

5.5.4 Hospitals

Hospitals provide various medical services to the patients. Hospital costing is applied to determine the cost of these services. A hospital may have different departments catering to many services to the patients – such as:

- Outdoor – Patient
- Admitted – Patient
- Medical services like X – Ray, Scanning, etc.
- General services like Catering, Laundry, Power house, etc.
- Miscellaneous services like Transport, Pharmacy, etc.

Unit of Cost

Common unit of Costs of various departments are as follows:

- Outdoor – Patient – Per Out – Patient
- Admitted – Patient – Per Room Day, Per Bed Day
- Scanning – Per Case
- Laundry – Per 100 items laundered

Segregation of Cost

The costs of hospital can be divided into fixed costs and variable costs.

Fixed costs are based on timelines and irrespective of services rendered. For example, Staff Salaries, Depreciation on Building and Equipment, etc.

Variable costs vary with the level of services rendered. For example, Laundry Charges, Cost of Food supplied to patients, Power etc.

Illustration 52

Zenith Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required.

Rent per month: ₹75,000

Supervisors - 2 persons @ ₹25,000 per month each

Nurses - 4 persons @ ₹20,000 per month each

Ward Boys - 4 persons @ ₹5,000 per month each

Doctors were paid ₹2,50,000 per month on the basis of number of patients attended and the time spent by them.

Other expenses for the year are as follows:

Repairs (fixed) – ₹81,000

Food to patients (variable) – ₹8,80,000

Other services to patients (variable) – ₹3,00,000

Laundry charges (variable) – ₹6,00,000

Medicines (variable) – ₹7,50,000

Other fixed expenses – ₹10,80,000

Administration expenses allocated – ₹10,00,000

It was estimated that for 150 days in a year, 35 beds are occupied and 25 beds are occupied for 80 days only.

The hospital hired 750 beds at a charge of ₹100 per bed per day to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required to –

(a) Calculate profit per Patient day, if the hospital recovers on an average ₹2,000 per day from each patient

(b) Find out Break-even point for the hospital.

Solution:

Working Notes:

Calculation of number of patient days

35 Beds × 150 days	5,250
25 Beds × 80 days	2,000
Extra beds	750
Total	8,000

Profitability Statement

Particulars	(₹)	(₹)
Income for the year (₹ 2,000 per patient per day × 8,000 patient days)		1,60,00,000
Less: Variable Costs:		
Doctor Fees (₹ 2,50,000 per month × 12months)	30,00,000	
Food to Patients (variable)	8,80,000	

Particulars	(₹)	(₹)
Other services to patients (variable)	3,00,000	
Laundry charges (variable)	6,00,000	
Medicines (variable)	7,50,000	
Bed Hire Charges (₹100 × 750 beds)	75,000	
Total variable costs		56,05,000
Contribution		1,03,95,000
Less: Fixed Costs:		
Rent (₹75,000 per month × 12 months)	9,00,000	
Supervisor (2 persons × ₹25,000 × 12months)	6,00,000	
Nurses (4 persons × ₹20,000 × 12months)	9,60,000	
Ward Boys (4 persons × ₹5,000 × 12months)	2,40,000	
Repairs (fixed)	81,000	
Other fixed expenses	10,80,000	
Administration expenses allocated	10,00,000	
Total Fixed Costs		48,61,000
Profit		55,34,000

Calculation of Contribution per Patient Day

Total Contribution = ₹1,03,95,000

Total Patient days = 8,000

Contribution per Patient Day = ₹1,03,95,000 / 8,000 = ₹1,299.375

Break even Point = Fixed Cost / Contribution per Patient Day

= ₹48, 61,000 / ₹1,299.375

= 3,741 patient days

Illustration 53

There are two warehouses for storing finished goods produced in a factory. Warehouse 'A' is at a distance of 10 kms and Warehouse 'B' is at a distance of 15 kms from the factory. A fleet, of 5 tonne lorries is engaged in transporting the finished goods from the factory. The records show that the lorries average speed is 30 kms per hour when running and regularly takes 40 minutes to load at the factory. At warehouse 'A' unloading takes 30 minutes per load while at warehouse 'B' it takes 20 minutes per load.

Drivers' wages, depreciation, insurance and taxes amount to ₹18 per hour operated. Fuel oil, tyres, repairs and maintenance cost is ₹2.40 per kilometer. You are required to draw up a statement showing the cost per tonne kilometer of carrying the finished goods to the two warehouses.

Solution:

Statement showing computation of total cost and cost per tonne kilometer of carrying finished goods to warehouses:

Particulars	Warehouse A		Warehouse B	
Time for travelling	$\frac{10\times2}{30}\times 60$	40 Min	$\frac{15\times2}{30}\times 60$	60 Min
Time for loading		40 Min		40 Min
Time for unloading		30 Min		30 Min
Total Time involved		110 Min		130 Min
Drivers' wages, depreciation, insurance and taxes	$\frac{110}{60}\times 18$	₹ 33	$\frac{120}{60}\times 18$	₹ 36
Fuel & Oil etc	10 × 2 × 2.40	₹ 48	15 × 2 × 2.4	₹ 72
Total Cost		₹ 81		₹ 108
Tonne Kilometers	5 tonne × 10 km	50	5 tonne × 15 km	75
Cost per tonne-kilometer	$\frac{₹\ 81}{50\ \text{tonne - km}}$	₹ 1.62	$\frac{₹\ 108}{75\ \text{tonne - km}}$	₹ 1.44

Illustration 54

A transport service company is running 4 buses between two towns which are 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books for April, 2022.

	Amount (₹)
Wages of Drivers, Conductors and Cleaners	2,400
Salaries of Office and Supervisory Staff	1,000
Diesel and oil and other oil	4,000
Repairs and Maintenance	800
Taxation, Insurance, etc.	1,600
Depreciation	2,600
Interest and Other Chargers	2,000
Total	**14,100**

Actual passengers carried were 75% of the seating capacity. All the four buses ran on all days of the month. Each bus made one round trip per day. Find out the cost per passenger mile.

Solution:

Computation of Cost per Passenger Mile

= Number of buses × Distance Covered per day × Number of days operating in a month × Number of passenger × Occupancy × No. of trips

= $4 \times (50 \times 2) \times 30 \times 40 \times 75\%$

= 3,60,000 passenger-mile

$$\text{Cost per Passenger-Mile} = \frac{\text{Total Cost}}{\text{Total Passenger - Mile}} = \frac{₹\ 14,100}{3,60,000\ \text{Passenger - Mile}} = ₹\ 0.04$$

Illustration 55

Mr. Sohan Singh has started transport business with a fleet of 10 taxies. The various expenses incurred by him are given below:

(i) Cost of each taxi ₹ 75,000.

(ii) Salary of Office Staff ₹ 1,500 p.m.

(iii) Salary of Garage's Supervisor ₹ 2,000 p.m.

(iv) Rent of Garage ₹ 1,000 p.m.

(v) Drivers Salary (per taxi) ₹ 400 p.m.

(vi) Road Tax and Repairs per taxi ₹ 2,160 p.a.

(vii)Insurance Premium @ 4% of Cost p.a.

The life of a taxi is 3,00,000 km and at the end of which it is estimated to be sold at ₹ 15,000. A taxi runs on an average 4,000 km per month of which 20% it runs empty, petrol consumption 9 km per litre of petrol costing ₹ 6.30 per litre. Oil and other sundry expenses amount to ₹ 10 per 100 km.

Calculate the effective cost of running a taxi per kilometre. If the hire charge is ₹ 1.80 per kilometre, find out the profit that Mr. Sohan may expect to make in the first year of operation.

Solution:

Total Distance travelled by 10 taxi per month = 4,000km/month × 10 Taxies = 40,000 km

Passenger - km = Total Distance × Occupancy = 40,000 × 80% = 32,000 passenger-km

Statement Showing Total Cost incurred per month for 10 taxies

Particulars	Workings	Cost per month (₹)	Cost per month (₹)
Fixed Expenses			
Salary of Staff		1,500	
Salary of Garage Supervisor		2,000	
Rent of Garage		1,000	
Drivers Salary	400 x 10	4,000	
Road Tax and Repairs	$\frac{2,160}{12} \times 10$	1,800	
Insurance Premium	$\frac{75,000 \times 10 \times 4\%}{12}$	2,500	
∴ **Total Fixed Expenses per month**			12,800
Running Expenses			

Particulars	Workings	Cost per month (₹)	Cost per month (₹)
Depreciation	$\frac{₹\ 75,000 - ₹\ 15,000}{3,00,000\ km} \times 4,000\ km \times 10$	8,000	
Petrol	$\frac{₹\ 6.30}{9\ km} \times 4,000\ km \times 10$	28,000	
Oil and other sundries	$\frac{₹\ 10}{100\ km} \times 4,000\ km \times 10$	4,000	
∴ **Total Running Expenses per month**			40,000
∴ **Total Cost per month (A)**	12,800 + 40,000		52,800
Total Hire charges (B)	32,000 × 1.80		57,600
Profit per month (B- A)	57,600 – 52,800		4,800
∴ **Profit per year**	4,800 × 12 months		57,600

Illustration 56

Janata Transport Co. has been given a route 20 km long for running buses. The company has a fleet of 10 buses each costing ₹ 50,000 and having a life of 5 years without any scrap value.

From the following estimated expenditure and other details calculate the bus fare to be charged from each passenger.

i.	Insurance charges	3% p.a.
ii.	Annual tax for each bus	₹ 1,000
iii.	Total Garage charges	₹ 1,000 p.m
iv.	Drivers' salary for each bus	₹ 150 p.m.
v.	Conductor's Salary for each bus	₹ 100 p.m.
vi.	Annual repairs to each bus	₹ 1,000
vii.	Commission to be shared by the driver and conductor equally:	10% of the takings
viii.	Cost of stationery	₹ 500 p.m.
ix.	Manager's salary	₹ 2,000 p.m.
x.	Accountant's salary	₹ 1,500 p.m.
xi.	Petrol and oil	₹ 25 per 100 km

Each bus will make 3 round trips carrying on an average 40 passengers on each trip. The bus will run on an average for 25 days in a month. Assuming 15% profit on takings, calculate, the bus fare to be charged from each passenger.

Solution:

Total Distance travelled by 10 bus per month

= (Distance of route one way × 2) × Number of trips per day × Number of days operating in the month × Number of buses

= 20 × 2 × 3 × 25 × 10

= 30,000 km per month

Computation of Passenger-Km per month

= Total Distance Travelled by 10 bus per month × Number of passenger

= 30,000 × 40

= 12,00,000 passenger - km per month

Computation of Total Cost for 10 bus per month
(Excluding Commission of Driver and Conductor)

Particulars	Workings	₹ (Cost per month)
Fixed or Standing Charges		
Depreciation	$\frac{₹\ 50,000 \times 10}{5\ \text{years}} \times \frac{1}{12}$	8,333.33
Insurance	$\frac{₹\ 50,000 \times 10 \times 3\%}{12}$	1,250.00
Tax	$\frac{₹\ 1,000 \times 10}{12}$	833.33
Garage Charges		1,000.00
Salary of Drivers	₹ 150 × 10	1,500.00
Salary of Conductors	₹ 100 × 10	1,000.00
Cost of Stationery		500.00
Salary of Manager		2,000.00
Salary of Accountant		1,500.00
Maintenance Charges		
Repairs	$\frac{₹\ 1,000 \times 10}{12}$	833.34
Running Charges		
Petrol and Oil	$\frac{30,000\ \text{km}}{100\ \text{km}} \times ₹\ 25$	7,500
		26,250.00

Let the taking be ₹ X

Total Cost (Excluding Commission) + Commission + Profit = Takings

or, $26,250 + \frac{10}{100} X + \frac{15}{100} X = X$

or, $\frac{75}{100} X = 26,250$

or, X = 35,000

∴ Takings= ₹ 35,000

Profit = 15% × 35,000 = ₹ 5,250

Commission of Driver and Conductor = 10% × 35,000 = ₹ 3,500

$$\therefore \text{ Fare per passenger - km} = \frac{₹\ 35,000}{12,00,000 \text{ passenger - km}} = ₹\ 0.0292 \approx ₹\ 0.03$$

Illustration 57

Union Transport Company supplies the following details in respect of a truck of 5 tonne capacity.

Cost of Truck	₹ 90,000
Estimated life	10 years
Diesel, oil, grease	₹ 15 per trip each way
Repairs and maintenance	₹ 500 p.m.
Driver's wages	₹ 500 p.m.
Cleaner's wages	₹ 250 p.m.
Insurance	₹ 4,800 per year
Tax	₹ 2,400 per year
General supervision charges	₹ 4,800 per year

The truck carries goods to and from the city covering a distance of 50 kms each way. On outward trip freight is available to the extent of full capacity and on return, 20% of capacity. Assuming that the truck runs on an average 25 days a month, work out:

(a) Operating cost per tonne-km.

(b) Rate per tonne-km that the company should charge if a profit of 50% on freight is to be earned.

Solution:

Computation of Tonne-km

= (Distance to × Tonne × capacity +Distance from × capacity × occupancy) × No.of days operating per month

= (50km × 5 tonne × 100% + 50km × 5tonne × 20%) × 25days = 7,500

Computation of Total Cost of the truck per month

Particulars	Workings	₹ (Cost per month)
Fixed Charges		
Wages of Driver		500
Wages of Cleaner		250
Insurance	$\frac{₹\ 4,800}{12}$	400
Tax	$\frac{₹\ 2,400}{12}$	200
General Supervision Charges	$\frac{₹\ 4,800}{12}$	400

Particulars	Workings	₹ (Cost per month)
Maintenance Charges		
Repairs and Maintenance		500
Running Charges		
Depreciation	$\frac{₹90,000}{10 \text{ years}} \times \frac{1}{12}$	750
Diesel, oil and grease	₹15 × 2 trips × 25days	750
Total Cost		**3,750**

(a) Computation of Cost per tonne-km

$$\text{Operating Cost per tonne-km} = \frac{\text{Cost incurred per month}}{\text{Tonne - km per month}} = \frac{3,750}{7,500} = ₹\ 0.50$$

(b) Computation of Rate per tonne-km

Let the Rate per tonne-km be ₹ X

or, Cost + Profit = Rate

or, 0.50 + 50% X = X

or, $X = \frac{0.50}{50\%} = ₹\ 1$

∴ Rate per tonne-km = ₹ 1

Illustration 58

XYZ Ltd runs a holiday home. For this purpose, it has hired a building at a rent of ₹ 10,000 per month along with 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.

Following information is available:

Type of Suite	Number	Percentage of Occupancy
Single Room	100	100%
Double Rooms	50	80%
Triple Rooms	30	60%

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.

Particulars	₹
Staff salaries	14,25,000
Room attendants' wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year.

Calculate the rent to be charged for each type of suite.

Solution:

Total Equivalent Single Room Suites

Nature of Suite	Occupancy (Room-days)	Equivalent Single Room Suite (Room-days)
Single Room	36,000 (100 rooms × 360 days × 100%)	36,000 (36,000 × 1)
Double Rooms	14,400 (50 rooms × 360 days × 80%)	36,000 (14,400 × 2.5)
Triple Rooms	6,480 (30 rooms × 360 days × 60%)	32,400 (6,480 × 2.5 × 2)
Total		**1,04,400**

Computation of Total Cost

Particulars	₹
Salary of Staff	14,25,000
Wages of Room Attendants	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000
Total Cost (Excluding Building Rent)	**25,21,000**
Building Rent (10,000 × 12 + 5% × Takings)	**1,20,000 + 5% takings**
Total Cost	**26,41,0000+5% × Takings**

Total Cost + Profit = Takings

or, (26,41,0000+5% × Takings)+20% × Takings = Takings

or, 75% Takings = 26,41,000

or, Takings = $\frac{26,41,000}{75\%}$ = ₹ 35,21,333

Let the Rent of Single Room Suite = R

or,Takings = 1,04,400 R

or, R = $\frac{₹\ 35,21,333}{1,04,400 \text{ Equivalent Single Room}}$ days = ₹ 33.73

∴ Rent to be charged for Single Room		= ₹ 33.73
Rent to be charged for Double Rooms	= ₹ 33.73 × 2.5	= ₹ 84.33
Rent to be charged for Triple Rooms	= ₹ 33.73 × 2.5 × 2	= ₹ 168.65

Illustration 59

Angel Holiday Home runs in a small hill station with 100 single rooms. The home offers concessional rates during six off season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March, 2022 [Assume a month as 30 days].

(i) Occupancy during the season is 80% while in the off-season it is 40% only.

(ii) Total investment in the home is ₹200 lakhs of which 80% relate to buildings and balance for furniture and equipment.

(iii) Expenses:

Particulars	₹
Staff salary [Excluding room attendants]	5,50,000
Repairs to building	2,61,000
Laundry Charges	80,000
Interior	1,75,000
Miscellaneous expenses	1,90,800

(iv) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight line basis.

(v) Room attendants are paid ₹10 per room day on the basis of occupancy of the rooms in a month.

(vi) Monthly lighting charges are ₹120 per room, except in four months in winter when it is ₹ 30 per room and this cost is on the basis of full occupancy for a month.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution:

Computation of Total Room days and Equivalent Full Room Rent days

Season	Total Room days	Equivalent Full Room Rent days
Season – 80% Occupancy	100 rooms × 80% × 6 months × 30 days in a month = 14,400	14,400 × 100%=14,400
Off – Season – 40% Occupancy	100 rooms × 40% × 6 months × 30 days in a month = 7,200	7,200 × 50%=3,600
Total	**21,600**	**18,000**

Lighting charges

The lighting charges for 8 months is ₹ 120 per month and during winter season of 4 months it is ₹ 30 per month. Further it is also given that peak season is 6 months and off season is 6 months.

Being hill station, winter season is to be considered as off-season. Hence, the non-winter season of 8 months include: peak season of 6 months and off-season of 2 months.

Computation of Lighting charges

Season	Workings	(₹)
Season & Non winter – 80% Occupancy (6 months)	100 rooms × 80% × 6 months × ₹ 120 per month	57,600
Off Season & Non winter – 40% Occupancy (2 months)	100 rooms × 40% × 2 months × ₹ 120 per month	9,600
Off Season & Winter – 40% Occupancy (4 months)	100 rooms × 40% × 4 months × ₹ 30 per month	4,800
Total Lighting charges		**72,000**

Computation of Total Cost

Particulars	(₹)
Salary of Staff	5,50,000
Repairs of Building	2,61,000
Laundry charges	80,000
Interior	1,75,000
Miscellaneous expenses	1,90,800
Depreciation – Building (₹ 200 lakhs × 80% × 5%)	8,00,000
Depreciation – Furniture & Equipment (₹ 200 lakhs × 20% × 15%)	6,00,000
Wages of Room Attendants (₹ 10 × 21,600 room days)	2,16,000
Lighting Charges	72,000
Total Cost	29,44,800

Total Cost + Profit = Takings

or, 29,44,800 + 20% Takings = Takings

or, Takings = $\frac{29,44,800}{80\%}$ = ₹ 36,81,000

Computation of Room Rent per day

$= \frac{\text{Takings}}{\text{Equivalent Full Room Rent days}} = ₹ \frac{36,81,000}{18,000} = ₹ 204.50$

∴ Room Rent during season = ₹ 204.50

and, Room Rent during Off-Season = ₹ 204.50 x 50% = ₹ 102.25

Illustration 60

Manar lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six-off season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March, 2022. [Assume a month to be of 30 days].

(i) Occupancy during the season is 80% while in the off season it is 40% only.

(ii) Expenses:

Staff salary [Excluding room attendants]	₹ 2,75,000
Repairs to building	₹ 1,30,500
Laundry and linen	₹ 40,000
Interior and tapestry	₹ 87,500
Sundry expenses	₹ 95,400

(iii) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipments @ 15% on straight line basis.

(iv) Room attendants are paid ₹ 5 per room day on the basis of occupancy of the rooms in a month.

(v) Monthly lighting charges are ₹ 120 per room, except in four months in winter when it is ₹ 30 per room and this cost is on the basis of full occupancy for a month.

(vi) Total investment in the home is ₹ 100 lakhs of which ₹ 80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information

Solution:

Computation of Total Room days and Equivalent Full Room Rent days

Season	Total Room days	Equivalent Full Room Rent days
Season – 80% Occupancy	50 rooms × 80% × 6 months × 30 days in a month = 7,200	7,200 × 100%=7,200
Off – Season – 40% Occupancy	50 rooms × 40% × 6 months × 30 days in a month = 3,600	3,600 × 50%=1,800
Total	**10,800**	**9,000**

Lighting charges

The lighting charges for 8 months is ₹ 120 per month and during winter season of 4 months it is ₹ 30 per month. Further it is also given that peak season is 6 months and off season is 6 months.

Being hill station, winter season is to be considered as off-season. Hence, the non-winter season of 8 months include: peak season of 6 months and off-season of 2 months.

Computation of Lighting charges

Season	Workings	₹
Season & Non winter – 80% Occupancy (6 months)	50 rooms × 80% × 6 months × ₹ 120 per month	28,800
Off Season & Non winter – 40% Occupancy (2 months)	50 rooms × 40% × 2 months × ₹ 120 per month	4,800
Off Season & Winter – 40% Occupancy (4 months)	50 rooms × 40% × 4 months × ₹ 30 per month	2,400
Total Lighting charges		**36,000**

Computation of Total Cost

Particulars	(₹)
Salary of Staff	2,75,000
Repairs of Building	1,30,500
Laundry charges	40,000
Interior	87,500
Miscellaneous expenses	95,400
Depreciation – Building (₹ 80 lakhs × 5%)	4,00,000
Depreciation – Furniture & Equipment (₹ 20 lakhs × 15%)	3,00,000
Wages of Room Attendants (₹ 5 × 10,800 room days)	54,000
Lighting Charges	36,000
Total Cost	**14,18,400**

Total Cost + Profit = Takings

or, 14,18,400 + 20% Takings = Takings

or, Takings $= \frac{14,18,400}{80\%} =$ ₹ 17,73,000

Computation of Room Rent per day

$$= \frac{\text{Takings}}{\text{Equivalent Full Room Rent days}} = \frac{17,73,000}{9,000} =$$ ₹ 197

∴ Room Rent during season = ₹ 197

and, Room Rent during Off-Season = ₹ 197 × 50% = ₹ 98.50

Exercise

A. Theoretical Questions

Multiple Choice Questions

1. Job Costing is used in:
   A. Furniture making
   B. Repair shops
   C. Printing press
   D. All of the above

2. In a job cost system, costs are accumulated _____.
   A. On a monthly basis
   B. By specific job
   C. By department or process
   D. By kind of material used

3. The most suitable cost system where the products differ in type of material and work performed is _____.
   A. Operating Costing
   B. Job Costing
   C. Process Costing
   D. All of these

4. Cost Price is not fixed in case of _____.
   A. Cost plus contracts
   B. Escalation clause
   C. De-escalation clause
   D. All of the above

5. Most of the expenses are direct in _____.
   A. Job Costing
   B. Batch Costing
   C. Contract Costing
   D. None of the above

6. Cost plus contract is usually entered into those cases where _____.
   A. Cost can be easily estimated
   B. Cost of certified and uncertified work
   C. Cost of certified work, cost of uncertified work and amount of profit transferred to Profit and Loss Account
   D. Determination of contract cost with reasonable accuracy is not possible

7. In order to determine cost of the products or services, different business firms follow:
   A. Different techniques of costing
   B. Uniform costing
   C. Different methods of costing
   D. None of the above

8. In case product produced or jobs undertaken are of diverse system, the system of costing to be used should be:
   A. Operating Costing
   B. Process Costing
   C. Job Costing
   D. None of the above

9. Job Costing is:
   A. Suitable where similar products are produced on mass scale
   B. Methods of costing used for non-standard and non-repetitive products
   C. Technique of costing
   D. Applicable to all industries regardless of the products or services provided

10. Batch costing is a type of:
   A. Direct Costing
   B. Process Costing
   C. Job Costing
   D. Differential Costing

11. Batch costing is similar to that under job costing except with the difference that:
   A. Process becomes a cost unit
   B. Job becomes a cost unit
   C. Batch become the cost unit instead of a job
   D. None of the above

12. Economic batch quantity is that size of the batch of production where:
   A. Carrying cost is minimum
   B. Set-up cost of machine is minimum
   C. Average cost is minimum
   D. Both A. and B.

14. Which of the following documents are used in job costing to record the issue of direct materials to a job:
    A. Purchase order
    B. Purchase requisition
    C. Goods received note
    D. Material requisition

15. Which of the following statements is true:
    A. Batch costing is a variant of jobs costing
    B. Job cost sheet may be used for estimating profit of jobs
    C. Job costing cannot be used in conjunction with marginal costing
    D. In cost plus contracts, the contractor runs a risk of incurring a loss

16. Which of the following statement is true:
    A. Job costing can be suitably used for concerns producing any specific product uniformly
    B. Job costing cannot be used in companies applying standard costing
    C. Job cost sheet may be prepared to facilitate routing and scheduling of the job
    D. Neither A. nor B. nor C.

17. The type of process loss that should not be allowed to affect the cost of good units is called:
    A. Standard Loss
    B. Normal Loss
    C. Abnormal Loss
    D. Seasonal Loss

18. Spoilage that occurs under inefficient operating conditions and is generally controllable is called _____.
    A. Normal defectives
    B. Abnormal spoilage
    C. Normal spoilage
    D. None of the above

19. In which of the following situations an abnormal gain in a process occurs:
    A. When normal loss is equal to actual loss
    B. When the actual output is greater than the planned output
    C. When actual loss is more than the expected
    D. When actual loss is less than the expected loss

20. The value of abnormal loss is equal to:

    A. Total cost of materials

    B. Total process cost less cost of scrap

    C. Total process cost less realisable value of normal loss less value of transferred out goods.

    D. Total process cost less realisable value of normal loss

21. A process account is debited by abnormal gain, the value is determined as:

    A. Equal to the value of good units less closing stock

    B. Equal to the value of normal loss

    C. Cost of good units less realisable value of normal loss

    D. Cost of good unit less realisable value of actual loss

22. In sugar manufacturing industry molasses is also produced along with sugar. Molasses may be of small value as compared with the value of sugar and is known as:

    A. Joint product

    B. Common product

    C. By-product

    D. None of them

23. Method of apportioning joint costs on the basis of output of each joint product at the point of split-offs is known as:

    A. Physical unit method

    B. Sales value method

    C. Average cost method

    D. Marginal cost and contribution method

24. The main purposes of accounting of joint products and by-products is to:

    A. Determine the replacement cost

    B. Determine the opportunity cost

    C. Determine profit or loss on each product line

    D. None of the above

25. Under net realisable value method of apportioning joint costs to joint products, the selling & distribution cost is:

    A. Ignored

    B. Deducted from sales value

    C. Deducted from further processing cost

    D. Added to joint cost

26. Which of the following is an example of by-product:

    A. Mustard seeds and mustard oil

    B. Diesel and Petrol in an oil refinery

    C. Edible oils and oil cakes

    D. Curd and butter in a diary

27. Which of following methods can be used when the joint products are of unequal quantity and used for captive consumption:

    A. Physical units method

    B. Net realisable value method

    C. Technical estimates, using market value of similar goods

    D. Market value at spit-off method

28. Cost of a particular service under operating costing is ascertained by preparing:

    A. Cost sheet

    B. Process account

    C. Job cost sheet

    D. Production account

29. Operating costing is applicable to:

    A. Hospitals

    B. Cinemas

    C. Transport undertaking

    D. All of the above

30. Composite cost unit for a hospital is:

    A. Per day

    B. Per bed

    C. Per patient day

    D. Per patient

31. Cost units used in power sector is called:

    A. Number of hours

    B. Number of electric points

    C. Kilowatt-hour (KWH)

    D. Kilo meter (K.M.)

32. Absolute Tonne-Km is an example of:

    A. Composite unit for bus operation

    B. Composite unit of transport sector

    C. Composite unit for oil and natural gas

    D. Composite unit in power sector

33. A company does job work for customers. Job 947 has direct materials costs of ₹ 125, direct labour costs of ₹80 and direct expenses of ₹ 25. Direct labour is paid ₹ 20 per hour. Production overheads are charged at the rate of ₹ 35 per hour and non-production overheads are charged as 60% of prime cost. What is the cost for Job 947?

    A. ₹ 493

    B. ₹ 508

    C. ₹ 514

    D. ₹ 592

34. A road haulage company transports goods. It operates two trucks. During a particular period, the two trucks travelled a total of 80,000 kilometers carrying goods. The average load was 3 tonnes per journey. In total they made 200 journeys. Total costs were ₹ 7,20,000. What is the average cost per tonne-kilometer transported?

    A. ₹ 3

    B. ₹ 4.50

    C. ₹ 6

    D. ₹ 12

35. A hotel has 80 standard twin-bedded rooms. The hotel is fully-occupied for each of the 350 days in each year that it is open. The total costs of running the hotel each year are ₹ 3,360,000. Calculate the cost per room/day

    A. ₹ 120

    B. ₹ 240

    C. ₹ 360

    D. None of the above

36. A company operates a job costing system. Job number 6789 will require ₹ 345 of direct materials and ₹ 210 of direct labour, which is paid ₹ 14 per hour. Production overheads are absorbed at the rate of ₹ 30 per direct labour hour and non-production overheads are absorbed at the rate of 40% of prime cost. Required What is the total expected cost of the job?

    A. ₹ 7,221

    B. ₹ 1,272

    C. ₹ 2,127

    D. ₹ 1,227

37. A road building company has the following data concerning one of its contracts.

Contract price ---- ₹11,200,000

Cost of work certified to date ---- ₹ 3,763,200

Estimated costs to completion ------ ₹ 2,956,800

No difficulties are foreseen on the contract.

The profit to be recognised on the contract to date is ₹ _____

A. ₹ 25,88,000

B. ₹ 25,80,800

C. ₹ 20,58,800

D. ₹ 25,08,800

38. ASA LLP operates a job costing system. The company's standard net profit margin is 20 per cent of sales value. The estimated costs for job B124 are as follows.

Direct materials 3 kg @ ₹ 5 per kg

Direct labour 4 hours @ ₹ 9 per hour

Production overheads are budgeted to be ₹ 2,40,000 for the period, to be recovered on the basis of a total of 30,000 labour hours.

Other overheads, related to selling, distribution and administration, are budgeted to be ₹ 1,50,000 for the period. They are to be recovered on the basis of the total budgeted production cost of ₹ 7,50,000 for the period.

The price to be quoted for job B124 is ₹ _____

A. ₹ 153.50

B. ₹ 124.50

C. ₹ 145.50

D. ₹ 142.50

39. A company calculates the prices of jobs by adding overheads to the prime cost and adding 30% to total costs as a profit margin. Job number Y256 was sold for ₹ 1,690 and incurred overheads of ₹ 694. What was the prime cost of the job?

A. ₹ 489

B. ₹ 606

C. ₹ 996

D. ₹ 1,300

40. Calculate the most appropriate unit cost for a distribution division of a multinational company using the following information.

    Miles travelled 636,500

    Tonnes carried 2,479

    Number of drivers 20

    Hours worked by drivers 35,520

    Tonne-miles carried 375,200

    Costs incurred ₹ 562,800

    A. ₹ 0.88

    B. ₹ 1.50

    C. ₹ 15.84

    D. ₹ 28,140

41. Process B had no opening inventory. 13,500 units of raw material were transferred in at ₹ 4.50 per unit. Additional material at ₹ 1.25 per unit was added in process. Labour and overheads were ₹ 6.25 per completed unit and ₹ 2.50 per unit incomplete.

    If 11,750 completed units were transferred out, what was the closing inventory in Process B?

    A. ₹ 6,562.50

    B. ₹ 12,250.00

    C. ₹ 14,437.50

    D. ₹ 25,375.00

42. A company makes a product, which passes through a single process.

    Details of the process for the last period are as follows.

    Materials 10,000 kg at 50 paisa per kg

    Labour ₹ 1,000

    Production overheads 200% of labour

    Normal losses are 10% of input in the process, and without further processing any losses can be sold as scrap for 20 paisa per kg.

    The output for the period was 8,400 kg from the process. There was no work in progress at the beginning or end of the period.

    The value of the abnormal loss for the period is _____

A. ₹ 200

B. ₹ 220

C. ₹ 80

D. None of the above

Answer:

1	**D**	**2**	**B**	**3**	**B**	**4**	**A**	**5**	**C**	**6**	**D**	**7**	**C**	**8**	**C**	**9**	**B**
10	**C**	**11**	**C**	**12**	**D**	**13**	**B**	**14**	**D**	**15**	**B**	**16**	**D**	**17**	**C**	**18**	**B**
19	**D**	**20**	**C**	**21**	**C**	**22**	**C**	**23**	**A**	**24**	**C**	**25**	**B**	**26**	**C**	**27**	**C**
28	**C**	**29**	**D**	**30**	**C**	**31**	**C**	**32**	**B**	**33**	**B**	**34**	**A**	**35**	**A**	**36**	**D**
37	**D**	**38**	**B**	**39**	**B**	**40**	**B**	**41**	**C**	**42**	**A**						

Hint

MCQ 37 - calculate percentage completion which will come as 56%.

Then,

Since the contract is 56% complete and no difficulties are foreseen, a profit can reasonably be taken.

Profit to be taken = 56% × final contract profit = 56% × ₹ (11200,000 – 6720,000) = ₹ 25,08,800

MCQ 38 - Production overheads absorption rate = ₹ 240,000/30,000 = ₹ 8 per labour hour

Other overheads absorption rate = (₹ 150,000/₹ 750,000) × 100% = 20% of total production cost

Then,

Do per unit cost sheet.

MCQ 39 - The most appropriate cost unit is the tonne-mile. Therefore, the cost per unit = 562800/35520= ₹1.50

MCQ 40 - Cost per unit in closing inventory = ₹ (4.50 + 1.25 + 2.50) = ₹ 8.25

Number of units in closing inventory = 13,500 – 11,750 = 1,750 units

∴ Value of closing inventory = 1,750 units × ₹ 8.25 = ₹ 14,437.50

MCQ 42

Normal loss = 10% × input = 10% × 10,000 kg = 1,000 kg

When scrap has a value, normal loss is valued at the value of the scrap i.e., 20 paisa per kg.

Normal loss = ₹ 0.20 × 1,000 kg = ₹ 200

State True or False

1. Operating costing is applied to ascertain the cost of products.
2. Cost of operating the service is ascertained by preparing job account.
3. The problem of equivalent production arises in case of operating costing.
4. FIFO methods are followed for evaluation of equivalent production when prices are fluctuating.
5. Work in progress is the inherent feature of processing industries.
6. Costs incurred prior to the split off point are known as "Joint Costs".
7. No distinction is made between Co products and Joint Products.
8. Contact costing is variant of job costing.
9. In contract costing, the unit of cost is a job.
10. Job costing is applied only in small concerns.

Answer:

1	F	**2**	F	**3**	F	**4**	F	**5**	T
6	T	**7**	F	**8**	F	**9**	F	**10**	F

Fill in the Blanks

1. Cost of _____ loss is not borne by good units.
2. If the actual loss in a process is less than the normal loss, the difference is known as _____.
3. _____ Costs are incurred after split off point.
4. The _____ product generally has a greater sale value than by product.
5. Statement of cost per unit of equivalent production shows the per unit cost_____.
6. Two principal methods of evaluation of equivalent production are _____ and _____.
7. In hospital the cost unit is _____.
8. In electricity companies, the cost unit is _____.
9. The method of costing used in undertaking like gas companies, cinema houses, hospitals etc is known as _____.
10. In motor transport costing two example of fixed cost are _____ and _____.

Answer:

1.	**Abnormal**	**2.**	**Abnormal Gain**	**3.**	**Subsequent**	**4.**	**Main**
5.	**Element wise,**	**6.**	**FIFO and Average Method**	**7.**	**per bed / per patient day**	**8.**	**kilowatt–hour**
9.	**Operating Costing**	**10.**	**Insurance abd Depreciation.**				

Short Essay Type Questions

1. Describe briefly, how joint costs up to the point of separation may be apportioned amongst the joint products
2. Write short notes on:
   (a) Escalation clause
   (b) Retention money
   (c) Equivalent units
   (d) Operating Costing
3. What is job costing?
4. Define batch costing.
5. What is contract costing?
6. Highlight a key difference between job costing and process costing.
7. How does batch size influence batch costing?
8. Explain very briefly EBQ.
9. Differentiate between contract costing and job costing.
10. How is loss treated in process costing?
11. Give an example of a service that would be suitable for service costing.
12. What is composite cost unit? Explain with example.

Essay Type Questions

1. Explain Job Costing and Batch Costing giving examples of Industries where they are used.
2. How is Economic Batch Quantity determined under Batch Costing System?
3. Distinguish between Joint products and By-products.
4. Discuss the advantages and disadvantages of using job costing in a manufacturing environment.
5. Explain the steps involved in the batch costing process, highlighting the key considerations for effective implementation.
6. Explore the challenges faced in contract costing and how these challenges can be addressed for accurate cost estimation.
7. Compare and contrast process costing with other costing methods, emphasizing its suitability for certain industries.

8. Analyze the unique challenges associated with service costing and propose strategies for overcoming these challenges.
9. Discuss situations where a company might use a combination of job costing, batch costing, and process costing in its operations.
10. How have technological advances influenced the accuracy and efficiency of costing methods in modern business environments?
11. Explore how environmental sustainability concerns can be integrated into costing practices, with a focus on batch and process costing.
12. Discuss ethical considerations related to costing methods, especially in cases where inaccurate costing information may have significant consequences.
13. Evaluate the applicability of traditional costing methods, such as job costing and process costing, in the service industry, and propose alternative approaches if necessary.

Hint

12. Ethical considerations play a crucial role in the realm of costing methods, particularly when inaccurate costing information can lead to significant consequences. Inaccurate costing can result in distorted financial reporting, misleading stakeholders, and potentially harming the organization's reputation. Several ethical considerations arise in such scenarios. some of the important ones are given below

    - Transparency and Accountability
    - Impact on Decision-Making
    - Legal Compliance
    - Employee Morale and Fairness
    - Long-Term Sustainability.

13. Traditional costing methods, including job costing and process costing, were originally developed for manufacturing industries, and their direct applicability to the service industry can be challenging due to the intangible and often customized nature of services.

    - Services are often intangible, making it difficult to define clear "jobs" or projects. Identifying direct costs for individual services may be ambiguous.
    - Services often lack standardized processes, making it difficult to identify homogeneous cost units.
    - Variation in service delivery may not align with the uniformity assumed in process costing.

    Alternative Approach:

    Activity-Based Costing (ABC): This method allocates costs based on the actual activities that drive costs. In the service industry, where activities may vary widely, ABC provides a more accurate reflection of resource consumption.

    While traditional costing methods may face challenges in the service industry, alternative approaches like ABC, offer more nuanced and adaptable ways to measure and manage costs effectively. The choice of approach should align with the specific characteristics and needs of the services provided by an organization, ensuring accurate cost measurement and informed decision-making in the dynamic service-oriented context.

B. Numerical Questions

⊙ Numerical Multiple Choice Questions

1. Equivalent production of 1,000 units, 60% complete in all respect, is:

   A. 1,000 units

   B. 1,600 units

   C. 600 units

   D. 1,060 units

   (1000 × 60%)

2. In a process 8,000 units are introduced during a period. 5% of input is normal loss. Closing work in progress 60% complete is 1,000 units. 6,600 completed units are transferred to next process. Equivalent production for the period is:

   A. 9,000 units

   B. 7,440 units

   C. 5,400 units

   D. 7,200 units

   (6,600 + 60% × 1,000)

3. 400 units were introduced in a process in which 40 units is the normal loss. If the actual output is 300 units, then there is:

   A. No abnormal gain

   B. Abnormal loss of 60 units

   C. No abnormal loss

   D. Abnormal gain of 60 units

   {(400 – 40) – 300}

Answer

1	**C**	**2**	**D**	**3**	**B**

SECTION-C

Cost Accounting Techniques