

MAR GREGORIOS COLLEGE OF ARTS & SCIENCE

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DEPARTMENT OF COMMERCE (ACCOUNTING & FINANCE)

SUBJECT NAME: ADVANCED COST ACCOUNTING

SUBJECT CODE: CPG6B

SEMESTER: VI

PREPARED BY: PROF.M.PREMA

SYLLABUS

Unit I: Contract Costing

Definition-Features of Contract Costing-Calculation of Profit on Contracts-Cost plus Contract-Contract Costing Vs Job costing-Preparation of Contract A/c.

Unit II: Process Costing

Features of Process costing - Process Loss - Normal and Abnormal Loss - Abnormal Gain - Joint Products - By Products - Concept of Equivalent Production - Process Accounts-Process Losses & Gains.

Unit III: Operation Costing

Operating Costing-Meaning-Preparation of Operating Cost Sheet-Transport Costing-Power Supply Costing-Hospital Costing-Simple Problems.

Unit IV: Marginal Costing

Meaning - Features - Absorption Costing - Marginal Costing Vs Absorption Costing - Contribution-PV Ratio-Break Even Point-Key Factor-Margin of Safety-Preparation of Marginal Cost Statement.

Unit V : Standard Costing

Definition-Objectives-Advantages-Standard Cost and Estimated Cost-Installation of Standard Costing-Variance analysis-Material, Labour, Overhead and Sales Variances
- Calculation of Variances.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Suggested Readings

1. Jain, S.P & Narang, K.L., Cost Accounting, Kalyani Publishers
2. Murthy A & Gurusamy S, Cost Accounting, Vijay Nicole Imprints Pvt. Ltd. Chennai
3. Khanna, B.S. Pandey, I.M-Ahuja, G. K and Arora M.N., Practical Costing, S Chand & Sons
4. Reddy, T.S. and Hari Prasad Reddy, Y, Cost Accounting, Margam Publications
5. Prasad, N. K and Prasad, V. K, Cost Accounting, Book Syndicate
6. Saxena and Vashist, Cost Accounting Sulthan Chand and Sons, 2014, New Delhi

UNIT- I CONTRACT ACCOUNT

Introduction

Contract costing, also known as terminal costing, is a variant of job costing. Contract means a big job in which work is done at site and not in factory premises. The cost of each contract is ascertained. Thus in this method of costing, each contract is a cost unit and an account is opened for each contract in the books of contractor to ascertain profit/loss thereon.

Features of Contract Costing

Contract costing usually shows the following features:

1. Contracts are generally of large size and, therefore, a contractor usually carries out a small number of contracts at a particular point of time.
2. A contract generally takes more than one year to complete.
3. Work on contracts is carried out at the site of contracts and not in factory premises.
4. Each contract undertaken is treated as a cost unit.
5. A separate contract account is prepared for each contract in the books of contractor to ascertain profit or loss on each contract.
6. Most of the materials are specially purchased for each contract. These will, therefore, be charged direct from the supplier's invoices. Any materials drawn from the store are charged to contract on the basis of material requisition notes.
7. Nearly all labour cost will be direct.
8. Most expenses (e.g., electricity, telephone, insurance, etc.) are also direct.
9. Specialist subcontractors may be employed for say, electrical fittings, welding work, glasswork, etc.
10. Plant and equipment may be purchased for the contractor or may be hired for the duration of the contract.
11. Payments by the customer (contractee) are made at various stages of completion of the contract based on architect's certificate for the completed stage. An amount, known as retention money, is withheld by the contractee as per agreed terms.
12. Penalties may be incurred by the contractor for failing to complete the work within the agreed period.

Contract Costing and Job Costing—Distinction

Main points of distinction between contract costing and job costing are as follows:

1. Contract is generally big while job is small. It is well said, "a job is a small contract and a contract is a big job."
2. The number of jobs undertaken at a time are usually large as compared to number of contracts because contracts are generally much bigger in size.
3. In contract costing most of the costs are chargeable direct to contract accounts. Under job costing, direct allocation to such an extent is not possible.
4. Allocation and apportionment of overhead costs is simpler in contract costing as compared to job costing.
5. Jobs are usually carried out in factory premises while contract work is done at site.

Contract Costing Procedure

The basic procedure for costing of contracts is as follows:

1. **Contract account.** Each contract is allotted a distinct number and a separate account is opened for each contract.
2. **Direct costs.** Most of the costs of a contract can be allocated direct to the contract. All such direct costs are debited to the contract account. Direct costs for contracts include: (i) Materials, (ii) Labour and supervision, (iii) Direct expenses, (iv) Depreciation of plant and machinery, (v) Subcontract costs, etc.
3. **Indirect costs.** Contract account is also debited with overheads which tend to be small in relation to direct costs. Such costs are often absorbed on some arbitrary basis as a percentage on prime cost, or materials, or wages, etc. Overheads are normally restricted to head office and storage costs.
4. **Transfer of materials or plant.** When materials, plant or other items are transferred from the contract, the contract account is credited by that amount.
5. **Contract price.** The contract account is also credited with the contract price. However, when a contract is not complete at the end of the financial year, the contract account is credited with the value of work-in-progress on that date.
- 6.

Profit or loss on contract. The balance of contract account represents profit or loss which is transferred to Profit and Loss Account. However, when contract is not completed

within the financial year, only a part of the profit arrived is taken into account and the remaining profit is kept as reserve to meet any contingent loss on the incomplete portion of the contract. This is discussed in detail later in this chapter.

SPECIAL POINTS IN CONTRACT COSTING

Some of the important points in contract costing are now discussed:

Cost of Materials

Materials include (i) materials specifically purchased for the contract; (ii) materials issued from store against material requisition notes. The cost of both these types of materials is debited to the contract account.

Materials returned to store. Whenever materials are issued in excess of requirements, as for instance, cement, sand, pipes, bricks, etc., these are later returned to the store accompanied by a Material Return Note which gives the details of the material returned. Such returned materials are credited to contract account.

Materials at site. At the end of each accounting period, value of materials lying unused at site is credited to contract account and is carried forward for charging against the next period.

Cost of Labour

All wages of workers engaged on a particular contract are charged direct to the contract irrespective of the type of work they perform. When several contracts are running at different locations, payroll is normally sectionalised so as to have separate payroll for each contract. Difficulties in costing may be encountered when some workers may have to move from one site to another when a number of small contracts are undertaken. In such a situation, it becomes necessary to provide time sheets from which allocations can be made. In order to control labour utilisation and prevent fraud in the payment of wages, surprise visits by head office personnel will be necessary.

Plant Depreciation

There are two different methods of dealing with depreciation of plant in contract account:

Contract account is debited with the cost of the plant installed. At the end of the year or when the plant is no longer required, the plant is revalued and contract account is credited with this revalued or depreciated figure. In case plant is sold on the completion of the contract, the contract account is credited with its sale proceeds. The net effect of the above debit and credit will be that the contract account will stand debited with the amount of depreciation which is the difference between the value of plant debited and value of plant credited.

The method is generally used on long contracts which extend over more than one year because depreciated value of the plant is credited to the contract account and brought down as an opening balance in the next period.

(b) Alternatively, contract account is simply debited with the amount of depreciation. It is usual to use this method when plant is sent to contract only for a short period. For example, mobile crane or bulldozer used in a contract may be charged on this basis.

However, when a plant is hired for a contract, a charge for the hire of the plant is debited to the contract as a direct expense.

Subcontract Costs

Work of specialised character, for which facilities are not internally available, is offered to a subcontractor. For example, steelwork, glasswork, painting, etc., is usually carried out by the subcontractors who are accountable to the main contractor. The cost of such work is charged to the contract account.

Payment based on Architect's Certificate

In case the contract is small, full payment is usually made on the completion of the contract. But in case of large contracts, it may take more than one year to complete. In such a case, if no payment is received until the completion of the contract, the financial resources of the contractor could surely become strained. Therefore, a system of progress payments is agreed by parties. In this system, part payments of the contract amount are paid from time to time on the basis of certificate issued by the architect (acting for the contractee), certifying the

value of the work satisfactorily completed. Such payments received by the contractor are usually credited to the personal account of the contractee. It should be noted that such payments are not entered in the Contract Account.

Work-in-progress—Work Certified and Uncertified

When the contract is not completed till the end of the accounting year, the architect is required to value the work-in-progress. Such work-in-progress is classified into work certified and work uncertified.

Work Certified. This is that part of the work-in-progress which has been approved by the contractee's architect/engineer for payment. Work certified is valued at contract price (*i.e.*, selling price), and include a net element of profit.

Work Uncertified. This is that part of the work-in-progress which is not approved by the architect/engineer. This is valued at cost and thus does not include a net element of profit.

Both work certified and uncertified appear on the credits side of the contract account and also on the assets side of the balance sheet.

Retention Money and Cash Ratio

It is usual practice not to pay the full amount of work certified. The contractee may pay a fixed percentage, say 80% or 90% of the work certified, depending upon the terms of the contract. This is known as *Cash Ratio*. The balance amount not paid is known as *Retention Money*. For example, if cash ratio is 75%, the retention money will be remaining 25%. This retention money is a type of security for any defective work which may be found in the contract later on. This also works as a deterrent for the contractor to leave the contract incomplete, if he finds the contract unprofitable. The retention money may also be adjusted against penalties that become due if the contract is not completed within the stipulated time as per the terms of the agreement.

Extra Work

Sometimes the contractor is required to do some extra work like additions or alterations in the work originally done as per agreement. The contractor will charge extra money for such extra work. The cost of such extra work is debited to the contract account and extra price realised is credited to the contract account.

PROFIT ON INCOMPLETE CONTRACTS

Contracts which are started and finished during the same financial year create no accounting problems. But in case of those contracts which take more than one year to complete, a problem arises whether profit on such contracts should be worked out only on the completion of the contract at the end of each financial year or the partly completed work. If profit is computed only on the completion of the contract, profit will be high in the year of completion of the contract, whereas in other years of working on contract, profit will be nil. This would result not only in distorted profit pattern but also in high tax liability because income tax at high rates may have to be paid. Therefore, when contracts extend beyond a year, it becomes necessary to take into account the profit earned (or loss incurred) on the work performed during each year. This helps in avoiding distortion of the year-to-year profit trend of the business. There are two aspects of profit computation:

- (a) Computation of notional profit or estimated profit.
- (b) Computation of the portion of such profit to be transferred to Profit and Loss Account.

Notional Profit

Notional profit is the difference between the value of work-in-progress certified and the cost of such work-in-progress certified.

Portion of Notional Profit or Estimated Profit to be Transferred to Profit and Loss Account

The portion of the notional or estimated profit to be transferred to P&L Account depends upon the stage of completion of the contract *i.e.*, ratio of work-in-progress certified to total contract work. For this purpose work-in-progress uncertified is not considered. Prudence requires that the total notional profit should not be transferred to P&L Account but a portion of it should be withheld as a reserve to meet any unforeseen future expenses or contingencies.

Rules. There are no hard and fast rules in this regard. However, the following general rules may be followed:

1. When work-in-progress certified is less than 25% of the contract price, no profit is transferred to Profit and Loss Account. This is based on the principle that no profit should be taken into account unless the contract has reasonably advanced.

2. When work-in-progress certified is 25% - 50% of the contract price, then generally 1/3 of the profit is transferred to Profit and Loss Account. The balance amount is treated as reserve. Thus, profit to be transferred to Profit and Loss Account is computed by the following formula:

$$\text{Transfer to P \& L A/C} = \text{Notional Profit} \times \frac{1}{3} \times \frac{\text{Cash Received}}{\text{Work certified}}$$

3. When work certified is above 50% of the contract price, then the profit to be transferred to P & L Account is computed as follows:

$$\text{Transfer to P \& L A/C} = \text{Notional Profit} \times \frac{2}{3} \times \frac{\text{Cash Received}}{\text{Work certified}}$$

4. When contract is near completion then the estimated profit should be calculated on the whole contract. The proportion of estimated profit to be transferred to Profit and Loss Account is computed by any one of the following formulas:

$$\text{Estimated profit} = \frac{\text{Work certified}}{\text{Contract price}}$$

$$\text{Estimated profit} = \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Worked certified}}$$

$$\text{Estimated profit} = \frac{\text{Cost of work to date}}{\text{Estimated total cost of work}}$$

$$\text{Estimated profit} = \frac{\text{Cost of work to date}}{\text{Estimated total cost of work}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

5. **Loss on Uncompleted Contracts.** In the event of a loss on uncompleted contracts, this should be transferred in full to the Profit and Loss Account, whatever be the stage of completion of the contract.

Problem: 1 The following expenditure was incurred on a contract of ₹ 12,00,000 for the year ending 31-12-2015.

Materials	2,40,000	Wages	3,28
Plant	40,000	Overheads	17,200

Cash received on account of the contract to 31st Dec., 2015 was ₹ 4,80,000, being 80% of the work certified. The value of materials in hand was ₹ 20,000. The plant had undergone 20% depreciation. Prepare Contract Account.

Solution:

Contract Account for the year ending 31st December, 2015

Particulars	₹	Particulars	₹
To Materials	2,40,000	By Materials in hand	20,000
To Wages	3,28,000	By Plant in hand (40,000 less 20%)	32,000
To Plant	40,000	By Work-in-progress	
To Overheads	17,200	Work certified $\frac{4,80,000}{4,80,000} \times 100 = 80\%$	6,00,000
To Notional Profit c/d	26,800		
	6,52,000		6,52,000
To Profit & Loss A/c (26,800 × 2/3 × 80%)	14,293	By Notional Profit b/d	26,800
To Reserve	12,507		
	26,800		26,800

Problem 2:

The following expenses were incurred on an unfinished contract during the year 2015.

Materials	₹ 90,000
Wages	₹ 60,000
Other expenses	₹ 30,000

₹ 2,00,000 was received by the contractor, being 80% of the work certified. Work done but not certified was ₹ 5,000. Determine the profit to be credited to profit and loss account and profit kept reserve in all the three alternatives given below:

- Contract price is ₹ 3,00,000
- Contract price is ₹ 5,50,000
- Contract price is ₹ 12,00,000
-

Solution:**Contract Account for the year 2015**

Particulars	₹	Particulars	₹
To Materials	90,000	By Working Progress: Wo	
To Wages	60,000	rk certified 2,00,000	2,50,000
To Other expenses	30,000		
To Notional profit	75,000	By Work uncertified	5,000
	2,55,000		2,55,000

Profit credited to profit and loss account:

(i) When contract price is ₹3,00,000, work certified is 2,50,000/3,00,000 X 100 = 83.33 of the contract price. As it is more than 50% of the contract price, profit credited to P&LA/cis

Notional profit $\times \frac{2}{3} \times 80\%$

$$= 75,000 \times \frac{2}{3} \times 80\% = ₹40,000$$

$$\text{Profit in reserve} = ₹75,000 - 40,000 = ₹35,000$$

(ii) When contract price is ₹5,50,000 work certified is 2,50,000/5,50,000 X 100 = 45.55 of the contract price. As it is less than 50% of the contract price, profit credited to P&LA/cis

Notional profit $\times \frac{1}{3} \times 80\%$

$$= 75,000 \times \frac{1}{3} \times 80\% = ₹20,000$$

$$\text{Profit in reserve} = ₹75,000 - 20,000 = ₹55,000$$

(iii) When contract price is ₹12,00,000 work certified is 2,50,000/12,00,000 X 100 = 20.83. As it is less than 25% of the contract price, no profit is credited to P&LA/cis and the entire amount of notional profit is to be kept in reserve.

Problem : 3 The following were the expenses on a contract which commenced on 1st January 2015.

Materials purchased	1,10,000
Material at the end	1,250
Direct wages	15,000
Plant issued	5,000
Direct expenses	8,000

The contract price was ₹1,50,000. It was duly received when the contract was completed on 31-3-2015. Charge indirect expenses at 15% on wages and provide ₹1,000 for depreciation on plant. Prepare the contract account and contractee's account.

Solution

Contract Account for the year ending 31-12-2015

Particulars	₹	Particulars	₹
To Materials	1,10,000	By Contractee's A/c (Contract price)	1,50,000
To Direct wages	15,000	By Materials at the end	1,250
To Direct expenses	8,000	By Plant at the end (5,000 - 1,000)	4,000
To Indirect expenses (15% on 15,000)	2,250		
To Plant issued	5,000		
To Profit and Loss A/c	15,000		
	1,55,250		1,55,250

Contractee's Account for the year ending 31-12-2015

Particulars	₹	Particulars	₹
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To Contract A/c	1,50,000	By Bank	1,50,000
	1,50,000		1,50,000

Note: As the contract is fully completed, entire profit is transferred to profit and loss A/C

Problem:4

Modern Contractors have undertaken the following two contracts on 1st January, 2015:

	Contract A	Contract B
Materials sent to sites	85,349	73,267
Labour engaged on sites	74,375	68,523
Plants installed at sites at cost	15,000	12,500
Direct expenditure	3,167	2,859
Establishment charges	4,126	3,852
Materials returned to store	549	632
Work certified	1,95,000	1,45,000
Cost of work not certified	4,500	3,000
Materials in hand 31st Dec., 2015	1,883	1,736
Wages accrued 31st Dec., 2015	2,400	2,100
Direct expenditure accrued 31st Dec., 2015	240	180
Value on plant 31st Dec., 2015	11,000	9,500

The contract prices have been agreed at ₹2,50,000 for contract A and ₹2,00,000 for contract B. Cash has been received from the contractees as follows: Contract A ₹1,80,000 and Contract B ₹1,40,000.

Prepare Contract Accounts, Contractees Accounts and show how the work-in-progress shall appear in the Balance Sheet of the contractor.

Solution: Contract 'A' Account for the year ending 31st Dec., 2015

Particulars	₹	Particulars	₹
To Materials sent to site	85,349	By Materials (returned to stores)	549
To Labour	74,375	By Materials in hand	1,883
To Plant	15,000	By Plant in hand	11,000
To Direct expenditure	3,167	By Work-in-progress:	
To Establishment charges	4,126	Work certified	1,95,000
To Wages accrued	2,400	Work uncertified	4,500
To Direct expenses accrued	240		1,99,500
To Notional Profit c/d	28,275		
	2,12,932		2,12,932
To Profit & Loss A/c	17,400*	By Notional Profit b/d	28,275
28275 x 2/3 x 1,80,000/1,95,000	10,875		
To Balance c/d (Reserve)	28,275		28,275

A Contractee's Account

	Particulars	₹		Particulars	₹
2015 Dec.31	To Balance c/d	1,80,000	2015 Dec.31	By Cash	1,80,000
		1,80,000			1,80,000
			2016 Jan.1	By Balance b/d	1,80,000

Contract 'B' Account for the year ending 31st Dec., 2015

Particulars	₹	Particulars	₹
To Materials	73,267	By Materials returned to store	632
To Labour	68,523	By Materials in hand	1,736
To Plant	12,500	By Plant in hand	9,500

To Direct expenditure	2,859	By Work-in-progress:		
To Establishment charges	3,852	Workcertified	1,45,000	
To Wagesaccrued	2,100	Work uncertified	3,000	1,48,000
To Direct expenditure accrued	180	By Losstransfer to P&L A/c		3,413
	1,63,281			1,63,281

B Contractee's Account

Particulars		₹	Particulars		₹
2015 Dec.31	ToBalance c/d	1,40,000	2015 Dec. 31	ByCash	1,40,000
		1,40,000			1,40,000
			2016 Jan.1	ByBalance b/d	1,40,000

BalanceSheet ason Dec. 31, 2015

Liabilities		₹	Assets		₹
Wagesaccrued (2,400 + 2,100)		4,500	Plantless Depreciation (27,500 – 7,000)		20,500
Directexpenses accrued (240 + 180)		420	Materialsin hand		3,619
Profit on contract A	17,400		Work-in-progress:		
Less: Loss on contract B	<u>3,413</u>	13,987	ContractA		
			Work certified	1,95,000	
			Work uncertified	4,500	
				<u>1,99,500</u>	
			Less: Profit in reserve	10,875	
				<u>1,88,625</u>	
			Less: Cash received	1,80,000	8,625
			ContractB		
			Work certified	1,45,000	
			Work uncertified	3,000	
				<u>1,48,000</u>	
			Less: Cash received	1,40,000	8,000

Problem 5

T.K.ConstructionLtd.isengagedontwocontractsAandBduringtheyear.The followingparticularsareobtainedattheyear end(Dec. 31):

	Contract A April 1	ContractBS eptember1
Dateof commencement		
Contract price	6,00,000	5,00,000
Materials issued	1,60,000	60,000
Materials returned	4,000	2,000
Materialson site (Dec. 31st)	22,000	8,000
Directlabour	1,50,000	42,000
Direct expenses	66,000	35,000
Establishment expenses	25,000	7,000
Plantinstalled at cost	80,000	70,000
Valueof plant (Dec. 31st)	65,000	64,000
Costof contact not yet certified	23,000	10,000
Valueof contract certified	4,20,000	1,35,000
Cashreceived from contractess	3,78,000	1,25,000
Architect's fees	2,000	1,000

Duringtheperiod,materialsamountingto`9,000havebeentransferredfromcontract AtocontractB.Youarerequiredtoshow:(a)ContractAccounts,(b)Contractees'Accounts,and ExtractsfromBalanceSheetasonDecember31st,clearlyshowingthecalculatioofwork-in-progress.

Solution

Contract 'A' Account for the year ending 31st Dec.....

Particulars	₹	Particulars	₹
ToMaterials usedTo	1,60,000	By Materials returned	4,000
Direct labourTo	1,50,000	ByMaterials transferred to B	9,000
	66,000	ByStock of materials	22,000

Direct expenses	25,000	By Work-in-Progress:		
To Establishment expenses	15,000	Work certified	4,20,000	
To Depreciation on plant	2,000	Work uncertified	23,000	4,43,000
To Architect's fees	60,000			
To Balance c/d (Notional Profit)	4,78,000			4,78,000
	36,000	By Balance b/d		60,000
To P&L A/c	—			
□ 2 8,80,000 □				
□ 1,35,000 × × □				
□ 3 1,10,000 □	24,000			
To WIP A/c (Reserve)	60,000			60,000

Contract 'B' Account for the year ending 31st Dec.....

<i>Particulars</i>	₹	<i>Particulars</i>	₹
To Materials used	60,000	By Materials returned	2,000
To Materials from Contract A	9,000	By Stock materials	8,000
To Direct labour	42,000	By Work-in-progress:	
To Direct expenses	35,000	Work certified	1,35,000
To Establishment expenses	7,000	Work uncertified	10,000
To Depreciation on plant	6,000		1,45,000
To Architect's fees	1,000	By P&L A/c (Loss on contract)	5,000
	1,60,000		1,60,000

A Contractee's Account

<i>Particulars</i>	₹	<i>Particulars</i>	₹
To Balance c/d	3,78,000	By Cash	3,78,000
		By Balance b/d	3,78,000

A Contractee's Account

<i>Particulars</i>	₹	<i>Particulars</i>	₹
To Balance c/d	1,25,000	By Cash	1,25,000
		By Balance b/d	1,25,000

Balance Sheet (Extracts) as on 31st December

<i>Liabilities</i>	₹	<i>Assets</i>	₹
Profit on Contract A	36,000	Plant	1,50,000
Less: Loss on Contract B	5,000	Less: Depreciation	21,000
	31,000	Stock of materials	
		Contract A	22,000
		Contract B	8,000
			30,000
		<i>Work-in-progress:</i>	
		Contract A	
		Work certified	4,20,000
		Work uncertified	23,000
			4,43,000
		Less: Reserve	24,000
			4,19,000
		Less: Cash received	3,78,000
			41,000
		<i>Work-in-progress:</i>	
		Contract B	
		Work certified	1,35,000
		Work uncertified	10,000
			1,45,000
		Less: Cash received	1,25,000
			20,000

UNIT- 2 PROCESS-COSTING

Process costing is used where the production moves from one process to the next until its final completion and there is a continuous mass production of identical units through a series of processing operations. It is applied for various industries like Chemicals and Drugs, Oil Refining, Food Processing, Paints and varnish, Plastics, Soaps, Textiles, and Paper etc.

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

Process costing method may also be adopted in firms that produce a variety of products, provided that the overall production process can be broken down into sub-operation of a continuous repetitive nature like automobiles, toy, plastic etc.

Features of Process Costing:

1. The process cost centres are clearly defined and all costs relating to each process cost centre are accumulated.
2. The cost and stock records for each process cost centre are maintained accurately. These records give clear picture of the unit's introduced in the process cost centre and also units passed to the next process.
3. The total costs of each process are averaged over the total production of that process, including partly completed units.
4. The charging of the cost of the output of one process as the raw materials input cost of the following process.
5. Appropriate method is used in absorption of overheads to the process cost centres.
6. The process loss may arise due to wastage, spoilage, evaporation, etc.
7. Since the production is continuous in nature, there will be closing work-in-progress which must be valued separately.
8. The output from the process may be a single product, but there may also be a by-products and/or joint products.

JOB COSTING VS. PROCESS COSTING:

Sr	Job Costing	Process Costing
1	It is concerned with the cost of an individual Job or batch regardless of the time taken to produce it.	It is impossible to identify individual Jobs and Costs are calculated on time basis for all units of output in that time.
2	A job is carried out or a product is produced to meet the specific requirements of the order. It may be related to single unit or a batch of similar units.	All the products are identical there is a continuous flow of production. It is applied to a large number of units.
3	Standardisation of controls is comparatively difficult as each job differs and more detailed supervision and control is necessary.	Proper control is relatively easy as there are standards applied for costs, process loss, time of production, etc.



4	Costs are collected to each Job at the end of its completion.	Costs are accumulated and collected for each process at the end of specified accounting period and transferred to next process/department till the last process is completed.
5	Only Prime Cost elements are traceable and the overheads are apportioned to each Job on some appropriate basis and sometimes it is difficult to select a suitable method of absorption of overheads to individual Jobs.	Process Costing system is easier to operate than Job costing system because the detailed work of allocating cost to many individual jobs is unnecessary. Many of the costs that are indirect in a Job Costing system may be regarded as direct in process costing system.
6	Work-in-process may or may not exist at the end of an accounting period.	Normally, there will be opening and closing work-in-progress for the accounting period.
7	The cost of each Job is ascertained by adding materials, labour and overheads.	The unit cost is the average cost of the process for a given period.
8	It is a specific order costing.	It is used to ascertain the cost of a product at each process.

PROCESS LOSSES AND GAINS

Normal loss:

The loss expected during the normal course of operations, for unavoidable reasons is called normal loss and this is due to inherent result of the particular process and thus uncontrollable in the short run. Management, overtime, are usually able to identify an average percentage of normal losses expected to arise from the production process.

The normal losses are absorbed by the completed production. The cost of normal losses should be borne by the goods production. If any value can be recouped from sale of scrap or wastage or spoilage etc., then this would be credited to the process account thus reducing the overall cost of the process.

Journal Entry:

Normal loss A/c Dr
 To process account A/c

Abnormal loss: Abnormal losses are those losses the level deemed to be the normal loss rate for the process. The abnormal loss is the amount by which the actual loss exceeds the normal loss and it is expected to arise under inefficient operating conditions.

The abnormal losses are not included in the process costs but are removed from the appropriate process account and reported separately as an abnormal loss. The abnormal loss is treated as a period cost and written off to the profit and loss account at the end of the period.

Abnormal Loss (units) = Normal output - Actual output

Journal Entry:

Abnormal Loss a/c Dr xx
 To process a/c xx

Transfer:

Costing profit & loss a/c .xx
 To Abnormal loss A/c xx

Calculation of Abnormal loss in terms of unit:

Abnormal loss = Normal output - Actual output

Value of Abnormal Loss:

Amount (Rs) 1000/100

= Normal cost of Normal Output / Normal output x Unit of Abnormal loss

Example: Input 100 units of Rs. 1000; Normal loss 10% scrap Rs. 100
 Actual output 87 units Calculate Abnormal loss

Answer:

	Unit	Amount (Rs.)
Input	100	1000
Less: Normal loss	10	100
Normal output	90	(Normal cost) 900
Less: Actual output	87	---
Abnormal loss	3	---

Calculation of value of Abnormal Loss:

Normal cost / Normal output x Unit of Abnormal loss = $900/90 \times 3 = \text{Rs. } 30$

Dr	Unit	Amount	Cr	Unit	Amount
To Input	100	1000	By Normal loss	10	100
			By abnormal loss	3	30
			By actual output	87	(b.f.) 870
	100	1000		100	1000

Abnormal Gain:

If the loss is less than the Normal expected loss, the difference is considered as abnormal gain. Abnormal gain is accounted in the same manner as abnormal loss. Abnormal gain will be debited to the process account and credited to an abnormal gain account. The abnormal gain account is debited with the figure of reduced normal loss in quantity and value. At the end of the accounting year the balance in the abnormal gain account will be carried to Profit and Loss Account.

Calculation of value of abnormal gain:

= Normal cost / Normal output x Unit of Abnormal gain.

Journal Entry:

Process a/c Dr xx

To abnormal gain a/c (Value of abnormal gain) xx

Transfer:

Abnormal gain a/c Dr. xx

To costing profit and loss a/c xx

Example:

Input 100 units = Cost Rs. 1000

Normal Loss 10%; Scrap Rs. 100

Actual output 95 units Calculate Abnormal gain?

	Unit	Amount (Rs.)
Input	100	1000
Less: Normal loss	10	100
Normal output	90	Normal cost 900
Less: Actual output	95	---
Abnormal gain	5	---

Calculation of Abnormal gain:

Normal cost / Normal Output x Unit of Abnormal = $900 / 90 \times 5 = \text{Rs. } 50/-$

D	Unit	Amount	C	Unit	Amount
To Input	100	1000	By Normal loss	10	100
To abnormal gain	5	50	By Actual output	95	(b.f.) 950
	105	1050		105	1050

Problem:

From the undermentioned figures prepare process accounts indicating the cost of each process and the total cost. The production was 480 articles per week.

Particulars	Process I	Process II	Process III
	Rs.	Rs.	Rs.
Material	3000	1000	400
Labour	1600	4000	1200
Factory overheads	520	1440	500

Office overheads amounting of Rs 1700 should be apportioned on the basis of wages. Ignore stock in hand and work-in-process at the beginning and end of week.

UNIT- 3 OPERATING COSTING

- Introduction:** Operating Costing method is generally used in the service sector. It is a method of costing applied to undertakings which provide services rather than production of commodities. Service may be performed internally and externally. Services are termed as internal when they are performed on inter-departmental basis in factory itself e.g. power house services, canteen service etc. Services are termed as external when they are to be rendered to outside parties. Public utility services like transport, water supply, electricity supply, hospitals are the best example for the service costing. Thus operating costing is a method which is designed to determine the cost of services.

Operating costing is just a variant of single or unit or output costing. So the principal of unit costing is used in operating costing. Operating costing is a method of ascertaining the cost of providing or operating a service. It is also known as service costing.

- Units used in certain undertakings:**

Determining the suitable cost unit to be used for cost ascertainment is a major problem in service costing. Selection of a proper cost unit is a difficult task. A proper unit of cost must be related with reference to nature of work and the cost objectives. The cost unit related must be simple i.e. per bed in a hospital, per cup of tea sold in a canteen and per child in a school. In a certain cases a composite unit is used i.e. Passenger – Kilometre in a transport company. The following are some of example of cost units used in different organizations

UNDERTAKINGS	COST UNIT
Goods transport	per tonne-kilo meter or per quintal kilometre
Railway or bus transport or passenger transport	per passenger-kilo meter
Electricity	per kilowatt-hour
Hospital	per patient, per bed occupied
Canteen	per meal, per tea, per thali, etc.
Water supply	per 1,000 litres or per 1,000 gallons

- In your syllabus there is only transport costing.
- Transport costing:** Transport costing is method of ascertaining the cost of providing service by a transport undertaking. This includes air, water, road and railways; motor transport includes private cars, carriers for owners, buses, taxis, carrier Lorries etc. The objective of motor transport costing may be summarized as follows:
 - to ascertain the operation cost of running a vehicle
 - to provide an accurate basis for quotation and fixing of rates

- to provide cost comparison between own transport and alternative *e.g.* hiring
- to compare the cost of monitoring one group of vehicle with another group
- to determine the cost to be charged against departments using the service
- to ensure the cost of maintenance and repairs is not excessive
- **Round trip:** Round trip means—to and fro.
- **Freightage:** The rate/price which is charged from the customer is called freightage (in case of goods transport/carriage). It can be assumed as a selling price.
- **Taking:** The rate/price which is charged from the customer is called taking. It can be assumed as a selling price. When the commission/profit is given as a percentage of taking then this means that commission/profit is given as a percentage of sales.
- Abnormal losses shall be excluded while ascertaining the cost.
- Fine/penalty paid due to the violation of traffic rules shall not be added to the cost.
- **Wages of driver/conductor/cleaner:** If given on the basis of hours or kilometres then these are variable otherwise in all other cases these are fixed.
- **Depreciation:** Depreciation is a variable expense unless otherwise specified.
- **Passenger kilometres:** Passenger kilometres are always calculated using absolute method. Formula is as follows:
- **Calculation of Cost Per Unit:** In order to calculate the cost per unit, divide the total cost by the number of units. *e.g.* Total cost is 50,000 and Passenger KMs are 5,00,000. The cost per passenger KM would be Rs. 0.10 (Rs. 50,000 / 5,00,000 Passenger KMs). Then add the profit to the cost per unit (or total cost) in accordance of the information given in the question.
- **Costs are classified into the following three heads:**
- **Standing or Fixed Charges:** These charges are included while ascertaining the cost whether or not the vehicle is operating. Insurance, tax, depreciation, part of driver wages, interest on capital, general supervision, and salary of operating managers are items which come under the category of fixed or standing charges.
- **Maintenance charges:** There are semi variable expenses in nature. Wear on tyres, repairs and overheads, painting etc. come under the category of maintenance charges.
- **Operating and running charges:** Running costs are the cost of operations. These charges vary more or less in direct proportion to kilometres. These expenses are variable in nature because they are dependent on distance covered and trips made.

Though the above three classification is there but in practical life it is difficult to divide these expenses in these categories. It depends basically on the circumstances of each case *e.g.* if the salary paid to driver is on monthly basis then it is a fixed charge but if the same is limited to kilometre run or hours then it is a running cost.

Format of the Operating Cost Sheet

OPERATING COST SHEET		
VehicleNumber:DL1T5689	For the Month/Quarter/Year	
	Passenger KMs	KMs/Tonnes KMs/Quintal
Particulars	Total Amount (Rs.)	Cost Per Passenger KM / Cost Per TonneKM / Cost Per Quintal KM (Rs.)
FIXED CHARGES/STANDING CHARGES:		
• Wages of drivers, conductors, cleaners, foreman, etc.		
• Salaries of office and supervisory staff, accountant, etc.		
• Taxation, insurance, road tax, license fee, etc.		
• Interest and other charges		
• Heating and lighting		
• Coolie wages		
• General overheads		
• Garage rent/charges/overheads		
• Other fixed overheads, expenses		
• Director fees		
• Stationery		
• Interest on capital (may be included treating as a notional expense)		
TOTAL STANDING CHARGES		
VARIABLE OVERHEADS/RUNNING CHARGES/RUNNING AND MAINTENANCE OVERHEADS:		
• Repair and maintenance		
• Diesel, petrol, other oils, etc.		
• Lubricating oil		
• Depreciation		
• Tyre allocation		
• Commission to driver or conductor		
TOTAL VARIABLE OVERHEADS/RUNNING CHARGES		
TOTAL COST (FIXED/STANDING + VARIABLE/RUNNING) AND COST PER PASSENGER/TONNE KM		

EXAMPLE

Varun Limited is running four buses between Delhi and Alwar, covering a distance of 100 KMs. The seating capacity of each bus is 40 passengers. The following particulars are obtained from its books for the month of October 2009:

Wages of drivers and conductors	Rs.9,600
Salaries of office staff	Rs.3,000
Honorarium of accountant	Rs.1,000
Diesel, oil etc.	Rs.16,000
Repair and maintenance	Rs.3,200
Road tax and insurance	Rs.6,400
Depreciation	Rs.10,400
Interest and other charges	Rs.8,000

Actual passengers carried were 75% of the seating capacity. All the buses ran for 30 days. Each bus made one

round trip per day. Find out the fare the company should charge per passenger KM if it wants a profit of 20% on the taking.

OPERATING COST SHEET		
VehicleNumber:DL1T5689	For the monthOctober2009Pa ssenger KMs:7,20,000	
Particulars	Total Amount (Rs.)	Cost Per Passenger KM(Rs.)
FIXED CHARGES/STANDING CHARGES:		
Wages of drivers and conductors	9,600	
Salaries of office staff	3,000	
Honorarium of accountant	1,000	
Road tax and insurance	6,400	
Interest and other charges	8,000	
TOTAL STANDING CHARGES	28,000	0.039
VARIABLE OVERHEADS/RUNNING CHARGES/RUNNING AND MAINTENANCE OVERHEADS:		
Diesel, oil, etc.	16,000	
Repair and maintenance	3,200	
Depreciation	10,400	
TOTAL VARIABLE OVERHEADS/RUNNING CHARGES	29,600	0.041
TOTAL COST (STANDING + RUNNING) AND COST PER PASSENGER KM	57,600	0.080
Add: Profit (20% of Taking i.e. Selling Price)=Cost □ % / (100-%) = 0.080 □ 20 / (100-20)	14,400	0.020
TOTAL FARE AND FARE (TAKING) THE COMPANY SHOULD CHARGE PER PASSENGER KM	72,000	0.100

PROBLEM

From the following information calculate the cost of running a taxi per kilometer:

Number of taxi	10	Cost of each taxi	Rs. 2,00,000
Salary of manager	Rs. 6,000 P.M	Salary of Accountant	Rs. 5,000 P.M
Salary of cleaner	Rs. 2,000P.M	Salary of Machanic	Rs. 4,000 P.M
Garage rent	Rs. 6,000 P.M	Insurance premium	5% p.a
Annual Tax	Rs. 6000 per taxi	Driver salary	Rs. 2,000 p.m per taxi
Annual repair	Rs. 10,000 per taxi		

Total life of a taxi is about 2,00,000 kms. A taxi runs in all 3,000 k.m. in a month of which 30% it runs empty. Petrol consumption is one litre for 10 k.m. at Rs.18 per litre. Oil and sundries are Rs. 50 per 100 kms.

Operating cost sheet for cost of running a taxi per kilometer

	Per month	Per K.m

PROBLEM

The road transport company which keeps a fleet of lorries shows the following information:

Kms runs in April	30,000
Wages for April	2,000
Petrol,oil for April	4,000
Original cost of vehicle	1,00,000
Depreciation to be allowed at 25% p.a on original cost.	
Repairs for the month of April	6,000
Garage rent for April	1,000
License, Insurance for the year	6,000

Prepare operating cost sheet for April showing the fixed cost, variable and total cost per running kilometre



UNIT- 4

MARGINAL COSTING AND BREAK-EVEN ANALYSIS

Definition of Marginal cost and Marginal costing

According to the Terminology of Cost Accountancy of the Institute of Cost and Management Accountants, London, Marginal Cost represents "the amount of any given volume of output by which aggregate costs are changed if the volume of output is increased by one unit.

Marginal cost may also be defined as "the aggregate of variable costs" or "prime cost plus variable overheads".

Thus, if for the production of 1,000 units of a product the manufacturer has to incur Rs. 75,000 for materials, Rs. 50,000 for direct wages, Rs. 25,000 for variable overheads and Rs. 50,000 fixed overheads, the marginal cost can be ascertained as follows:

	Total (1,000 units) Rs.	Per unit Rs.
Direct materials	75,000	75
Direct Wages	50,000	50
Prime Cost	1,25,000	125
Variable Overheads	25,000	25
Marginal Cost	1,50,000	150

MARGINAL COSTING

The Institute of Cost and Management Accountants, London, has defined Marginal Costing as "the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs.

BASIC CHARACTERISTICS OF MARGINAL COSTING

1. The stock of finished goods and work-in-process are valued at marginal cost only.
2. It is a technique of analysis and presentation of costs which help management in taking many managerial decisions; and is not an independent system of costing such as process costing or job costing.
3. The variable costs (marginal costs) are regarded as the costs of the products.
4. All elements of cost production, administration and selling and distribution are classified into variable and fixed component.
5. Fixed costs are treated as period costs.

ASSUMPTIONS OF MARGINAL COSTING

1. The volume of production or output is the only factor which influences the costs.
2. All elements of cost production, administration and selling and distribution— can be segregated into fixed and variable components.
3. The selling price per unit remains unchanged or constant at all levels of activity.
4. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.
5. Fixed costs remain unchanged or constant for the entire volume of production.

MARGINAL COSTING VS DIRECT/DIFFERENTIAL/VARIABLE COSTING

The term marginal costing is also referred to as 'variable costing', 'direct costing', 'differential costing' or 'incremental costing'.

MARGINAL COSTING VS ABSORPTION COSTING OR FULL COSTING

1. Absorption costing is the total cost technique. Under absorption costing all costs whether variable or fixed are treated as product costs. In marginal costing technique only variable costs are treated as product costs.
2. In absorption costing arbitrary apportionment of fixed costs, over the products, results in under or over-absorption of such costs. While marginal costing excludes fixed costs and the question of under or over-absorption of fixed costs does not arise.
3. Absorption costing differs from marginal costing from the point of view of inventory valuation also. In absorption costing, the stock of finished goods and work-in-process is valued at total cost which includes both variable and fixed cost. In marginal costing, such stocks are valued at marginal cost.
4. In absorption costing, managerial decision-making is based upon 'profit' which is the excess of sales value over total cost. While in marginal costing, the managerial decisions are guided by 'contribution' which is the excess of sales value over variable cost.

CONTRIBUTION:

Contribution is the difference between sales and variable cost or marginal cost of sales. It may also be defined as the excess of selling price over variable cost per unit. Contribution is also known as Contribution Margin or Gross Margin. Contribution being the excess of sales over variable cost is the amount that is contributed towards fixed expenses and profit.

If the selling price of a product is Rs. 20/- per unit and its variable cost is Rs. 15/- per unit, contribution per unit is Rs. 5/- (i.e. Rs. 20-15).

$$\text{Contribution} = \text{Sales} - \text{Variable (Marginal) Cost}$$

Or Contribution per unit = Selling Price - Variable (or marginal) cost per unit or Contribution = Fixed Costs + Profit (— Loss)

Advantages of contribution:

- It helps the management in deciding whether to purchase or manufacture a product or a component.
- It helps the management in the fixation of selling prices. It assists in determining the break-even point.
- It helps in taking a decision as regards to adding a new product in the market.
- It helps management in the selection of a suitable product mix for profit maximisation.
- It helps in choosing from among alternative methods of production; the method which gives highest contribution per limiting factor is adopted.

Marginal Cost Equation:

$\text{Sales} - \text{Variable cost} = \text{Contribution}$
 or, $\text{Sales} = \text{Variable cost} + \text{Contribution}$
 $\text{Sales} = \text{Variable cost} + \text{Fixed Cost} \pm \text{Profit/Loss}$
 or, $\text{Sales} - \text{Variable cost} = \text{Fixed cost} \pm \text{Profit/Loss}$
 or, $S - V = F \pm P$
 Where 'S' stands for Sales
 'V' stands for Variable cost
 'F' stands for Fixed cost
 'P' stands for Profit/Loss

Determine the amount of variable cost from the following particulars:

Sales	150000
Fixed Cost	30000.
Profit	40000

Solution:

$\text{Sales} - \text{Variable cost} = \text{Fixed Cost} \pm \text{Profit} / \text{Loss}$
 or $150000 - V.C. = 30,000 + 40,000$ or
 $\text{Variable cost} = 1,50,000 - 70,000 = \text{Rs. } 80,000.$

Illustration: From the following information find out the amount of profit earned during the year using the marginal costing technique:

Fixed Cost	Rs. 250000
Variable cost	Rs. 10 per unit
Selling price	Rs. 15 per unit
Output level	75000 units

Solution:

$S - V = F + P$
 $\text{Sales} = \text{Rs. } 75,000 \times 15 = \text{Rs. } 11,25,000$
 $\text{Variable Cost} = 75,000 \times 10 = \text{Rs. } 7,50,000$

$\text{Fixed Cost} = \text{Rs. } 2,50,000$
 $\text{Profit (P)} = ?$
 $11,25,000 - 7,50,000 = 2,50,000 + P$
 $3,75,000 = 2,50,000 + P$
 $= 3,75,000 - 2,50,000$
 $\text{Profit} = \text{Rs. } 1,25,000.$

Profit/Volume Ratio (P/V ratio or C/S Ratio)

The Profit/volume ratio, which is also called the 'contribution ratio' or 'marginal ratio', expresses the relation of contribution to sales and can be expressed as under:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

$\text{P/V Ratio} = \frac{\text{Sales} - \text{Variable cost}}{\text{Sales}}$ i.e. $\frac{S - V}{S}$
 or, $\text{P/V Ratio} = \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}}$
 $\text{P/V Ratio} = \frac{\text{Change in profit or Contribute}}{\text{Change in Sales}}$
 $\text{P/V Ratio} = \frac{20 - 15}{20} \times 100 = \frac{5}{20} \times 100 = 25\%$

The PA/ ratio, which establishes the relationship between contribution and sales is of vital importance for studying the profitability of operations of a business. It reveals the effect on profit of changes in the volume.

The formula for the sales volumes required to earn a given profit is:

$$P/V \text{ Ratio} = \text{Contribution} / \text{Sales}$$

$$\text{or, } P/V \text{ Ratio} = \text{Fixed Cost} + \text{Profit} / \text{Sales}$$

$$\text{or, } \text{Sales} = \text{Fixed cost} + \text{Profit} / P/V \text{ Ratio} = \frac{F + P}{P/V \text{ Ratio}}$$

Illustration:

Sales	Rs.100000
Profit	Rs.10000
Variable cost	70%

Find out (i) PA/ ratio, (ii) Fixed Cost (iii) Sales Volume to earn a Profit of Rs.

$$40000 \text{ Sales} = \text{Rs.}100000$$

$$\text{Variable cost} = 70\% = 70 / 100 \times 100000 = \text{Rs.}$$

$$70000 \text{ P/V Ratio} = \text{sales} - \text{variable cost} / \text{sales} \times 100$$

$$= 100000 - 70000 / 100000 \times 100 = 30\%$$

$$\begin{aligned} \text{Contribution} &= \text{Fixed cost} + \\ \text{profit } 30000 &= \text{fixed cost} + 10000 \\ &= \text{Rs.}20000 \end{aligned}$$

$$\text{Fixed cost} = 30000 - 10000$$

$$\text{Sales} = \text{Fixed cost} + \text{profit} / P/V \text{ Ratio}$$

$$= 20000 + 40000 / 30\%$$

$$= 60000 \times 100 / 30 = \text{Rs.}200000$$

Illustration:

The sales turnover and profit during two years were as follows:

Year	Sales Rs.	Profit Rs.
2015	140000	15000
2016	160000	20000

You are required to calculate:

- a) P/V ratio
- b) Sales required to earn a profit of Rs.40,000,
- c) Profit when sales are Rs.1, 20,000.

Solution:

$$\begin{aligned} \text{a) } P/V \text{ Ratio} &= \text{Change Profit} / \text{Change in Sales} \times 100 \\ &= 5000 / 20000 = 100 = 25\% \end{aligned}$$

$$\begin{aligned} \text{b) } \text{Sales required to earn a profit of Rs.} \\ 40,000 \text{ P/V Ratio} &= \text{Fixed cost} + \text{profit} / \\ \text{Sales or} \end{aligned}$$

$$25/100 = F + 15,000 / 1,40,000 \text{ or}$$

$$140000 \times 25/100 = F + 15000 = 35000 - 15000 = F \text{ or}$$

$$\text{Fixed cost} = \text{Rs. } 20000 \text{ or Fixed Cost} = \text{Rs.}$$

$$20,000 \text{ Desired Sales} = F + P / P/V \text{ Ratio}$$

$$= 20000 + 40000 / 25 / 100 = 60000 \times 100 / 25 = \text{Rs.}240000$$

c) Profit when sales are Rs.

$$1,20,000S = F + P/P/V \text{ Ratio}$$

$$S \times P/V \text{ ratio} = F + P$$

$$1,20,000 \times 25/100 = 20,000 + P$$

$$30,000 = 20,000 + P$$

$$\text{Profit} = 30,000 - 20,000 = \text{Rs. } 10,000$$

COST-VOLUME & PROFIT ANALYSIS

Cost-Volume-Profit Analysis is a technique for studying the relationship between cost, volume and profit. Profits of an undertaking depend upon a large number of factors. The CVP relationship is an important tool used for the profit planning of a business. In cost-volume-profit analysis an attempt is made to analyse the relationship between variations in cost with variations in volume.

The cost-volume-profit relationship is of immense utility to management as it assists in profit planning, cost control and decision making. Cost-volume-profit analysis can be used to answer questions such as:

1. How much sales should be made to avoid losses?
2. How much should be the sales to earn a desired profit?
3. What will be the effect of change in prices, costs and volume on profits?
4. Which product or product mix is most profitable?
5. Should we manufacture or buy some product or component? And soon.

BREAK-EVEN ANALYSIS

The study of cost-volume-profit analysis is often referred to as a break-even analysis. The term "break-even analysis" is used in two senses. In its broad sense, break-even analysis refers to the study of relationship between costs, volume and profit at different levels of sales or production. In its narrow sense, it refers to a technique of determining that level of operations where total revenue equals total expenses, i.e., the point of no profit, no loss.

ASSUMPTIONS OF BREAK-EVEN ANALYSIS

1. The break-even analysis is based upon the following assumptions:
2. All elements of cost, i.e., production, administration and selling and distribution can be segregated into fixed and variable components.
3. Selling price per unit remains unchanged or constant at all levels of output.
4. There is only one product or in case of multi-products, the sales mix remains unchanged.
5. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.
6. There will be no change in the general price-level.
7. Fixed cost remains constant at all volumes of output.
8. Volume of production is the only factor that influences cost.
9. There is synchronisation between production and sales.

BREAK-EVEN POINT

The break-even point may be defined as that point of sales volume at which total revenue is equal to total cost. It is a point of no profit, no loss. A business is said to break-even when its total sales are equal to its total costs. At this point contribution, i.e., sales minus marginal cost equals the fixed costs and hence this point is often called as Critical Point or Equilibrium Point or Balancing Point or no profit, no loss. If production/sales are increased

beyond this level, there shall be profit to the organisation and if it is decrease from this level, there shall be loss to the organisation.

Break-even point can be stated in the form of an equation:

Sales revenue at break-even point = Fixed Costs + Variable Costs.

ALGEBRAIC FORMULA METHOD FOR COMPUTING THE BREAK-EVEN POINT

The break-even point can be computed in terms of:

- a. Units of sales volume.
- b. Budget total or in terms of money value.
- c. As a percentage of estimated capacity.

(a) Break-Even Point in Units:

As the break-even point is the point of no profit or loss, it is that level of output at which the total contribution equals the total fixed costs, it can be calculated with the help of the following formula:

Break Even Point = $\frac{\text{Fixed Cost}}{\text{Selling Price per unit} - \text{Variable Cost per unit}}$
= $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

(b) Break-Even Point in terms of budget-total or money value:

At break-even point:

Total Sales = Total Fixed Cost + Total Variable Cost S =
F + V (Where S = Sales, F = Fixed Cost and V = Variable cost)

Break-Even Sales = $\frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost} \times \text{Sales}}$
= $\frac{\text{Fixed Cost}}{\text{Contribution} \times \text{Sales}}$

With the use of P/V Ratio, B.E.P = $\frac{\text{Fixed cost}}{\text{P/V Ratio}}$ (As, $\frac{\text{contribution}}{\text{sales}} = \text{P/V Ratio}$)

MARGIN OF SAFETY

The excess of actual or budgeted sales over the break-even sales is known as the margin of safety. It is the difference between actual sales minus the sales at break-even point.

Margin of Safety = Total Sales - Sales at Break - Even

Point Margin of Safety (M/S) = $\frac{\text{Profit}}{\text{P/V Ratio}}$

ANGLE OF INCIDENCE

The angle of incidence is the angle between the sales line and the total cost line formed at the break-even point where the sales line and the total cost line intersect each other. The angle of incidence indicates the profit earning capacity of a business. A large angle of incidence indicates a high rate of profit and, on the other hand, a small angle of incidence indicates a low rate of profit.

MANAGERIAL APPLICATIONS OF MARGINAL COSTING

(Decisions Involving Alternative Choices)

Marginal costing technique is a valuable aid to management in taking many managerial decisions. It is a useful tool for making policy decisions, profit planning and cost control. The

following are some of the important managerial problems where marginal costing technique can be applied.

1. Pricing Decisions.
2. Profit Planning and Maintaining a Desired Level of Profit.
3. Make or Buy Decisions.
4. Problems of Key or Limiting Factor.
5. Selection of a Suitable or Profitable Sales Mix.
6. Effect of Changes in Sales Price.
7. Alternative Methods of Production.
8. Determination of Optimum Level of Activity.
9. Evaluation of Performance.
10. Capital Investment Decisions.

PRICING DECISIONS

Fixing of selling prices is one of the most important functions of management. Although prices are generally determined by market conditions and other economic factors yet marginal costing technique assists the management in the fixation of selling prices under various circumstances as:

- a) Pricing under normal conditions
- b) During stiff competition
- c) During trade depression.

Profit Planning and Maintaining a Desired Level of Profit

Marginal costing techniques can be applied for profit planning as well. Profit planning involves the planning of future operations to achieve maximum profits or to maintain a desired level of profits.

Make or Buy Decisions:

Sometimes a concern has to decide whether a certain product or a component should be made in the factory itself (having unused production facilities) or bought from outside from a firm which specialises in it. In taking such a 'make or buy' decision, the technique of marginal costing is of immense help.

Materials
Direct labour
Other Variable Expenses

Depreciation and other Fixed Expenses Solution:

Since fixed costs are to be incurred whether we manufacture this component or not the decision depends upon the marginal cost of making the component which is calculated as follows:

Marginal Cost of Component 0.51 (per unit)	Rs.
Materials	3.00
Direct Labour	2.00
Other Variable Expenses	-

It is advisable to make the component itself if the marginal cost of making the component is lower than the purchase price because every component produced will give some contribution to the company. But in case the marginal cost is higher than the purchase price, it is better to buy the component from outside than to make it.

In the above example, if the purchase price is Rs. 6.50, it is not advisable to buy the component from outside. We should rather make the component of our own because every component manufactured will give a contribution of 50 paise. But the company should not manufacture the component if it is available at Rs. 5.50 from outside. In that case it is better to buy than to make.

Problem of Key or Limiting Factor:

A limiting factor is a factor which limits or restricts production or sales and thus prevents a concern from making unlimited profits. Limiting factor is also known as key factor. The limiting factor may be any factor of production such as availability of raw material, labour, capital, plant capacity and even sales.

Effect of Changes in Sales Price:

Management is generally confronted with a problem of analysing the effect of changes in sales price upon the profitability of the concern. It may be required to reduce the prices on account of competition, depression.

Alternative Methods of Production:

Sometimes the management has to choose from among alternative methods of production, e.g., machine work or hand work. The same product may be produced either by employing machine No. 1 or Machine No. 2, and the management may be confronted with the problem of choosing one among them. In such circumstances, technique of marginal costing can be applied and the method which gives the highest contribution can be adopted keeping in view, of course, the limiting factor.

Evaluation of Performance:

Evaluation of performance efficiency of various departments, product lines or markets can also be made with the use of the technique of managerial costing.

Capital Investment Decisions:

The technique of marginal costing also helps the management in taking capital investment decisions.

ADVANTAGES OF MARGINAL COSTING:

- The technique of marginal costing is very simple to operate and easy to understand.
- It does away with the need for allocation, apportionment and absorption of fixed overheads and hence removes the complexities of under-absorption of overheads.
- Marginal cost remains the same per unit of output irrespective of the level of activity. It is constant in nature and helps the management in production planning.
- There is no possibility of fictitious profits by over-valuing stocks.
- It facilitates the calculation of various important factors.
- It is a valuable aid to management for decision-making and fixation of selling prices, selection of a profitable product/sales mix.
- It facilitates the study of relative profitability of different product lines, departments.
- It is complementary to standard costing and budgetary control.

- Help in cost control
- It helps the management in profit planning.
- It is very useful in management reporting

LIMITATIONS OR DISADVANTAGES OF MARGINAL COSTING

- The technique of marginal costing is based upon a number of assumptions which may not hold good under all circumstances.
- All costs are not divisible into fixed and variable.
- Variable costs do not always remain constant.
- Selling prices do not remain constant.
- Fixed costs do not remain constant after a certain level of activity
- The exclusion of fixed costs from the stocks of finished goods and work-in-progress is illogical.
- Although the technique of marginal costing overcomes the problem of under or over-absorption of fixed overheads, the problem still exists in regard to under or over-absorption of variable overheads.
- Marginal costing completely ignores the time factor.
- The technique of marginal costing cannot be applied in contractorship building industry.
- Cost control can be better achieved with the help of other techniques, viz., standard costing and budgetary control than by marginal costing technique.
- Fixation of selling prices in the long run cannot be done without considering fixed costs. Thus, pricing decisions cannot be based on marginal cost alone.
- Managerial decisions based upon only the marginal cost ignoring equally important element of fixed cost may not be correct.



Cost control is a basic objective of cost accountancy. Standard costing is the most powerful system ever invented for cost control.

Historical costing or actual costing is nothing but, a record of what happened in the past. It does not provide any 'Norms' or 'Yardsticks' for cost control. The actual costs lose their relevance after that particular accounting period. But, it is necessary to plan the costs, to determine what should be the cost of a product or service. If the actual costs do not conform to what the costs should be, the reasons for the change should be assessed and appropriate actions should be initiated to eliminate the causes.

Standard costing fulfills the need to compensate the shortcomings of Historical costing from the point of view of cost control. (a) It provides the norms or yardsticks in the form of standards- specifying what costs should be or yardsticks in the form of standards- specifying what cost should be (b) comparison of actual costs with standards is facilitated to ascertain variances for each element of cost. (c) The variances are further analysed

for contributory reasons. Responsibility is fixed on the basis of the reasons for each variance.

(a) Corrective measures are under taken to eliminate the unfavourable variances wherever possible.

Thus, standard costing is a costing technique specifically evolved to provide complete 'Infrastructure' and 'Systematic approach' for cost control.

DEFINITION: STANDARD, STANDARD COST, STANDARD COSTING

Standard. According to Prof. Eric L. Kohler, "Standard is a desired attainable objective, a performance, a goal, a model". Standard may be used to a predetermined rate or a predetermined amount or a predetermined cost.

Standard Cost: Standard cost is predetermined cost or forecast estimate of cost. I.C.M.A. Terminology defines Standard Cost as, "a predetermined cost, which is calculated from management standards of efficient operations and the relevant necessary expenditure. It may be used as a basis for price-fixing and for cost control through variance analysis". The other names for standard costs are predetermined costs, budgeted costs, projected costs, model costs, measured costs, specifications cost etc. Standard cost is a

predetermined estimate of cost to manufacture a single unit or a number of units of a product during a future period. Actual costs are compared with these standard costs.

Standard Costing is defined by I.C.M.A. Terminology as, "The preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence".

"Standard costing is a method of ascertaining the costs whereby statistics are prepared to show (a) the standard cost (b) the actual cost (c) the difference between these costs, which is termed the variance" says Wheldon. Thus the technique of standard cost study comprises of:

1. Pre-determination of standard costs;
2. Use of standard costs;
3. Comparison of actual cost with the standard costs;
4. Find out and analyse reasons for variances;
5. Reporting to management for proper action to maximize efficiency.

ADVANTAGES OF STANDARD COSTING

Cost control:

Standard costing is universally recognized as a powerful cost control system. Controlling and reducing costs becomes a systematic practice under standard costing.

Elimination of wastage and inefficiency:

Wastage and inefficiency in all aspects of the manufacturing process are curtailed, reduced and eliminated over a period of time if standard costing is in continuous operation.

Norms:

Standard costing provides the norms and yardsticks with which the actual performance can be measured and assessed.

Locate sources of inefficiency:

It pinpoints the areas where operational inefficiency exists. It also measures the extent of the inefficiency.

Fixing responsibility:

Variance analysis can determine the persons responsible for each variance. Shifting or evading responsibility is not easy under this system.

Management by exception:

The principle of management by exception can be easily followed because problem areas are highlighted by negative variances.

Improvement in methods and operations:

Standards are set on the basis of systematic study of the methods and operations. As a consequence, cost reduction is possible through improved methods and operations.

Guidance for production and pricing policies:

Standards are valuable guides to the management in the formulation of pricing policies and production decisions.

Planning and Budgeting:

Budgetary control is far more effective in conjunction with standard costing. Being predetermined costs on scientific basis, standard costs are also useful in planning the operations.

Inventory valuation:

Valuation of stocks becomes a simple process by valuing them at standard cost.

LIMITATIONS OF STANDARD COSTING

1. It is costly, as the setting of standards needs high technical skill.
2. Keeping of up-to-date standards is a problem. Periodic revision of standards is a costly thing.
3. Inefficient staff is incapable of operating this system.
4. Since it is difficult to set correct standards, it is difficult to ascertain correct variance.
5. Industries, which are subject to frequent changes in technological process or the quality of material or the character of labour, need a constant revision of standard. But revision of standard is more expensive.
6. For small concerns, standard costing is expensive.

APPLICABILITY OF STANDARD COSTING

Standard Costing is a control device. It is not a separate method of product costing. Any activity of recurring nature is susceptible for setting standards. The standard-cost process is mostly used to control the operating tasks. Manufacturing activities are routine and frequent and therefore easy for establishing standards.

Industries where standardized and uniform work of repetitive nature is done are suitable for introduction of standard costing. Standard costing system is of little use or no use where works vary from job to job or contract to contract.

SETTING THE STANDARDS

While setting standard cost for operations, process or product, the following preliminaries must be gone through:

- i) There must be Standard Committee, similar to Budget Committee, in which Purchase Manager, Personnel Manager, and Production Manager are represented. The Cost Accountant coordinates the functions of the Standard Committee.
- ii) Study the existing costing system, cost records and forms in use. If necessary, review the existing system.
- iii) A technical survey of the existing methods of production should be undertaken so that accurate and reliable standards can be established.
- iv) Determine the type of standard to be used.
- v) Fix standard for each element of cost.
- vi) Determine standard costs for each product.
- vii) Fix the responsibility for setting standards.
- viii) Classify the accounts properly so that variances may be accounted for in the manner desired.
- ix) Comparison of actual costs with pre-determined standards to ascertain the deviations.
- x) Action to be taken by management to ensure that adverse variances are not repeated.

INTRODUCTION OF STANDARD COSTING SYSTEM

Introducing standard costing in any establishment requires the fulfillment of following preliminaries.

1. Establishment of cost centres;
2. Classification and codification of accounts;
3. Determining the types of standards and their basis;
4. Determining the expected level of activity;
5. Setting standards

Establishment of cost centres

A cost centre is a location, person or item of equipment for which costs may be ascertained and used for the purpose of cost control. The cost centres divide an entire organisation into convenient parts for costing purpose. The nature of production and operations, the organisational structure, etc. influence the process of establishing cost centres. No hard and fast rule can be laid down in this regard. Establishment of the cost centres is essential for pinpointing responsibility for variances.

Classification and codification of accounts

The need for quick collection and analysis of cost information necessitates classification and codification. Accounts are to be classified according to different items of expenses under suitable headings. Each of the headings is to be given a separate code number. The codes and symbols used in the process facilitate introduction of computerization.

Determining the types of standards and their basis

Standards can be classified into two broad categories on the basis of the length of use.

- (a) **Current standards:** These are standards which are related to current conditions, particularly of the budget period. They are for short-term use and are more suitable for control purpose. They are also more amenable for combining with budgeting.
- (b) **Basic standards:** These are long-term standards, some of them intended to be in use for even decades. They are helpful for planning long-term operations and growth. Basic standards are established for some base year and are not changed for a long period of time.

It is preferable to use both kinds of standards depending on the nature and type of activity or cost for which they are fixed. Generally, the number of basic standards may be very few and current standards are predominant in number.

Basic standards

There can be significant difference in the standards set depending on the base used for them. The following are the different bases for setting standard, whether they are current standards for short-term or basic standards for long-term use.

- (a) **Ideal standards:** These standards reflect the best performance in every aspect. They are like 100 marks in a paper for students taking up examinations. What is possible under ideal circumstances in all aspects is reflected in these standards. They are impractical and unattainable in practice. Their utility for control purpose is negligible.
- (b) **Past performance based standards:** The actual performance attained in the past may be taken as basis and the same may be retained as standard. Such standards do not provide any incentive or challenge to the employees. They are too easy to attain. Their value from cost control point of view is minimal.
- (c) **Normal standard:** It is defined as "the average standard which, it is anticipated can be attained over a future period of time, preferably long enough to cover one trade cycle". They are average standards reflecting the average performance over a complete trade cycle which may take three to five years. For a specific period, say a budget period, their relevance is negligible.
- (d) **Attainable high performance standards:** They are based on what can be achieved with reasonable hard work and efforts. They are based on the current conditions and capability of the workers. These standards are considered to be of great practical value because they provide sufficient incentive and challenge to the workers to attain them. Any variances from such standard are really significant because the standard which is attainable with the effort is not attained.

Determining the expected level of activity

Capacity of operation or level of activity expected over a future period is vital in fixing current or short-term standards. When the activity level is decided on the basis of sales or production, whichever is the limiting factor; all standard can be developed with the activity level as the focal point. The purchase of material, usage of material, labour hours to be worked, etc. are solely governed by the planned level of activity.

Setting standards

Setting standards may also be called developing standards or establishment of standard cost because as a consequence of setting standards for various aspects, standard cost can be computed.

Setting standards is like laying a building foundation. The success of standard costing system depends on the care with which the standards are developed.

It is preferable, particularly in large firms, to establish 'Standard committee' which is responsible for determining standards in all aspects of the business and also making suitable revisions in due course. The standard committee usually consists of all the functional managers like purchase, production and sales, technical experts like Production Engineer, the General Manager and the Cost Accountant. It is the Cost Accountant's role which is crucial because he has to assign the monetary values for the different standards set by the other experts in each area or function.

The following is a brief discussion on the setting of standards for each element of cost:

(1) Standards for Direct Material Cost

Direct material standards are broadly divided into standards for usage or quantity standards and standards for material price. There may be several materials used in the production of a product. It is necessary to set standards for each of the important materials.

Material usage or Quantity standards

These standards deal with the quantity of material needed for each unit of finished product, the quality specifications and tolerances like length, breadth, strength, volume, etc. Based on the past experience, the normal loss to be expected has to be determined. Based on the expected or permitted loss, the quantity standard per unit is fixed. If two or more materials are mixed in the production, the standard proportion of each material has to be fixed.

The production manager and technical expert play the most important role in setting quantity standards. Their knowledge, experience and the shop floor situation are instrumental in deciding upon the quality and quantity of each material. The following are the usual quantity standards set.

- (a) Quantity of material per unit of finished product.
- (b) Standard loss permitted in the production process.
- (c) The proportion of different materials, if more than one material is used.
- (d) The yield expected from material.

Material price standards: Price standards for the material are the most difficult to set because material prices are subject to the market forces. Usually, current market price for each material, the trends observed and the forecasts of the purchasing department are the determining factors.

While fixing price standards, the other terms like trade discounts, freight, credit terms, etc., are also considered.

Material prices should also include the cost of purchasing and storing including the handling costs.

It is customary to prepare a standard 'Bill of Materials' which is a list of all the direct materials to be used and incorporate therein all the standards set for each material so that it acts like a ready reckoner.

(2) Standards for direct labour cost

The two major aspects for which standards are developed relating to labour are (A) Labour time and (B) Labour rate.

(A) Labour Time Standards: These standards represent the time to be taken by the direct labour in the production of one unit of product or performing a specific operation. It may be determined with the help of (1) Time and Motion study; (2) Technical estimates; (3) Trial runs; (4) Past experience; (5) Caliber of the workers; (6) Working conditions.

Since, human factor is involved, the cooperation of workers should be obtained by suitable briefing about the purpose and significance of the exercise.

If different kinds of labour have to perform group tasks, standards should also be fixed for labour mix or gang.

The most ticklish problem in setting the labour time standards is the provision for idle time. Idle time includes rest pauses, personal needs of the workers, etc. the care with which the idle time standards are fixed determines the level of arguments and quarrels on the production lines.

The following are the usual labour time standards etc.

- (a) Standard time to be taken for one unit of output.
- (b) Idle time permitted
- (c) Proportion of different kinds of labour where two or more kinds of workers are involved.

(B) Labour rate standards: Labour rates are generally governed by agreements with trade unions, the firm's wage policy and incentive systems in use. However, the following factors influence the labour rate standards: (i) Existing, labour rates; (ii) Rates paid by similar firms; (iii) Type or kind of labour needed for production and (iv) Labour law governing the industry.

Wage rate standards differ for different grades or kinds of labour. The rate is also subject to revision whenever new agreements are concluded with the unions.

(3) Standards for overhead cost

Overheads are usually segregated into fixed and variable. It is necessary to fix standard overhead rates separately for fixed overheads and variable overheads. Separate rates have to be determined for factory, office, selling and distribution overheads- both fixed and variable.

While determining the overhead rates, the factors to be considered are:

- (a) Standard level of activity;
- (b) Number of units to be produced
- (c) Labour and machine hours to be worked.

Standard overhead costs – both fixed and variable should be determined. Based upon the standard output and standard hours, the overhead rates are finalized.

Standard output and its standard cost

Once all the cost standards are finalised, it is possible to consolidate them in the shape of 'standard cost for standard output'.

The direct material cost per unit, direct wages per unit, fixed and variable overheads per unit can be listed out. The total of all of these represents standard cost per unit. This can be multiplied with the standard output for the budget period or a specified period to ascertain the standard cost of the standard output.

Standard hour

If a single product is produced in a firm, the output can be expressed in terms of the units of that product. However, several different products may be produced and they may be measured in different units like kgs, Tons, liters, gallons, barrels, etc. Though all of these can not be expressed in terms of a single measure, it is possible to express all of them in terms of 'Time'. Time taken to produce is the common factor for all output. Production, expressed in terms of hours needed to produce them is called 'Standard hours'.

According to I.C.M.A., England, "Standard hours are a hypothetical hour which represents the amount of work which should be performed in one hour under standard conditions".

The 'Standard hour' is very useful in ascertaining overhead variances. The total output of a firm comprising different products is expressed in the form of standard hours and the fixed and variable overhead rates are set for standard hours.

Revision of standards

Current or short-term standards have to be periodically revised. Long-term or basic standards may be used for longer periods. They may also need revision when the factors affecting the standard change.

Revision may be needed in all the following cases:

- (a) Change in market price of materials
- (b) permanent change in labour rates
- (c) Major alterations in products or method of production or materials used
- (d) Basic change in product specifications or design.
- (e) Errors in setting of the original standards.

ESTIMATED COSTING AND STANDARD COSTING

Both standard costing and estimated costing are predetermined costs. But the object of standard costing differs. The differences between these two costs are:

Estimated Cost	Standard Cost
1. It is used as statistical data, and leads to a lot of guesswork.	It is scientifically used, and it is a regular system of account based upon estimation and time studies.
2. Its objects are to ascertain "What the cost will be".	Its object is to ascertain "what the costs should be"
3. It gives importance to cost ascertainment for fixing a sale price.	It is used for effective cost control and to take proper action to maximise efficiency.
4. It is used for a specific use; i.e., fixing sale price.	It is a continuous process of costing, and takes into account all the manufacturing processes. It can be used where standard costing is in operation.
5. It can be used where costing is in operation.	As it is based on scientific analysis, it is more accurate than the estimated cost.
6. It is not accurate. It is an approximation based on past experience.	

HISTORICAL COST AND STANDARD COST

Historical Cost	Standard Cost
1. It is an after-production-recorded cost.	It is a predetermined cost.
2. It is, actually, incurred cost.	It is an ideal cost.
3. As it relates to the past, it is not useful for cost control.	It is a future cost. It can be used for cost control.
4. It is used to ascertain the profit or the loss incurred during a period.	It is used for the measurement of operational efficiency of the enterprises.

BUDGETARY CONTROL AND STANDARD COSTING

Budgetary Cost	Standard Cost
1. It is extensive in its application, as it deals with the operation of department or business as a whole.	It is intensive, as it is applied to manufacturing of a product or providing a service.
2. Budgets are prepared for sales, production, cash etc.	It is determined by classifying recording and allocating expenses to cost unit.
3. It is a part of financial account, a projection of all financial accounts.	It is a part of cost account, a projection of all cost accounts.
4. Control is exercised by taking into account budgets and actuals. Variances are not revealed through accounts.	Variances are revealed through difference accounts.
5. Budgeting can be applied in parts.	It cannot be applied in parts.
6. It is more expensive and broad in nature, as it relates to production, sales, finance etc.	It is not expensive because it relates to only elements of cost.
7. Budgets can be operated with standards.	This system cannot be operated without budgets.

1 Elimination of wastage and inefficiency: Wastage and inefficiency in all aspects of the manufacturing process are curtailed, reduced and eliminated over a period of time if standard costing is in continuous operation.

2 Norms: Standard costing provides the norms and yard sticks with which the actual performance can be measured and assessed.

Limitations of standard costing

1. It is costly, as the setting of standards needs high technical skill.
2. Keeping of up-to-date standards is a problem. Periodic revision of standards is a costly thing.
3. Inefficient staff is incapable of operating this system.

VARIANCE ANALYSIS

The most significant contribution of standard costing to the science and art of management is the presentation of 'Variances'. As a matter of fact, without determination and analysis of variances, standard costing is meaningless.

The term **variance** is derived from the very 'to vary' which means to differ. According to *CIMA*, England, a cost variance is 'the difference between a standard cost and the comparable actual cost incurred during a period'. Thus, Variance represents the extent to which actual costs deviate from the 'Norms' or 'Yardsticks'.

FAVOURABLE AND UNFAVOURABLE VARIANCES

Variance may be **Favourable [positive or credit] or Unfavourable [negative or adverse or debit]** depending upon whether the actual resulting cost is less or more than the standard cost.

Favourable Variance [F]:

When the actual cost incurred is less than the standard cost, the deviation is known as favourable variance. The effect of the favourable variance increases the profit. Again, favourable variance would result when the actual cost is lower than the standard cost. It is also known as positive or credit variance and viewed as savings.

Unfavourable Variance [A]:

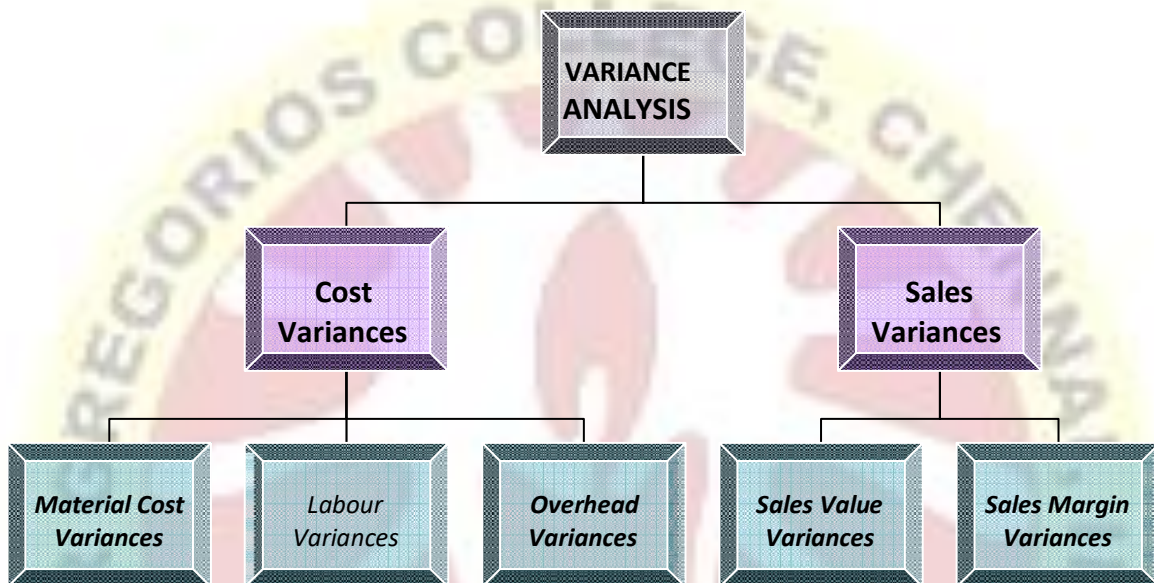
When the actual cost incurred is more than the standard cost, there is a variance, known as Unfavourable or adverse variance. Adverse variance refers to deviation to the loss of the business. It is also known as negative or debit variance and viewed as additional costs or losses.

When the sales/ profit is greater than the standard sales/profits, it is called as favourable variance. When the sales/profit is less than the standard sales/profit, it is known as Unfavourable variance.

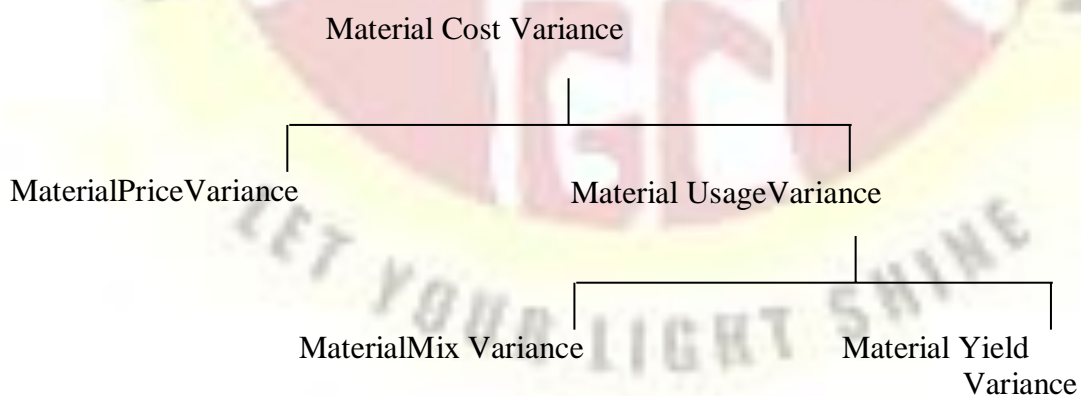
The favourable variance is a sign of efficiency of the organization and the Unfavourable variance is considered as a sign of inefficiency.

The computation and analysis of variance are the objectives of standard costing. The causes of variance are necessary to find remedial measures; and therefore a detailed study of variance analysis is essential. Variance can be broadly divided into two categories – [1] cost variances and [2] sales variances. Variances can be found out with respect to all the elements of costs i.e., direct materials, direct labour and overheads. In other words, the total cost variances is split into its component parts on the basis of elements, and each element is further subdivided to locate the responsibility of variance. The following are the common variances, which are calculated by the management. Sub-divisions of variances really have given detailed information to the management in order to control the cost.

- Material cost variances;
- Labour or Wage variances;
- Overhead cost variances – [i] variable and [ii] fixed
- Sales variances – volume or margin



Materials form a very high percentage of total cost. Therefore, it is important to study its variances.



[a] **Direct Material Cost Variance [MCV]** is the difference between the standard costs of direct materials specified for the output achieved and the actual cost of direct materials used. The standard cost of materials is computed by multiplying the standard price with the standard quantity for actual output; and the actual cost is computed by multiplying the actual price with the actual quantity. The formula is:

$$MCV = [\text{Standard Cost of Materials} - \text{Actual cost of materials used}]$$

[OR]

$$= [\text{Standard cost of Actual output} - \text{Actual cost}]$$

[OR]

$$= [SQ \times SP] - [AQ \times AP]$$

Where, SQ refers Standard quantity for actual output; SP means Standard price AQ means Actual quantity and AP refers Actual price

If the actual cost is less than the standard cost, the variance is favourable and vice versa. MCV arises due to change in the price of the materials or a change in the usage of materials

In order to find the exact causes for the material cost variance, the material cost variances is divided into two. Material price and Materials usage variances are the components of MCVs. Materials usage variance is further divided into material mix variances and materials yield or material sub-usage variances. Let us discuss all these in the following sections.

[b] Materials Price Variance[MPV]

It is that part of material cost variance which is due to the difference between the standard price specified and the actual price paid.

$$MPV = AQ[SP-AP]$$

MPV arises due to the following reasons:

i. changes in the market prices of materials; ii. Uneconomical size of purchase orders; iii. Uneconomical transport costs; iv. Failure to obtain cash discount; and v. failure to purchase materials at proper time.

The responsibility of Material price variance is mainly of the purchase manager. However, a general increase in the prices is uncontrollable and cannot fix responsibility.

[c] Material Usage Variance [MUV]

It is the difference between the standard quantity specified and the actual quantity used.

$$MUV = SP [SQ-AQ]$$

MUV may arise due to carelessness in use of materials; loss due to pilferage; faulty workmanship; use of material mix other than the standard mix and defect in plant and machinery causing excessive consumption of materials.

[d] Material Mix Usage[MMV]

It is the part of material usage variance which arises due to change in standard and actual compositions of mix.

$$MMV = SP [RSQ - SQ]$$

where RSQ refers Revised Standard Quantity

$$RSQ = \frac{\text{Standard Quantity}}{\text{Standard Quantity}} \times \frac{\text{Total Actual Quantity}}{\text{Total}}$$

The variance arises in industries like chemical, rubber etc. where definite proportions of different raw

materials are mixed to get a product. Variations may arise due to general shortage or non-purchases of materials at the proper time.

[e] Materials Yield Variance[MYV]

It is part of material usage variance and it is the difference between standard yield specified and actual yield obtained.

$$MYV = [Standard Yield - Actual Yield] \times Average Standard Price per unit$$

Or

$$= [Standard loss on actual output - Actual Loss] \times Average Standard Price per unit$$

[f] Materials Sub-usage Variance[MSUV]

It is the general practice to analyze the material usage variance into mix and yield variations. However, in some cases it may not be possible or convenient to calculate yield variance. For example information may not be available about units of output, in such cases; sub-usage variance is calculated on the assumption that a single job or work is the output. By computing yield variance become a problem.

$$MSUV = SP [SQ-RSQ]$$

Generally material sub-usage variance is not popular among those who use standard costing as a control system.

Note: The symbols “F” refers favourable variances and “A” indicates Adverse Variance.

Relationship	
MCV =	MPV + MUV
MUV =	MMV + MYV/MSUV

Illustration

Calculate material variances from the following data

	Standard	Actual
Quantity	400 kgs	460 Kgs.
Price	Rs.2 per Kg.	Rs.1.5 Per kg.
Value	Rs.800	Rs.690

Solution

$$\begin{aligned}
 [a] \text{ Material Cost Variance} &= [SQ \times SP] - [AQ \times AP] \\
 &= [400 \times Rs.2] - [460 \times Rs.1.5] \\
 &= Rs.800 - Rs.690 = \mathbf{Rs.110[F]} \\
 [b] \text{ Material Price Variance} &= AQ[SP-AP] \\
 &= 460 [2-1.5] = \mathbf{Rs.230[F]} \\
 [c] \text{ Material Usage Variance} &= SP[SQ-AQ] \\
 &= Rs.2 [400-460] = \mathbf{Rs.120 [A]}
 \end{aligned}$$

Relationship and Verification:

$$MCV = MPV + MUV$$

$$Rs.110 [F] = Rs.230 [F] + Rs.120 [A]$$

Note: ‘A’ denotes adverse/ negative (-)variance and ‘F’ denotes favourable/ positive [+] variance.

Illustration

The standard estimate for materials to manufacture 1,000 units of a commodity is 400 kgs., at Rs.2.50 per kg.

When 2,000 units of the commodity are manufactured, it is found that 820 kgs. Of materials are consumed at Rs.2.60 per kg.

Calculate the material variances.

Solution

Working Notes: Calculation of standard quantity for actual output

To produce 1,000 units, standard materials = 400 kgs.

To produce 2,000 units, standard materials = $2,000 / 1,000 \times 400 = 800$ Kgs

$$\begin{aligned} \text{[a] Material Cost Variance} &= [SQ \times SP] - [AQ \times AP] \\ &= [800 \times \text{Rs.}2.5] - [820 \times \text{Rs.}2.60] \\ &= \text{Rs.}2,000 - \text{Rs.}2,132 = \text{Rs.}132 \text{ [A]} \end{aligned}$$

$$\begin{aligned} \text{[b] Material Price Variance} &= AQ [SP-AP] \\ &= 820 [2.50-2.60] = \text{Rs.}82 \text{ [A]} \end{aligned}$$

$$\begin{aligned} \text{[c] Material usage Variance} &= SP [SQ-AQ] \\ &= \text{Rs.}2.50 [800-820] = \text{Rs.}50 \text{ [A]} \end{aligned}$$

Relationship and Verification:

$$\text{MCV} = \text{MPV} + \text{MUV}$$

$$\text{Rs.}132 \text{ [A]} = \text{Rs.}82 \text{ [A]} + \text{Rs.}50 \text{ [A]}$$

Illustration

From the following particulars, calculate material cost variance, material price variance and material usage variance.

Material purchased – 3,000 kgs at Rs.6 per kgs;

Standard quantity of material fixed for one unit of finished product – 25 kgs at Rs.4 per kg.

Opening stock – Nil and Closing Stock – 500 kgs. Actual output during the period – 80 units

Solution

Working Notes: [1] Actual quantity used = Opening Stock + Purchases – Closing Stock
 $= \text{Nil} + 3,000 - 500 = 2,500$ kgs

[2] Calculation of standard quantity for actual output

To produce one unit, standard materials = 25 kgs.

To produce 80 units, standard materials = $25/1 \times 80 = 2,000$ Kgs

$$\begin{aligned} \text{[a] Material Cost Variance} &= [SQ \times SP] - [AQ \times AP] \\ &= [2000 \times \text{Rs.}4] - [2,500 \times \text{Rs.}6] \\ &= \text{Rs.}8,000 - \text{Rs.}15,000 = \text{Rs.}7,000 \text{ [A]} \end{aligned}$$

$$\begin{aligned} \text{[b] Material Price Variance} &= AQ [SP-AP] \\ &= 2,500 [6-4] = \text{Rs.}5,000 \text{ [A]} \end{aligned}$$

$$\text{[c] Material usage Variance} = SP [SQ-AQ]$$

Rs.4 [2,000-2,500] =Rs.2,000 [A]

Relationship and Verification:

$$\text{MCV} = \text{MPV} + \text{MUV}$$

$$\text{Rs.7,000 [A]} = \text{Rs.5,000[A]} + \text{Rs.2,000 [A]}$$

DIRECT LABOUR COST VARIANCE

Labour cost variances arise because of [1] difference in actual rates and standard rates of labour and [2] variation in actual time taken by workers and the standard time allotted to them for performing a work. The labour variances are computed on the same pattern as those of material variances as calculated in the above section. One can find out the various formulae for Direct labour variances by simply putting the word 'time' in place of quantity. The various labour variances which will be analysed are as follows:

- Labour Cost Variance;
- Labour Rate Variance;
- Labour Time or Efficiency Variance;
- Labour Idle Time variances;
- Labour Mix or Gang Composition Variance; and
- Labour Yield Variance

[a] Labour Cost Variance [LCV]

Labour cost variance is the difference between the standard wages specified and the actual wages paid.

$$\begin{aligned} \text{LCV} &= \text{Standard cost of Labour} - \text{Actual cost of labour} \\ &= [ST \times SR] - [AT \times AR] \end{aligned}$$

If the standard cost is higher, the variation is favourable and vice versa.

[b] Labour Rate Variance [LRV]

It is the difference between the standard rate of wages specified and the actual rate paid to the labour.

$$\text{LRV} = AT [SR - AR]$$

Labour rate variance arises due to changes in the basic wage rates; rate of difference methods of wages payment and unscheduled overtime.

[c] Labour Efficiency Variance [LEV]

It is a part of labour cost variance. It is the difference between standard labour hours/time specified and actual labour hours spent.

$$\text{LEV} = SR [ST - AT]$$

This variance arises due to lack of proper supervision; insufficient training; poor working conditions and increase in labour grades utilized.

[a] Labour Idle Time Variance [LITV]

Idle time variance is due to time lost abnormally on account of strikes, lockouts, power failure, machine breakdown etc. Time wasted due to such causes on which the individual workers have not control should be separately accounted for should be shown as separate variance.

$$LITV = SR \times Idle\ Time[IT]$$

It should be noted that this variance is always shows [A] adverse variance

[b] Labour Mix Variance[LMV]

The difference between the standard labour grade specified and the actual labour grade utilized is referred as labour gang composition variance.

$LMV = SR [RST - AT]$ where RST refers Revised Standard Time RSQ=

$$\frac{\text{StandardTime}}{\text{Total Standard Time}} \times \text{Total ActualTime}$$

[c] Labour Yield Variance[LYV]

It is just like material yield variance and it is the difference between the standard labour output and the actual labour output or yield. It is calculated as below:

$$LYV = \text{Standard Cost per unit} [\text{Standard output for Actual mix} - \text{Actual output}]$$

Note: The symbols “F” refers favourable variances and “A” indicates Adverse Variance.

Relationship	
LCV	= LRV + LEV
LEF	= LMV + LYV + LITV

Illustration No. 16.6

The standard time and rate for unit components are given below: Standard hours 20;

Standard Rate Rs.5 per hour;

Actual data and related information are as under:

Actual production 1,000 units:

Actual Hours 20,500 hours; Actual Rate per hour Rs.4.80

Calculate [1] Labour Cost Variance; [2] Labour Efficiency Variance ; and [3] Labour Rate Variance