

PROCESS COSTING

Unit Structure

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1.0 LEARNING OBJECTIVES

After studying this chapter you should be able to understand

- the meaning of Process Costing and its importance
- the distinction between job costing and process costing
- the accounting procedure of process costing including normal loss abnormal loss (or) gain
- the valuation of work-in-progress, using FIFO, LIFO average and weighted average methods
- the steps involved in inter process transfer

1.1 INTRODUCTION:

Process costing is a form of operations costing which is used where standardized homogeneous goods are produced. This costing method is used in industries like chemicals, textiles, steel, rubber, sugar, shoes, petrol etc. Process costing is also used in the assembly type of industries also. It is assumed in process costing that the average cost presents the cost per unit. Cost of production during a particular period is divided by the number of units produced during that period to arrive at the cost per unit.

1.2 MEANING OF PROCESS COSTING

Process costing is a method of costing under which all costs are accumulated for each stage of production or process, and the

cost per unit of product is ascertained at each stage of production by dividing the cost of each process by the normal output of that process.

1.2.1 Definition:

CIMA London defines process costing as “that form of operation costing which applies where standardize goods are produced”

1.2.2 Features of Process Costing:

- (a) The production is continuous
- (b) The product is homogeneous
- (c) The process is standardized
- (d) Output of one process become raw material of another process
- (e) The output of the last process is transferred to finished stock
- (f) Costs are collected process-wise
- (g) Both direct and indirect costs are accumulated in each process
- (h) If there is a stock of semi-finished goods, it is expressed in terms of equivalent units
- (i) The total cost of each process is divided by the normal output of that process to find out cost per unit of that process.

1.2.3 Advantages of process costing:

1. Costs are be computed periodically at the end of a particular period
2. It is simple and involves less clerical work than job costing
3. It is easy to allocate the expenses to processes in order to have accurate costs.
4. Use of standard costing systems is very effective in process costing situations.
5. Process costing helps in preparation of tender, quotations
6. Since cost data is available for each process, operation and department, good managerial control is possible.

1.2.4 Limitations:

1. Cost obtained at each process is only historical cost and are not very useful for effective control.
2. Process costing is based on average cost method, which is not that suitable for performance analysis, evaluation and managerial control.
3. Work-in-progress is generally done on estimated basis which leads to inaccuracy in total cost calculations.
4. The computation of average cost is more difficult in those cases where more than one type of products is manufactured and a division of the cost element is necessary.
5. Where different products arise in the same process and common costs are prorated to various cost units. Such individual product costs may be taken as only approximation and hence not reliable.

1.3 DISTINCTION BETWEEN JOB COSTING AND PROCESS COSTING

Job order costing and process costing are two different systems. Both the systems are used for cost calculation and attachment of cost to each unit completed, but both the systems are suitable in different situations. The basic difference between job costing and process costing are

	Basis of Distinction	Job order costing	Process costing
1.	Specific order	Performed against specific orders	Production is continuous
2.	Nature	Each job may be different.	Product is homogeneous and standardized.
3.	Cost determination	Cost is determined for each job separately.	Costs are compiled for each process for department on time basis i.e. for a given accounting period.
4.	Cost calculations	Cost is compiled when a job is completed.	Cost is calculated at the end of the cost period.
5.	Control	Proper control is comparatively difficult as each product unit is different and the production is not continuous.	Proper control is comparatively easier as the production is standardized and is more suitable.
6.	Transfer	There is usually not transfer from one job to another unless there is some surplus work.	The output of one process is transferred to another process as input.
7.	Work-in-Progress	There may or may not be work-in-progress.	There is always some work-in-progress because of continuous production.
8.	Suitability	Suitable to industries where production is intermittent and customer orders can be identified in the value of production.	Suitable, where goods are made for stock and production is continuous.

1.4 COSTING PROCEDURE

For each process an individual process account is prepared. Each process of production is treated as a distinct cost centre.

1.4.1 Items on the Debit side of Process A/c.

Each process account is debited with –

- Cost of materials used in that process.
- Cost of labour incurred in that process.
- Direct expenses incurred in that process.
- Overheads charged to that process on some pre determined.
- Cost of ratification of normal defectives.
- Cost of abnormal gain (if any arises in that process)

1.4.2 Items on the Credit side:

Each process account is credited with

- Scrap value of Normal Loss (if any) occurs in that process.
- Cost of Abnormal Loss (if any occurs in that process)

1.4.3 Cost of Process:

The cost of the output of the process (Total Cost less Sales value of scrap) is transferred to the next process. The cost of each process is thus made up to cost brought forward from the previous process and net cost of material, labour and overhead added in that process after reducing the sales value of scrap. The net cost of the finished process is transferred to the finished goods account. The net cost is divided by the number of units produced to determine the average cost per unit in that process. Specimen of Process Account when there are normal loss and abnormal losses.

Dr. **Process I A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Basic Material	xxx	xx	By Normal Loss	xx	xx
To Direct Material		xx	By Abnormal Loss	xx	xx
To Direct Wages		xx	By Process II A/c.	xx	xx
To Direct Expenses		xx	(output transferred to		
To Production Overheads		xx	Next process)		
To Cost of Rectification of Normal Defects		xx	By Process I Stock A/c.	xx	xx
To Abnormal Gains		xx			
	xx	xxx		xx	xx

1.4.4 Process Losses:

In many process, some loss is inevitable. Certain production techniques are of such a nature that some loss is inherent to the production. Wastages of material, evaporation of material is unavoidable in some process. But sometimes the Losses are also occurring due to negligence of Labourer, poor quality raw material, poor technology etc. These are normally called as avoidable losses. Basically process losses are classified into two categories (a) Normal Loss (b) Abnormal Loss

1. Normal Loss:

Normal loss is an unavoidable loss which occurs due to the inherent nature of the materials and production process under normal conditions. It is normally estimated on the basis of past experience of the industry. It may be in the form of normal wastage, normal scrap, normal spoilage, and normal defectiveness. It may occur at any time of the process.

No of units of normal loss: Input x Expected percentage of Normal Loss.

The cost of normal loss is a process. If the normal loss units can be sold as a scrap then the sale value is credited with process account. If some rectification is required before the sale of the normal loss, then debit that cost in the process account. After adjusting the normal loss the cost per unit is calculated with the help of the following formula:

Cost of good unit:

$$\frac{\text{Total cost increased} - \text{Sale Value of Scrap}}{\text{Input} - \text{Normal Loss units}}$$

2. Abnormal Loss:

Any loss caused by unexpected abnormal conditions such as plant breakdown, substandard material, carelessness, accident etc. such losses are in excess of pre-determined normal losses. This loss is basically avoidable. Thus abnormal losses arrive when actual losses are more than expected losses. The units of abnormal losses are calculated as under:

$$\text{Abnormal Losses} = \text{Actual Loss} - \text{Normal Loss}$$

The value of abnormal loss is done with the help of following formula:

Value of Abnormal Loss:

$$\frac{\text{Total Cost increase} - \text{Scrap Value of normal Loss}}{\text{Input units} - \text{Normal Loss Units}} \times \text{Units of abnormal loss}$$

Abnormal Process loss should not be allowed to affect the cost of production as it is caused by abnormal (or) unexpected conditions. Such loss representing the cost of materials, labour and overhead charges called abnormal loss account. The sales value of the abnormal loss is credited to Abnormal Loss Account and the balance is written off to costing P & L A/c.

Dr. **Abnormal Loss A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A/c.	xx	xx	By Bank	xx	xx
			By Costing P & L A/c.	xx	xx
	xx	xxx		xx	xx

3. Abnormal Gains:

The margin allowed for normal loss is an estimate (i.e. on the basis of expectation in process industries in normal conditions) and slight differences are bound to occur between the actual output of a process and that anticipates. This difference may be positive or negative. If it is negative it is called ad abnormal Loss and if it is positive it is Abnormal gain i.e. if the actual loss is less than the normal loss then it is called as abnormal gain. The value of the abnormal gain calculated in the similar manner of abnormal loss. The formula used for abnormal gain is:

Abnormal Gain

$$\frac{\text{Total Cost incurred} - \text{Scrap Value of Normal Loss}}{\text{Input units} - \text{Normal Loss Units}} \times \text{Abnormal Gain Unites}$$

The sales values of abnormal gain units are transferred to Normal Loss Account since it arrive out of the savings of Normal Loss. The difference is transferred to Costing P & L A/c. as a Real Gain.

Dr. **Abnormal Gain A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal Loss A/c.	xx	xx	By Process A/c.	xx	xx
To Costing P & L A/c.	xx	xx			
	xx	xx		xx	xx

Check Your Progress:

1. Define the following terms
 - a. Process costing
 - b. Normal Loss
 - c. Abnormal Loss
2. Give the formulas of following
 - a) Cost of good / normal unit
 - b) Value of Abnormal Loss

1.5 SOLVED ILLUSTRATIONS**Illustration 1: (Normal / Abnormal Loss)**

Prepare a Process Account, Abnormal Loss Account and Normal Loss Account from the following information.

Input of Raw material	1000 units @ Rs. 20 per unit
Direct Material	Rs. 4,200/-
Direct Wages	Rs. 6,000/-
Production Overheads	Rs. 6,000/-
Actual output transferred to process II	900 units
Normal Loss	5%
Value of Scrap per unit	Rs. 8/-

Solution :

Dr. **Process – I A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Raw material @ 20	1000	20000	By Normal Loss		
To Direct Material		4200	(5% on 1000)	50	400
To Direct Wages		6000	By Abnormal Loss A/c.	50	
To Production Overheads		6000	BY Process – II A/c.		
			(output transferred)	900	
	1000	36200		1000	36200

Dr.		Abnormal Loss A/c.		Cr.	
Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – I A/c.	50		By Bank A/c.	50	400
			By Costing P & L A/c.		
	50			50	400

Dr.		Normal Loss A/c.		Cr.	
Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – I A/c.	50	400	BY Bank	50	400

Working Notes:

(1) Cost of abnormal Loss :

$$= \frac{\text{Total Cost increased} - \text{Sales value of Scrap}}{\text{Input units} - \text{Normal Loss Units}} \times \text{abnormal units}$$

$$= \frac{36200 - 400}{1000 - 50} \times 50$$

(2) It has been assumed that units of abnormal loss have also been sold at the same rate i.e. of Normal Scrap

Illustration 2: (Normal / Abnormal Loss and Abnormal Gain)

The product of a company passes through 3 distinct process. The following information is obtained from the accounts for the month ending January 31, 2008.

Particulars	Process – A	Process – B	Process – C
Direct Material	7800	5940	8886
Direct Wages	6000	9000	12000
Production Overheads	6000	9000	12000

3000 units @ Rs. 3 each were introduced to process – I. There was no stock of materials or work in progress. The output of each process passes directly to the next process and finally to finished stock A/c.

The following additional data is obtained :

Process	Output	Percentage of Normal Loss to Input	Value of Scrap per unit (Rs.)
Process – I	2850	5 %	2
Process – II	2520	10 %	4
Process – III	2250	15 %	5

Prepare Process Cost Account, Normal Cost Account and Abnormal Gain or Loss Account.

Solution:

Dr. **Process – A A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Units introduced	3000	9000	By Normal Loss A/c.	150	300
To Direct Material		7800	By Process – B A/c.	2850	28500
To Direct Wages		6000	(Units transferred		
To Production Overheads			@ Rs. 10/-)		
		6000			
	3000	28800		3000	28800

Dr. **Process – B A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – I A/c.	2850	28500	By Normal Loss A/c.	285	1140
To Direct Material		5940	By Abnormal Loss A/c.	45	9000
To Direct Wages		9000	By Process – C A/c.	2520	50400
To Production Overheads					
		9000			
	2850	52440		2850	52440

Dr. Process – C A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – II A/c.	2520	50400	By Normal Loss A/c.	378	1890
To Direct Material A/c		8886	By Finished Stock A/c.	2250	85500
To Direct Wages		12000			
To Production Overheads		12000			
To Abnormal Gain A/c.	108	4104			
	2628	87390		2628	87390

Dr. Abnormal Gain A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal Loss A/c.	108	540	By Process – C A/c.	108	4104
To Costing P&L A/c.		3564			
	108	4104		108	4104

Dr. Normal Loss A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process – A A/c.	150	300	By Bank A/c. (Sales)		
To Process – B A/c.	285	1140	Process – A A/c.	150	300
To Process – C A/c.	378	1890	Process – B A/c.	285	1140
			Process – C A/c.	270	1350
			By Abnormal Gain A/c.	108	540
	813	3330		813	3330

1.6 INTER PROCESS PROFITS:

Normally the output of one process is transferred to another process at cost but sometimes at a price showing a profit to the transfer process. The transfer price may be made at a price corresponding to current wholesale market price or at cost plus an agreed percentage. The advantage of the method is to find out

whether the particular process is making profit (or) loss. This will help the management whether to process the product or to buy the product from the market. If the transfer price is higher than the cost price then the process account will show a profit. The complexity brought into the accounting arises from the fact that the inter process profits introduced remain a part of the prices of process stocks, finished stocks and work-in-progress. The balance cannot show the stock with profit. To avoid the complication a provision must be created to reduce the stock at actual cost prices. This problem arises only in respect of stock on hand at the end of the period because goods sold must have realized the internal profits. The unrealized profit in the closing stock is eliminated by creating a stock reserve. The amount of stock reserve is calculated by the following formula.

$$\text{Stock Reserve} = \text{Transfer Value of stock} \times \frac{\text{Profit included in transfer price}}{\text{Transfer Price}}$$

Illustration 3 :

A product passes through three processes before its completion. The output of each process is charged to the next process at a price calculated to give a profit of 20% on transfer price. The output of Process III is transferred to finished stock account on a similar basis. There was no work-in-progress at the beginning of the years. Stock in each process has been valued at prime cost of the process. The following data is available at the end of 31st March, 2009.

	Process I	Process II	Process III	Finished Stock Rs.
Direct Material	20000	30000	10000	--
Direct Wages	30000	20000	40000	--
Stock on 31 st March 2009	10000	20000	30000	15000
Sale during the year	--	--	--	180000

From above information prepare:

1. Process Cost Account showing the profit at each stage.
2. Actual realized profit and
3. Stock Valuation as would appear in the balance sheet

Solution:

Dr.

Process – I A/c.

Cr.

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To Materials	20000	20000	--	By Process I/A/c. (Transfer)	50000	40000	10000
To Wages	30000	30000	--				
Total	50000	50000	--				
Les Closing							
Stock c/d	10000	10000	--				
Prime Cost	40000	40000	--				
To Gross Profit							
Profit (20% on Transfer Price)	10000	--	10000				
	50000	40000	10000		50000	40000	10000
To Stock B/d.	10000	10000	--				

Dr.

Process – II A/c.

Cr.

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To Process – I A/c.	50000	40000	10000	By Process-III A/c. (Transfer)			
					100000	72000	28000
To Material	30000	30000	--				
To Wages	20000	20000	--				
	100000	90000	10000				
Less : Closing Stock C/d.	20000	18000	2000				
Prime Cost	80000	72000	8000				
To Gross Profit (20% on Transfer Price)	20000	--	20000				
	100000	72000	28000		100000	72000	28000
To Stock B/d.	20000	18000	2000				

Process III A/c

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To process II A/c	100000	72000	28000	By Finished stock A/c	150000	97600	52400
To Material	10000	10000	-----				
To Wages	40000	40000	-----				
TOTAL	150000	122000	28000				
Less. Closing stock	30000	24400	5600				
To Gross profit	120000	97600	22400				
(20% of transfer price)	30000	-----	30000				
	150000	97600	52400		150000	97600	52400
To Stock b/d	30000	24000	5600				

Finished stock A/c

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To process III A/c	115000	97600	52400	By Sales	180000	87840	92160
(-) Stock	15000	9760	5240				
To gross profit	135000	87840	92160				
	45000	---	45000				
	180000	87840	92160		180000	87840	92160
To Stock A/c	15000	9760	5240				

Calculation of profit on closing stock

Profit included in stock = $\frac{\text{Profit included in transfer price} \times \text{Value of stock}}{\text{Transfer price}}$

Process I = No profit

Process II = $\frac{10000 \times 20000}{100000} = 2000$

Process III = $\frac{28000 \times 30000}{150000} = 5600$

Finished stock = $\frac{52400 \times 15000}{150000} = 5240$

Illustration 4 :

A product process through three process A, B and C. The details of expenses incurred on the three process during the year 2008 were as under :

	Process A	Process B	Process C
Units introduced	10000		
Cost per unit is Rs. 50/-			
	Rs.	Rs.	Rs.
Sundry Material	6000	9000	3233
Labour	18000	48000	39000
Direct Expenses	3000	11000	18000
Selling price per unit of output	70	100	200

Management expenses during the year were Rs. 80000 and selling were Rs. 5000. There are not allocable to the processes. Actual output of the three process were A – 9300 units, B – 5400 units and C 2100 units. Two-thirds of the output of process A and one half of the output of process B was passed on to the next process A and one-half of the output of process B was passed on to the next process and the balance was sold. The entire output of process C was sold.

The normal losses of the three process, calculated on the input of every process was : Process A – 5%, B – 15% and C – 20%. The loss of process A was sold @ Rs. 3 per unit, that of B @ Rs. 5 per unit and of process C @ Rs. 10 per unit. Prepare process A, B and C account and the Profit and Loss Account.

Solution :

Dr. **Process A A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Units Introduced			By Normal Loss	500	1,500
@ Rs. 50	10000	5,00,000	By Abnormal Loss A/c.	200	11063
To Sundry Materials		6,000		6,200	342958
To Labour		18,000	By Process B A/c.	3,100	171479
To Direct Expenses		3,000	By P & L A/c.		
			(@ 55.32)		
	10000	5,27,000			5,27,000

Dr. **Process B A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c.	6200	342958	By Normal Loss	930	4650
To Sundry Materials		9000	By Process C A/c.	2700	2,08,165
To Labour		48000	By P & L A/c.	2700	2,08,165
To Direct Expenses		11000			
To Abnormal Gains A/c. (@ 77.19)		100221			
	6330	420980		6,330	4,20,980

Dr. **Process C A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process B A/c.		208165	By Normal Loss	540	5400
To Sundry Materials		3233	By Abnormal Loss	60	7305
To Labour		39000	By P & L A/c.	2100	255693
To Direct Expenses		18000	(@ 12.76)		
	2700	268398		2700	268398

Dr. **Profit & Loss A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c.	3100	171479	By Sales(@ Rs. 70)	3100	217000
To Process B A/c.	2700	208165	By Sales(@Rs. 100)	2700	270000
To Process C A/c.	2700	265693	By Sales(@Rs.2000)	2700	420000
To Management Expenses A/c.		80000	BY Abnormal Gain A/c.		9372
To Selling Expenses		50000			
To Abnormal Loss A/c.		17168			
To Net Profit		133867			
		916372			916372

Dr. **Abnormal Loss A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c.	200	11063	By Bank Sales		
To Process B A/c.	60	7305	(@ Rs. 30)	200	600
			By Bank		
			(@ Rs. 10)	60	600
			By P & L A/c.		17168
	260	18368		260	18368

Dr. **Abnormal Gain A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Normal Loss A/c.	130	650	By Process B /c.	130	10022
To Costing P & L A/c.		9372			
	130	10022		130	10022

Illustration 5

Mahesh Ltd process a material which passes through three processes. Figures relating to production for the first 6 months of 2009 are as follows.

	Process A	Process B	Process C
Raw material used	1000 tones @ Rs. 200		
Manufacturing Wages	Rs. 40000	Rs. 30000	Rs. 7000
Expenses	Rs. 32500	Rs. 10800	Rs. 3710
Scrap sold @ Rs. 50 per tone	50 tones	30 tones	51 tones
Selling price per tone	Rs. 320	Rs. 450	Rs. 800
Weight Loss	5%	10%	20%

Management expenses were Rs. 10500, selling expenses Rs. 8000 and interest on borrowed capital Rs. 2000. Two third of process I and one half of process 2 are passed on to the next process and the balance are sold.

Prepare Process Account, Process Stock Account and Costing Profit & Loss A/c.

Solution**Dr.****Process No. 1 A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Material @ Rs. 200	1000	200000	By Normal Loss (sale of Scrap)	50	2500
To Wages		40000	By Weight Loss	50	--
To Expenses		32500	By Process I Stock A/c. (@300per tone)	900	270000
	1000	272500		1000	272500

Dr.**Process No. 1 Stock A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process I A/c.	900	270000	By Bank (@ 320)	300	96000
To Costing Profit & Loss A/c.		6000	By Process No.2 A/c.	600	180000
	900	276000		900	276000

Dr.**Process No. 2 A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 1 Stock A/c.	600	180000	By Normal Loss (@ Rs. 50)	30	1500
To wages		30000			
To Expenses		10800	By Wight Loss	60	--
			By Process 2 Stock		
			A/c (@ Rs. 430)	510	219300
	600	220800		600	220800

Dr.**Process No. 2 Stock A/c.****Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 2 A/c.	510	219300	By Bank		
To Costing P&L A/c.		5100	(sale @ 450)	255	114750
			By Process 3 A/c.	255	109650
	510	244400		510	244400

Dr. **Process No. 3 A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 2 Stock A/c.	255	109650	By scrap	51	2550
To wages		7000	By Weight Loss	51	--
To Expenses		3710	By Process 3 stock A/c	153	117810
	255	120360		255	120360

Dr. **Process No. 3 Stock A/c.** Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process 3 A/c.	153	117810	By Bank		
To Costing P & L A/c.		4590	(sale @ 800)	153	122400
	153	122400		153	122400

Dr. **Costing Profit & Loss A/c.** Cr.

Particulars	Rs.	Particulars	Rs.
To Management Expenses	10500	By Process 1 Stock A/c.	6000
To Selling Expenses	8000	By Process 2 Stock A/c.	5100
To Interest on Capital	2000	By Process 3 Stock A/c.	4590
		By Net Loss	4810
	20500		20500

1.7 VALUATION OF WORK-IN-PROGRESS

1.7.1 Meaning of Work-in-Progress:

Since production is a continuous activity, there may be some incomplete production at the end of an accounting period. Incomplete units mean those units on which percentage of completion with regular to all elements of cost (i.e. material, labour and overhead) is not 100%. Such incomplete production units are known as Work-in-Progress. Such Work-in-Progress is valued in terms of equivalent or effective production units.

1.7.2 Meaning of equivalent production units :

This represents the production of a process in terms of complete units. In other words, it means converting the incomplete production into its equivalent of complete units. The term equivalent unit means a notional quantity of completed units substituted for an actual quantity of incomplete physical units in progress, when the aggregate work content of the incomplete units is deemed to be equivalent to that of the substituted quantity. The principle applies when operation costs are apportioned between work in progress and completed units.

Equivalent units of work in progress = $\frac{\text{Actual no. of units in progress}}{\text{Percentage of work completed}} \times$

Equivalent unit should be calculated separately for each element of cost (viz. material, labour and overheads) because the percentage of completion of the different cost component may be different.

1.7.3 Accounting Procedure:

The following procedure is followed when there is Work-in-Progress

- (1) Find out equivalent production after taking into account of the process losses, degree of completion of opening and / or closing stock.
- (2) Find out net process cost according to elements of costs i.e. material, labour and overheads.
- (3) Ascertain cost per unit of equivalent production of each element of cost separately by dividing each element of costs by respective equivalent production units.
- (4) Evaluate the cost of output finished and transferred work in progress

The total cost per unit of equivalent units will be equal to the total cost divided by effective units and cost of work-in-progress will be equal to the equivalent units of work-in-progress multiply by the cost per unit of effective production. In short the following from steps an involved.

- | | |
|--------|---|
| Step 1 | – prepare statement of Equivalent production |
| Step 2 | – Prepare statement of cost per Equivalent unit |
| Step 3 | – Prepare of Evaluation |
| Step 4 | – Prepare process account |

The problem on equivalent production may be divided into four groups.

- I. when there is only closing work-in-progress but without process losses
- II. when there is only closing work-in-progress but with process losses
- III. when there is only opening as well as closing work-in-progress without process losses
- IV. when there is opening as well as closing work-in-progress with process losses

Situation I :**Only closing work-in-progress without process losses :**

In this case, the existence of process loss is ignored. Closing work-in-progress is converted into equivalent units on the basis of estimates on degree of completion of materials, labour and production overhead. Afterwards, the cost per equivalent unit is calculated and the same is used to value the finished output transferred and the closing work-in-progress

Situation II:**When there is closing work-in-progress with process loss or gain.**

If there are process losses the treatment is same as already discussed in this chapter. In case of normal loss nothing should be added to equivalent production. If abnormal loss is there, it should be considered as good units completed during the period. If units scrapped (normal loss) have any reliable value, the amount should be deducted from the cost of materials in the cost statement before dividing by equivalent production units. Abnormal gain will be deducted to obtain equivalent production.

Situation III:**Opening and closing work-in-progress without process losses.**

Since the production is a continuous activity there is possibility of opening as well as closing work-in-progress. The procedure of conversion of opening work-in-progress will vary depending on the method of apportionment of cost followed viz, FIFO, Average cost Method and LIFO.

Let us discuss the methods of valuation of work-in-progress one by one.

- (a) **FIFO Method:** The FIFO method of costing is based on the assumption of that the opening work-in-progress units are the first to be completed. Equivalent production of opening work-in-progress can be calculated as follows:

$$\text{Equivalent Production} = \text{Units of Opening WIP} \times \begin{array}{l} \text{Percentage of work} \\ \text{needed to finish} \\ \text{the units} \end{array}$$

- (b) **Average Cost Method:** This method is useful when price fluctuate from period to period. The closing valuation of work-in-progress in the old period is added to the cost of

new period and an average rate obtained. In calculating the equivalent production opening units will not be shown separately as units of work-in-progress but included in the units completed and transferred.

- (c) **Weighted Average Cost Method:** In this method no distinction is made between completed units from opening inventory and completed units from new production. All units finished during the current accounting period are treated as if they were started and finished during that period. The weighted average cost per unit is determined by dividing the total cost (opening work-in-progress cost + current cost) by equivalent production.
- (d) **LIFO Method:** In LIFO method the assumption is that the units entering into the process is the last one first to be completed. The cost of opening work-in-progress is charged to the closing work-in-progress and thus the closing work-in-progress appears cost of opening work-in-progress. The completed units are at their current cost.

(1) Format of statement of Equivalent Production :

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening Stock	xx	Units completed	xx	xx	xx	xx	xx		
Units Introduced	xx	Normal Loss	xx	--	--	--	--		
		Abnormal Loss	xx	xx	xx	xx	xx		
	xx	Equivalent Units	xx	xx	xx	xx	xx	xx	Xx

(2) Statement of cost per Equivalent Units :

Element of costing	Cost Rs.	Equivalent Units	Cost per Equivalent Units Rs
Material Cost (Net)	Xx	Xx	Xx
Labour Cost	Xx	Xx	Xx
Overheads Cost	Xx	xx	Xx
	xx		Xx

(3) Statement of Evaluation

Particulars	Element of cost	Equivalent Units	Cost per equivalent units Rs.	Cost Rs.	Total Cost Rs.
Units completed	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Closing WIP	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Abnormal Loss	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx

Illustration 6: (Average Costing)

Prepare a statement of equivalent production, statement of cost, process account from the following information using average costing method.

Opening Stock	50000 Units
Material	Rs. 25000
Labour	Rs. 10000
Overheads	Rs. 25000
Units Introduced	200000 Units
Material	Rs. 100000
Wages	Rs. 75000
Overheads	Rs. 70000

During the period 1,50,000 units were completed and transferred to Process II.

Closing stock 1,00,000 units. Degree of completion.

Material	100 %
Labour	50 %
Overheads	40 %

Solution :

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening Stock	50,000	Units Produced	150000	100	150000	100	150000	100	150000
Introduced	200,000	Closing Stock	100000	100	100000	50	50000	40	40000
	250000		250000		250000		200000		190000

Statement of Cost :

Element	Opening cost Rs.	Current cost Rs.	Total Cost Rs.	Equivalent units	Cost per unit
Material	25,000	1,00,000	1,25,000	2,50,000	0.500
Labour	10,000	75,000	85,000	2,00,000	0.425
Overheads	25,000	70,000	95,000	1,90,000	0.500
	60,000	2,45,000	3,05,000		1.425

Statement of Apportionment of Cost

Particulars	Units	Cost per unit	Cost	Total cost
1. Units introduced & transferred	1,50,000	1.425		213750
2. Closing work-in-progress				
Material	1,00,000	0.500	50,000	
Labour	50,000	0.425	21,250	
Overheads	40,000	0.500	20,000	91,250
				3,05,000

Dr. **Process I A/c.** **Cr.**

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening Stock	50,000	60,000	By Units completed		
To Materials	2,00,000	1,00,000	& transfer	50,000	2,13,750
To Labour		75,000	By Closing Stock	50,000	91,250
To Overheads		70,000			
	2,50,000	3,05,000		2,50,000	3,05,000

Illustration 7: (FIFO Method)

From the following information relating to KKN Company Ltd. Prepare Process Cost Account for Process III for the year 2008.

Opening Stock IN Process III	5000 units of Rs. 36,000
Transfer from Process II	2,13,000 units of Rs. 8,27,000
Direct Material added in Process III	Rs. 4,01,800
Direct Wages	Rs. 1,98,100
Production Overhead	Rs. 99,050
Units Scrap	11,000 units
Transferred to Process IV	1,89,000 units
Closing Stock	18,000 units

Degree of Completion :

	Opening Stock	Closing Stock	Scrap
Material	70 %	80 %	100 %
Labour	50 %	60 %	80 %
Overhead	50 %	60 %	80 %

There was a normal loss of 5% production and unit scrapped were sold at Rs. 1.50

Solution :

Input		Output		Equivalent Production					
Particulars	Units	Particulars	Units	Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening Stock	5,000	Normal							
		Loss	10000						
Process II		Op. Stock							
Transfer	213,000	Processed	5000	-	-	30	1500	50	2500
		Introduces & Completed	184000	100	184000	100	184000	100	184000
		Abnormal Loss	1000	100	1000	100	1000	80	800
		Closing Stock	18000	100	18000	80	14400	60	10800
	218000		218000		203000		200900		198100

Note : Units Produced: Opening stock + units introduced – closing stock

$$: 5000 + 213000 - 18000 = 200000$$

$$\text{Normal Loss} : 5 \% \text{ of } 200000 = 10000 \text{ units}$$

Statement of Cost

Particulars		Cost Rs.	Equivalent Units Rs.	Cost Per Unit Rs.
Material – I				
Transfer from Previous process	8,27,000			
Less – Value of scrap (normal)	15,000	8,12,000	2,03,000	4.00
Material – II				
Aded+ in the process		4,01,800	2,00,900	2.00
Direct Wages		1,98,100	1,98,100	1.00
Overheads		99,050	1,98,100	0.50
				7.50

Statement of Apportionment of Cost

Particulars	Elements	Equivalent Units	Cost Per Unit Rs.	Cost Rs.	Total cost Rs.
Op. Stock Processed	Material I	--		--	
	Material II	1,500	2.00	3,000	
	Wages	2,500	1.00	2,500	
	Overheads	2,500	0.50	1,250	6,750
Units introduced and Completed	Material I	1,84,000	4.00	7,36,000	
	Material II	1,84,000	2.00	3,68,000	
	Wages	1,84,000	1.00	1,84,000	
	Overheads	1,84,000	0.50	92,000	13,80,000
Closing stock	Material I	18,000	4.00	72,000	13,86,750
	Material II	14,400	2.00	28,800	
	Wages	10,800	1.00	10,800	
	Overheads	10,800	0.50	5,400	1,17,000
Abnormal loss	Material I	1,000	4.00	4,000	
	Material II	1,000	2.00	2,000	
	Wages	800	1.00	800	
	Overheads	800	0.50	400	7,200
TOTAL					15,10,950

Dr.

Process III A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Balance b/d.	5,000	36,000	By Normal Loss	10,000	15,000
To Process II A/c.	2,13,000	8,27,000	By Process IV A/c.	1,89,000	14,22,750
To Materials		4,01,800	By Abnormal Loss	1,000	7,200
To Wages		1,98,100	By Closing Stock	18,000	1,17,000
To Overheads		99,050			
	2,18,000	15,61,950		2,18,000	15,61,950

Note :

Cost of goods transferred to Process IV :

Value of Opening Stock

36,000

Cost incurred in this process for Opening Stock

6,750

Cost incurred for the units introduced & Processed

13,80,000**Total****14,22,750**

Illustration 8

The following information is given in respect of Process costing 10 : 3 for the month of January 2009.

Opening stock – 2,000 units made up of

	Rs.
Direct Material – I	12,350
Direct Material – II	13,200
Direct Labour	17,500
Overheads	11,000

Transferred from Process 2 – 20,000 units @ Rs. 6 per unit.

Transferred to Process 4 – 17,000 units

Expenditure incurred in process – 3

	Rs.
Direct Material	30,000
Direct Labour	60,000
Overheads	60,000

Scrap:1,000 units-Direct Materials 100%,Direct Labour 60%, Overheads 40%.

Normal Loss 10 % of Production.

Scrapped units realized Rs. 4/- per unit

Closing stock : 4,000 units – Degree of completion. Direct Materials 80 %, Direct Labour 60 % and Overheads 40 %.

Prepare Process 3 Account using average price method along with necessary supporting statements.

[C. A. – Inter, May 2001]

Solution :

Statement of Equivalent Production (weighted Average cost Material)

Particulars	Total Units	Material – I		Material – II		Labour		Overheads	
		%	Units	%	Units	%	Units	%	Units
Units Completely									
Processed	17000	100	17000	100	17000	100	17000	100	17000
Normal Loss	1800	--							
10% of (2000 + 20000 – 4000)									
Abnormal Gain	800	100	800	100	800	100	800	100	800
Closing Stock	4000	100	4000	80	3200	60	2400	40	1600
	22000		20200		19400		18600		17800

Statement of Cost

Particulars	Cost Rs.	Equivalent Units	Rate / Equivalent Units Rs.
Material – I :			
Opening balance 2000 units	12,350		
Cost of 20000 units @ Rs. 6			
Per unit	1,20,000		
	1,25,150	20,200	6.1955
Material – II :			
Opening Stock	13,200		
In Process II	30,000		
	43,200	19,400	2.2268
Labour :			
Opening Labour	17,500		
In Process II	60,000		
	77,500	18,600	4.1667
Overheads :			
Opening Stocks	11,000		
In Process II	60,000		
	71,000	17,800	3.9888
Total cost per unit			16.5778

Valuation of Equivalent Unit

			Rs.
Finished goods	(17000 units x Rs. 16.5778)		2,81,822
Abnormal Units	(800 units x Rs. 16.5778)		13,262
Workinprogress			
Material I	(4000 units x Rs. 6.1955)	24,782	
Material II	(3200 units x Rs. 2.2268)	7,126	
Labour	(2400 units x Rs. 4.1667)	10,000	
Overheads	(1600 units x Rs. 3.9888)	6,382	48,290

Dr.

Process III A/c.

Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening WIP	2,000	57,050	By Normal Loss	1,800	7,200
To Process 2	20,000	1,20,000	By Finished Goods		
To Direct Material I			Units	17,000	2,81,822
Material II		30,000	By Closing Balance	4,000	48,290
To Direct Labour		60,000			
To Overheads		60,000			
To Abnormal Gain	800	13,262			
	22,800	3,37,312		22,800	3,37,312

Illustration.9

The finished product of a factory pass through two processes : the entire material being placed in process at the beginning of the first process. From the following production and last data relating to the first process, work out the value of the closing inventory and the value of the materials transferred to the second process.

Process I	Rs.
Opening inventory	10,000
Material	27,500
Labour	50,000
Manufacturing Overheads	40,000
Opening inventory (25 percent complete)	4,000
Put into Process	12,000
Transferred to II Process	10,000
Closing inventory (20 percent completed)	5,000
Spoilage during process	1,000
	[I.C.W.A., Final]

Solution :**Process I A/c**

Particulars	Kg.	Amount Rs.	Particulars	Kg.	Amount Rs.
Opening Inventory	4,000	10,000	Transferred to Process II	10,000	1,15,750
Material	12,000	27,500	Normal Loss	1,000	--
Labour		50,000	Closing Inventory	5,000	11,750
Manufacturing					
Overheads		40,000			
	16,000	1,27,500		16,000	1,27,500

Working Note :

Statement of Equivalent Production Units

Particulars	Output Kg.	Material		Labour		Overheads	
		Qty.	%	Qty.	%	Qty.	%
Opening Stock	4,000	3,000	75	3,000	75	3,000	75
Completely Processed	6,000	6,000	100	6,000	100	6,000	100
Normal Loss	1,000	--	--	--	--	--	--
Closing Inventory	5,000	1,000	20	1,000	20	1,000	20
	16,000	10,000		10,000		10,000	

Statement of Element of Cost on the basis of Equivalent Production

Particulars	Cost Rs.	Equivalent Units	Cost per Unit Rs.
Material	27,500	10,000	2.75
Labour	50,000	10,000	5.00
Overheads	40,000	10,000	4.00
Total			11.75

Statement of Apportionment of Cost

Particulars	Elements	Equivalent Units	Cost Per Unit Rs.	Cost Rs.	Total cost Rs.
Op. Stock Processed	Material	3,000	2.75	8,250	
	Labour	3,000	5.00	15,000	
	Overheads	3,000	4.00	12,000	35,250
Completely Processed	Material	6,000	2.75	16,500	
	Labour	6,000	5.00	30,000	
	Overheads	6,000	4.00	24,000	70,500
Closing Inventory	Material	1,000	2.75	2,750	
	Labour	1,000	5.00	5,000	
	Overheads	1,000	4.00	4,000	11,750
TOTAL					1,17,500

Value of goods transferred to next process

	Rs.	Units
Value of opening stock (given)	10,000	
Additional cost on opening stock	35,250	4,000
Value of completely processed units	70,500	6,000
	1,15,750	10,000

Illustration 10

ABC Limited manufactures a product '2X' by using the process normally R. T. for the month of May 2009, the following data is available.

	Process R. T.
Material Introduced	16,000 units
Transfer to next process	14,000 units
Work-in-Process	4,000 units
At the beginning of the month (4/5 completed)	3,000 units
At the end of the month (2/3 completed)	
Cost records:	
Work-n-Process at the beginning of the month	
Material	Rs. 30,000
Conversion cost	Rs. 29,200
Cost during the month	
Materials	Rs. 1,20,000
Conversion cost	Rs. 1,60,800

Normal spoiled units are 10% of goods finished output transferred to next process.

Defects in these units are identified in their finished state.

Materials for the product is put in the process at the beginning of the cycle of operation, whereas labour and other indirect cost flow evenly over the year. It has no realizable value for spoiled units.

Required :

- (1) Statement of equivalent production (average cost method)
- (2) Statement of cost and distribution of cost
- (3) Process accounts

[C.A. PCE. Nov. 2007]

Solution :

Statement of Equivalent Production (average cost method)

Input units	Particulars	Output Units	Equivalent Production			
			Materials		Conversion cost	
			% completed	Equivalent Units	% Completed	Equivalent Units
4000	Opening WIP	--	--			
16000	Introduced and	14,400	100	14,400	100	14,400
	Completed to next					
	Normal spoilage	1,440	100	1,440	100	1,440
	Abnormal spoilage	1,160	100	1,160	100	1,160
	Closing WIP	3,000	100	3,000	66.67	2,000
20000		20000		20000		19000

Statement showing cost of each element

Particulars	Materials	Conversion cost
Opening	30,000	29,200
Cost in process	1,20,000	1,60,800
Total (a)	1,50,000	1,90,000
Equivalent Units (b)	20,000	19,000
Cost per unit (a ÷ b)	7.50	10.00

Statement showing distribution of cost

Particulars	Equivalent Units	Cost per unit	(Rs.)	
Units completed				
Materials	14,400	7.50	1,08,000	
Conversion cost	14,400	10.00	1,44,000	2,52,000
Normal spoilage (10 %)	1,440	17.50		25,200
Closing stock :				
Material	3,000	7.50	22,500	
Conversion cost	2,000	10.00	20,000	42,500
Abnormal Stock:				
Material	1,160	7.50	8,700	
Conversion Stock	1,160	10.00	11,600	20,300

Dr. Process A/c. Cr.

Particulars	Rs.	Particulars	Rs.
To Opening WIP	59,200	By Profit and Loss A/c.	
To Material Introduced	1,20,000	(abnormal)	20,300
To Conversion cost Incurred	1,60,800	By Transfer to Next Process	2,77,200
		By Closing WIP	42,500
	340000		3,40,000

Illustration.11

GH & Co. manufactures a product. The process costing is followed and work-in-progress stocks at the end of each month are valued at FIFO basis.

At the beginning of the month of June, the inventory of work-in-progress showed 400 units, 40% complete, valued as follows:

	Rs.
Material	3,600
Labour	3,400
Overheads	1,000
Total	8,000

In the month of June, materials were purchased for Rs. 75,000. Wages and overheads in the month amounted to Rs. 79,800 and Rs. 21,280 respectively. Actual issue of material to production was Rs. 68,500. Finished stock in the month was 2500 units. There was no loss in process.

All the end of the month, the work-in-process inventory was 500 units, 60 percent complete as to labour and overheads and 80 % complete as to materials.

Prepare a Process Account for recording the month's transactions and prepare a Process Cost Sheet showing total and units costs

[I.C.W.A., Final]

Solution:

Dr. Process A/c. Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening Stock	400	8,000	BY Transfer to		
To Material	2,600	68,500	Finished stock	2,500	1,56,094
To Labour		79,800	By Work-in-		
To Overheads		21,280	Progress	500	21,486
	3000	1,77,580		3000	1,77,580

Working Note :

Statement of Equivalent Production (Units)

Input	Particulars	Output	Material		Labour		Overhead	
			Qty.	%	Qty.	%	Qty.	%
400	Opening Stock	400	240	60	240	60	240	60
2600	Completely Processed	2,100	2,100	100	2,100	100	2,100	100
	Work-in-Progress	500	400	80	300	60	300	60
3000		3,000	2,740		2,640		2,640	

Working Note :

- (1) For opening stock also equivalent production has been calculated as it was partly complete and it has to be converted into finished product in this period. They were completed 60 % in this period.
- (2) Total units produced in a month are 2,50 units. Out of this 400 units of opening stock has been deducted because they have been partly processed in this particular month and we have already calculated equivalent units of opening stock. Only, 2,100 units have been introduced and completed in the particular period.
- (3) For closing stock also equivalent production in terms of total units completed has been calculated.

Statement of Element of cost on the basis of Equivalent Units

	Cost Rs.	Equivalent Units	Cost per unit Rs.
Material	68,500	2,740	25.000
Labour	79,800	2,640	30.2273
Overheads	21,280	2,640	8.0606

Statement of Apportionment of Cost

Particulars		Equivalent Units	Cost Per Unit Rs.	Details Rs.	Total Rs.
Op. Stock Processed	Material	240	25.0000	6,000	15,190
	Labour	240	30.2273	7,255	
	Overheads	240	8.0606	1,935	
Completely Processed	Material	2,100	25.0000	52,500	1,32,904
	Labour	2,100	30.2273	63,477	
	Overheads	2,100	8.0606	16,927	
Work-in- Process	Material	400	25.0000	10,000	21,486
	Labour	300	30.2273	9,068	
	Overheads	300	8.0606	2,418	
				TOTAL	1,69,580

Total Cost of 2500 units

	Rs.
Cost of opening stock	8,000
Additional cost of opening stock processed	15,190
Cost of completely processed	1,32,904
	1,56,094

Illustration 12

The following data is available in respect of Process I for February 1990.

- (1) Opening stock of work-in-process 800 units at a total cost of Rs. 4,000.
- (2) Degree of completion of opening work in process

Materials	100 %
Labour	60 %
Overheads	60 %
- (3) Input of materials at a total cost of Rs. 36,800 for 9,200 units
- (4) Direct wages incurred Rs. 16,7540
- (5) Production overheads Rs. 8,370
- (6) Units scrapped 1,200 units. The stage of completion of these units was

Materials	100 %
Labour	80 %
Overheads	80 %
- (7) Closing work-in-process : 900 units. The stage of completion of these units was :

Materials	100 %
Labour	70 %
Overheads	70 %
- (8) 7,900 units were completed and transferred to the next process.
- (9) Normal Loss is 80 % of the total input (opening stock plus units put in)
- (10) Scrap value is Rs. 4 per unit

You are required to :

- (a) Compute equivalent production
- (b) Calculate the cost per equivalent unit for each element
- (c) Calculate the cost of abnormal loss (or gain), closing work in process and the units transferred to the next process using the FIFO method.
- (d) Show the Process Account for February 1990

[C.A., Inter]

(a) Statement of Equivalent Production (FIFO Method)

input Particulars	units	Output Particulars	Units	Equivalent			
				Material		Labour & Overheads	
				Units	%	Units	%
Op. Stock of W.I.P.	800	Units completed	800	--		320	40
Units Introduced	9,200	Work on Op. stock					
		New units	7100	7100	100	7,100	100
		Closing stock	900	900	100	630	70
		Normal Loss	800	--		--	
		Abnormal Loss	400	400	100	320	100
		Loss					
	10,000		10,000	8,400		8,370	

(b) Statement of cost per equivalent units for each element

Particulars	Cost Rs.	Equivalent Unit	Cost Per Unit
Material	36,800		
Less : Scrap realization (800 units @ Rs. 4)	3,200		
Labour	16,740	8,400	4.00
Overheads	8,370	8,370	2.00
			1.00

I Statement showing cost of abnormal loss, closing WIP and units transferred to the next process :

Particulars	Cost per unit Rs.	Equivalent unit	Total cost Rs.
Abnormal Loss			
Materials	4.00	400	1,600
Labour	2.00	320	640
Overheads	1.00	320	320
			2,560
Closing WIP			
Material	4.00	900	3,600
Labour	2.00	630	1,260
Overheads	1.00	630	630
7900 units transferred to next process			5,490
(i) Cost of opening WIP (80 units)			4,000
(ii) Cost incurred on opening WIP			
Material	--	--	
Labour	2.00	320	640
Overheads	1.00	320	320
			960

(iii) Cost of completing 7100 units			
Material	4.00	7100	28400
Labour	2.00	7100	14200
Overheads	1.00	7100	7100
			49700
Total (I + ii + iii)			54600

Dr. Process A/c. for February 1990 Cr.

Particulars	Units	Rs.	Particulars	Units	Rs.
To Opening WIP	800	4000	By Finished Goods	7900	54660
To Materials	9200	36800	By Closing WIP	900	5490
To Labour	--	16740	By Normal Loss	800	3200
To Overheads	--	8370	By Abnormal Loss	400	2560
	10000	65910		10000	65910

1.8 EXERCISE

1.8.1 Objective type:

Answer in Brief

1. State any four features of process costing.
2. Define process costing,
3. What do you mean by normal loss ? How is it treated in process cost accounts?
4. What do you mean by abnormal loss ? How is it treated in process cost accounts?
5. Distinguish between normal loss and abnormal loss.
6. What do you mean by abnormal effective? How is it treated in process cost accounts?
7. What do you mean by inter process profit? What purpose does it serve?
8. What do you mean be equivalent production?
9. Name any four industries in which process costing is applicable?
10. Enumerate any two advantages of process costing.
11. Enumerate any two disadvantages of process costing.
12. What do you meant by equivalent units?

Multiple Choice Questions

1. The type of spoilage that should not affect the cost of inventories is
 - (a) Abnormal spoilage
 - (b) Normal spoilage
 - (c) Seasonal spoilage
 - (d) Indirect spoilage

2. Materials may not be put into process
 - (a) At the beginning of an operation
 - (b) Continuously
 - (c) At the end of the operation
 - (d) In the shipping department.

3. Process cost method is especially suitable for
 - (a) Custom production
 - (b) Standard costs
 - (c) FIFO
 - (d) LIFO

4. In process costing, costs follow
 - (a) Price rise
 - (b) Price declines
 - (c) Product flow
 - (d) Finished goods

5. When average costing is used, the opening inventory costs are
 - (a) Kept separate from the costs for the new period
 - (b) Added to the costs of the new period
 - (c) Subtracted from the new costs
 - (d) Averaged with other costs to arrive at total cost.

6. A disadvantage of FIFO costing is that
 - (a) The first units produced cannot be distinguished from later production.
 - (b) Several units costs are used at the same time.
 - (c) The units have to be kept separate
 - (d) The shipping costs are higher

7. Which of the following method of costing can be used in a large oil refinery?
 - (a) Process costing
 - (b) Operating costing
 - (c) Unit costing
 - (d) Job costing

8. Which of the following paid is odd :
- (a) Construction-Contract costing
 - (b) Ship-building-Job costing
 - (c) Brick manufacturing – Process costing
 - (d) Transport undertaking – Operating costing
9. A product which has practically no sales or utility value is
- (a) Waste
 - (b) Scrap
 - (c) Spoilage
 - (d) Defectives
10. Trimmings in timber industry should be treated as a :
- (a) Waste
 - (b) Scrap
 - (c) Spoilage
 - (d) Defectives
11. The type of process loss that should not affect the cost of inventory is
- (a) Abnormal loss
 - (b) normal loss
 - (c) Seasonal loss
 - (d) standard loss
12. The stage where joint products are separated from each other is known as
- (a) break-even point
 - (b) angle of incidence
 - (c) split-off point
13. Fifty units are put in a process at a total cost of Rs. 90. Wastage is normally 10% without any scrap value. If output is 40 units the amount of abnormal loss would be
- (a) Rs. 80
 - (b) Rs. 8
 - (c) Rs. 10
 - (d) Rs. 9
14. Abnormal loss is charged to
- (a) process account
 - (b) costing profit and loss account
 - (c) Normal loss account

(Answers: 1(a), 2 (d), 3 (b), 4(c), 5(a), 6(b), 7(a), 8(c), 9(a), 10(b).)11 (a), 12(c), 13 (c), 14(b))

1.8.2 Short notes

1. Write a short note-Inter process profits.(Apr-08)
2. Write a Short Note-Treatment of losses in Process.(Apr 07)
3. Write a short Note-Equivalent Production. (Apr-07)
4. Describe the main features of process costing.
5. Explain the features of process costing
6. How would you treat abnormal gain ?

1.8.3. Long questions

2. What do you mean by inter-process profits in process cost accounts.
3. Explain the methods to be adopted in the treatment of joint products and by-products in process account.
4. What do you understand by 'Normal' and 'Abnormal' Wastage during the process of manufacture?
5. Describe briefly the method known as Process Costing, stating four types of manufactures which would be suitable for its application. A description of the method of dealing with by-products is not required.
6. Explain the concept of Equivalent Production. Discuss the two methods of its valuation.

1.8.4 Practical Problems

Illustration 1:

During a particular period 2,000 units at a cost of ` 60,000 were introduced into Process 'A' (at the beginning). The normal loss was estimated at 5% of the input. At the end, 1,400 units were produced and transferred to the Process 'B', 460 units being partially completed and 140 units scrapped. The partially completed units had reached the following state of production:

Materials	100% complete
Labour	50% complete
Overheads	50% complete

Additional costs incurred during the process were:

Materials	Rs. 17,000
Labour	Rs.33, 400
Overheads	Rs. 16,700

The units scrapped realised Rs.10 per unit.

Prepare Process 'A' A/c with all relevant statements.

(Ans.: Equivalent Units, Material: 1,900, Labour: 1670, Overheads: 1,670
Transfer to Process B 1,400 units @Rs. 70 p.u.)

(M.Com. Mar. 2002)

Illustration 2 :

XYZ Ltd. is engaged in process industry. During the month August 2000, 2000 Units were introduced in process 'X'. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to process 'Y'. 460 units were incomplete and 140 units, after passing through fully the entire process had to be scrapped. The incomplete units had reached the following state of completion:

Materials	75% Completed
Labour	50% Completed
Overheads	50% Completed

Following are the further information on the process 'X' :

Cost of the 2000 units	Rs. 58,000
Additional Direct materials	Rs. 14,400
Direct Labour	Rs. 33,400
Direct Overheads	Rs. 16,700
Units scrapped realised	Rs. 10 each

Prepare statement of equivalent production, statement of cost, statement of evaluation and process 'X' account.

(M.Com. Mar. 2005)

Ans. (Equivalent Units, Material: 1,785, Labour: 1,670, Overheads: 1,670)

Illustration 3 : (FIFO)

The following information is available for Process IV of Swastik Fabrications Ltd. for the month of March 2005.

Opening Stock: 4,800 units @ Rs.16,500

Degree of Completion:	Material	70%
	Labour	60%
	Overheads	60%

Transfer from Process III: 30,600 units @ Rs. 30,600

Transfer to Process V: 27,600 units

Direct Material introduced in Process IV: ` 13,440

Direct Labour introduced in Process IV: ` 39,420

Production overheads incurred ` 52,560

Units scrapped: 2,400

Degree of completion:	Material	100%
	Labour	70%
	Overheads	70%

Closing stock 5400 units

Degree of completion:	Material	60%
	Labour	40%
	Overheads	40%

There was a normal loss of 10% of production in the process. Unites scrapped were realised at Re. 1 per unit. From the above information prepare:

- 1) Statement of equivalent production
- 2) Cost of equivalent unit for each element of the cost, the loss, the work-in-process, etc.
- 3) Process account using FIFO method.

(M.Com. Oct. 2005)

Ans. (Equivalent Units, Material I: 27,600, Material II: 26,880, Labour: 26,460, Overheads: 26,460)

Illustration 4 : (FIFO)

The following data pertains to Process I for March 2003 of Beta Limited :

Particulars	Units	Rs.
Opening Work-in-Progress	1,500	15,000
Degree of completion :		
Materials 100%; Labour and overheads 33 $\frac{1}{3}$ %		
Input of Materials	18,500	52,000
Direct Labour		14,000
Overheads		28,000
Closing Work-in-Progress	5,000	

Degree of Completion Materials 90% and Labour and Overheads 30%.

Normal Process Loss is 10% of total input (opening work in progress units + units put in).

Scrap value 2.00 per unit.

Units transferred to the next process 15,000 units.

You are required to:

- 1) Compute equivalent units of production.
- 2) Compute cost per equivalent unit for each cost element i.e., materials, labour and overheads.
- 3) Compute the cost of finished output and closing work-in-progress.
- 4) Prepare the process and other Account.

Assume:

- i) FIFO Method is used by the Company.
- ii) The cost of opening work-in-progress is fully transferred to the next process.

(M.Com. Mar.2006)

Ans. (Equivalent Units, Material: 16000, Labour:14,000, Overheads: 14,000)

Illustration 5: (Weighted Average)

From the following details prepare Statement at Equivalent Production, statement of Cost and find the value of: (a) Output transferred and (b) Closing work in progress

Opening work in progress (units)	2,000
Materials (100% Complete)	7,500
Labour (60 % Complete)	3,000
Overheads (60% Complete)	1,500
Units introduced into this process	8,000

There are 2,000 units in process at the end and the stage of completion is estimated to be :

Materials	100%
Labour	50%
Overheads	50%

8,000 units are transferred to next process.

The process costs for the period are:

Materials	Rs. 1, 00,000
Labour	Rs.78,000
Overheads	Rs. 39,000

(M.Com. Oct. 2006)

Ans. (Equivalent Units, Material:10,000, Labour: 9,000, Overheads: 9,000)

Illustration 6 : (Average)

Shete and Shete Pvt. Ltd. gives the following particulars relating to process 'P' in its plants for the month of January 2007 :

Particulars	Rs.	Rs.
Work-in-Progress (500 units) on 01-01-2007		
Material (100%)	12,000	-
Degree of Completion Labour (50%)	7,200	-
Overheads (50%)	16,000	35,200
Units introduced during the Month		
January, 2007 – Units – 19,500	-	-
Processing Cost incurred during the Month		
January, 2007 Materials	4,65,500	-
Labour	1,80,000	-
Overheads	<u>2,64,800</u>	9,10,300

Particulars	Units
Output transferred to Process Q	18,200
Units Scrapped (Degree of Completion Material 100%, Labour 80% and Overheads 80%)	1,400
Work-in-Progress (Closing Balance)	400
(Degree of Completion-Materials 100%, Labour and Overheads 50%)	

Normal loss in processing is 5% of total input and scrapped units fetch 2.50 each. Prepare the following statements for Process 'P' for January, 2007 :

- Statement of Equivalent Production
- Statement of Cost and Statement of Evaluation
- Process 'P' A/c
- Abnormal Loss A/c

Use Average Method

(Mar. 07, adapted)

Ans. (Equivalent Units, Material: 19,000, Labour: 18,720, Overheads: 18,720)

Illustration 26 : (FIFO – No Losses)

Avdoot Ltd., a manufacturer of a specialized product, is have a process costing system. The stock of work-in-progress at the end of each month is valued on First in First Out (FIFO) basis. At the beginning of January 2008 the stock of work-in-progress was 2000 units (40% completed) which was valued as :

Material	Rs. 18,000
Labour	Rs. 17,000
Overheads	Rs. 5,300

During the month of January 2008, actual issue of materials for the production purpose was Rs. 3,42,500. wages and overheads in the month of January, 2008 amounted to Rs. 4,02,600 and Rs. 1,12,200 respectively. Finished production taken into the stock in the month was 12,500 units. There was no loss in the process. At the end of the month of January, 2008 the stock of Work-in-Progress was 2500 units (60% complete as to Labour and Overheads and 80% complete as to materials). Prepare the following statements for January, 2008.

- | | |
|---|---------------------------------------|
| a) No. of units introduced in the process | b) Statement of Equivalent Production |
| c) Statement of Cost | d) Statement of Evaluation |
| e) Process Account. | |

(Apr. 08, adapted)

(Equivalent Units, Material: 13,700, Labour: 13,200, Overheads: 13,200)

Illustration 27 : (FIFO – Process A/c with Abnormal Loss)

From the following information prepare Process account as per FIFO assumption:

Opening stock	Degree of completion
80 units @ ` 6 per unit Rs. 4,800	Material 60%
	Labour 40%
	Overheads 40%

Transfer from previous process : 12,000 units costing Rs. 16,350

Transfer to next process : 9,700; Units scrapped 1,300 units

Normal loss 10%; Closing stock : 1,800 units

Degree of completion

For units scrapped :	For closing stock :
Material 100%	Material 60%
Labour 50%	Labour 50%
Overheads 50%	Overheads 50%

Scrap realised Re. 1.00 per unit

Other information

Material	10,500
Labour	20,760
Overheads	16,470

(M.Com, Oct. 2008, adapted)

(Ans. Equivalent Units, Material I: 10,900, Material II: 10,500, Labour: 10,380, Overheads: 10,380)



OPERATING COSTING

Unit Structure

- 2.0 Learning objectives
- 2.1 Introduction
- 2.2 Meaning of Operating Costing
- 2.3 Transport Costing
- 2.4 Solved Problems of Operating Costing
- 2.5 Hospital Costing
- 2.6 Solved Problems on Hospital Costing
- 2.7 Hotel Costing
- 2.8 Solved Problems on Hotel Costing
- 2.9 Exercise
- 2.10 Questions

2.0 LEARNING OBJECTIVES

After studying this chapter one should be able to understand:

- The meaning of operating costing.
- Process to select cost limit in operating costing.
- Procedure in operating costing according to the procedure of a transporter
- Accounting procedure of a Hotel
- Accounting procedure of a Hospital

2.1 INTRODUCTION

Operating Costing method is normally used in service sector. When the service is not completely standardized, it is the cost of producing and monitoring a service. It is a method of costing applied to undertakings which provide service rather than production of commodities. Service may be performed internally and externally. Services are termed as internal when they have to be 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 of cost accumulation which is designed to determine the cost of services.

Operating costing is just a variant of unit or output costing. Operating costs are collected periodically like process cost. The cost of rendering the service for particular period is related to quantum of services rendered during the particular period to arrive at cost per unit of service rendered. So the principal of unit costing is used in operating costing.

2.2 MEANING OF OPERATING COSTING

Operating costing is a method of ascertaining the cost of providing or operating a service. It is also known as service costing. CIMA London, defines Operating Costing as “that form of operation costing which applies where standardized services are rendered either by an undertaking or by a service cost renter with in an undertaking”.

2.2.1 Cost Unit:

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 – Kilometer in a transport company. The following are some of example of cost units used in different organizations

Enterprises	Cost per unit
Passenger transport	Kilometer
Goods transport	Ton – Kilometer
Hotel	Per room per day
Hospital	Per bed per day
Canteen	Per item, per meal
Water supply	Per 1000 liters
Electricity	Per kilowatt

2.2.2 Collection of costing data:

After determining the cost unit, the cost relating to the service is collected. The collected cost is presented under the heads suitable for control purpose i.e. fixed expenditure and variable expenditure. The presentation of cost data under different categories helps to improve managerial control over cost.

2.3 TRANSPORT COSTING

2.3.1 Meaning

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

2.3.2 Classification of costs:

Costs are classified into the following three heads:

1. **Standing or Fixed Charges:** These charges are included whether vehicle is operating or not. Insurance, tax, depreciation and part of driver wages. Interest on capital, general supervision, and salary of operating managers are items come under the category of fixed or standing charges.
2. **Maintenance charges:** There are semi variable expenses in nature and include wear on tires, repairs and overheads painting etc.
3. **Operating and running charges:** Running costs are the cost of operations. These charges vary more or less in direct proportion to kilometers etc. These expenses are variable in nature because they are dependent on distance covered and trips made.

Though the above three classification is done, in practical it is difficult to distribute. 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 kilometer run then it is a running cost.

2.3.3 Collection of Cost Data:

Each vehicle is given a separate unique number and all the basic documents will contain the assigned number of the respective vehicles. A separate daily log sheet for each vehicle is maintained to

record the details of trips, running time, capacity, distance cover, cost of petrol / diesel, lubricants, loading and unloading time etc on daily basis. A specimen of log sheet is given below:

Daily log sheet Table

Vehicle No.: Route No.:-----
 Date of Purchase: Driver:
 Make and Specification:
 Time of Leaving:
 License No.: Time of Returning:

Trip no.	From	To	Packages		Kilometers	Time			Remarks
			Out	Collected		Out	In	Hrs	

Supplies Worker's time abnormal delays
 Petrol / diesel Driver Loading / unloading.....
 Oil conductor Accident
 Grease Cleaner Traffic Delays Others

Format of transport operating cost sheet:

Operating cost sheet

Vehicle No. : Period
 Cost Unit: No. of Cost units

Particulars	Rs.	Total Rs.	Per Km Rs.	
A. Fixed Cost (or Standing charges)				
1. Road Tax	xx		xx	
2. Insurance	xx		xx	
3. Driver's Salary	xx		xx	
4. Conductor's Salary	xx		xx	
5. Depreciation	xx		xx	
6. Interest on Capital	xx		xx	
7. Garage Rent	xx		xx	
8. Office & Administration Overheads	xx	xx	xx	xx
B. Variable (Running) costs				
Depreciation	xx		xx	
Petrol Diesel	xx		xx	
Oil & Grease	xx		xx	
Repairs and maintenance	xx		xx	
Tyres and tubes	xx	xx	xx	xx
Total operating cost		xxx		xxx

Note: Maintenance expenses can be shown separately also depends on cases.

Check Your Progress:

1. Give the format of Transport Operating cost-sheet
2. give the Cost Unit of the following
 - a) Passenger Transport
 - b) Good Transport
 - c) Electricity
 - d) Hospital
 - e) Hotel

2.4 SOLVED PROBLEMS OF OPERATING COSTING**Illustration 1:**

From the following information calculate fare for passenger KM.

The cost of the Bus	Rs. 450000
Insurance charges	3 % p.a.
Annual tax	Rs. 4500
Garage rent	Rs. 500 p.m.
Annual repairs	Rs. 4800
Expected life of the bus	5 yrs
Value of scrap at the end of 5 years	Rs. 3000
Route distance	20 km long
Driver's salary	Rs. 550 p.m.
Conductor's Salary	R. 500 p.m.
Commission to Driver & conductor (shared equally)	10 % of the takings
Stationary	Rs. 250 p.m.
Manager-cum-accountant's Salary	Rs. 1750 p.m.
Diesel and Oil (for 100 kms)	125

The bus will make 3 rounds trips for carrying on the average 40 passenger's in each trip. Assume 15 % profit on takings. The bus will work on the average 25 days in a month.

Solution :

Operating Cost Statement

Bus No.

Capacity: 40 persons

Particulars	Per Annum Rs.	Per Annum Rs.	Per Annum Rs.
A. Standing Charges			
Depreciation	84,000		
Tax	4,500		
Insurance	13,500		
Stationery	3,000		
Manager's Salary	21,000	1,26,000	00.08750
B. Maintenance Charges			
Garage Rent	6,000		
Repairs	4,800	10,800	00.00750
C. Operating (or) Running Charges			
Diesel & Oil	3,750		
Driver' Salary	6,600		
Conductor's Salary	6,000	16,350	00.01135
Total		1,53,150	00.10635
Add : Commission and Profit 25/75			00.03545
Fare per passenger km.			00.14180

Working Note:

- (1) No. of Km run in a month : $3 \times 2 \times 20 \times 25 = 3000$ km
(2) No. of passenger km per annum : $3000 \times 40 \times 12 = 14,40,000$
(3) Diesel and oil : $3000 \times 125 / 100 = \text{Rs. } 3750$
(4) Commission & Profits: Commission 10 % of taking + profit
15 % of Taking total = 25 % of taking so the cost
Cost is only 75 %

Illustration 2 :

From the following data relating to two different vehicles A and B, compute cost per running mile.

	Vehicle A	Vehicle B
Milage run (annual)	15000	6000
Cost of vehicles	Rs. 25000	Rs. 15000
Road License (Annual)	750	750
Immune (Annual)	700	400
Garage rent (Annual)	600	500
Supervision and Salaries (Annual)	1200	1200
Driver's wage per hour	3	3
Cost of fuel per gallon	3	3
Miles runs per gallon	20	15
Repairs and maintenance per mile (Rs.)	1.65	2.00
Tire allocation per mile	0.80	0.60
Estimated life of vehicle (miles)	1,00,000	75,000

Charge interest @ 5 % p.a. on cost of vehicles. The vehicles run 20 miles per hour on an average

[M. Com. Madurai Kamraj]

Solution :**Operating cost sheet (cost per mile)**

Particulars	Vehicle-A	Vehicle-B
A. Operating and Maintenance Charges		
Depreciation A – 25000 / 100000	0.25	--
B – 15000 / 75000	--	0.20
Repairs and maintenance	1.65	0.20
Tire allocation	0.80	2.00
Fuel (3 / 20 miles)	0.15	0.60
Driver's wages (A – 3 / 20) (3 – 3 / 15)	0.15	0.15
	3.00	3.15
B. Standing Charges		
	A	B
Road license	Rs. 750	Rs. 750
Insurance	700	400
Charges	600	500
Supervision	1200	1200
Interest @ 5 % p.a.	1250	750
	4500	3600
Mileage run per annum	15000	6000
Fixed standing charge per mile	0.30	0.60
Operating cost per mile	3.30	3.75

- Note :** (1) Depreciation is linked with mileage so operating cost.
 (2) Driver wage is taken as operating since it is paid per hour.

Illustration 3 :

A company presently brings coal to its factory from a nearby yard and the rate paid for transportation of coal from the yard located 6 kms. Away to factory is Rs. 50 per ton. The total coal to be handled in a month is 24,000 tones.

The company is considering proposal to buy its own trucks and has the option of buying either a 10 ton capacity or a 8 ton capacity trucks.

The following information is available:

	10 Ton Truck	8 Ton Truck
Purchase Price Rs.	10,00,000	8,50,000
Life (Years)	5	5
Scrap value at the end of 5 th year	Nil	Nil
KM Per liter of diesel	3	4
Repair and maintenance p.a. per truck (Rs.)	60,000	48,000
Other fixed expenses p.a. (Rs.)	60,000	36,000
Lubricants and sundries per 100 km (Rs.)	20	20

Each truck will daily make 5 trips (to and fro) on an average for 24 days in a month. Cost of diesel Rs. 15/- per liter. Salary of driver Rs. 3,000/-, p.a. month. Two drivers will be required per truck. Other staff expenses Rs. 1,08,000 p.a.

Present a comparative cost sheet on the basis of above data showing transport cost per ton of operating 10 ton and 8 ton Truck at full capacity utilization.

[C.A. Final]

Solution :

Comparative statement of operating cost sheet :

	10 Ton Truck Rs.	8 Ton Truck Rs.
Fixed Charges (p.m.)		
Driver's Salary (working no. 1)	12,000	15,000
Staff expenses	9,000	9,000
Other fixed expenses	5,000	3,000
Operating & Maintenance Charges (p.m.)		
Depreciation (Note No. 2)	3,33,333	3,54,167
Diesel Cost (Note No. 3)	1,44,000	1,35,000
Lubricants & Sundries (Note No. 3)	5,760	7,200
Repairs & Maintenance	1,00,000	1,00,000
Total Cost (A)	7,17,093	7,58,367
Tons Carried (B)	24,000	24,000
Cost per ton (A/B)	29.87	31.59

Conclusion : A comparison of cost per ton by using 10 ton trucks is more economical. The cost paid for bringing coal per ton presently viz. Rs. 50/- is the highest.

Working Note :

	10 ton	8 ton
1 Total number o trucks and drivers required		
Coal brought to the factory per month (5 x 24 x 10)	1200	--
(5 x 24 x 8)		960
No. of truck required to bring 24,000 tons is	$24000/1200=20$	$24000/960=25$
Total number of drivers required	$20 \times 2 = 40$	$25 \times 2 = 50$
2 Total monthly depreciation		
Depreciation per truck per annum	2,00,000	1,70,000
Depreciation per truck per month	1,666.66	14,166.66
Total depreciation	$16666.66 \times 20 = 3,33,333$	$14166.66 \times 25 = 3,54,167$
3 Diesel requires		
Total Km run per truck p.m. (6 km x 10 trips x 24 days)	1440	1440
Total KM run by all trucks	28800	36000
Km per liter of diesel	3	4
Diesel required liters	9600	9000
	(28800 / 3)	(36000 / 4)

Illustration.4 :

You are required to calculate a suggested fare per passenger – km from the following information for a mini bus.

- (i) Length of route 30 km
- (ii) Purchase price Rs. 4,00,000.
- (iii) Part of above cost meet by loan, annual interest Rs. 10,000 p.a.
- (iv) Other annual charges : Insurance Rs. 15,000, Garage Rent Rs. 9,000, Road Taxes Rs. 3,000, Repairs and Maintenance Rs. 5,000. Administrative charges Rs. 5000.
- (v) Running expenses : Driver & Conductor Rs. 5000 p.m., Repairs / Replacement of tyre tube Rs. 3600 p.a. Diesel and Oil cost per Km Rs. 5/-
- (vi) Effective life of vehicle is estimated at 5 years at the end of which it will have a scrap value of Rs. 10,000.
- (vii) Mini Bus has 20 seats and is planned to make six two way trips for 25 days / p.m.
- (viii) Provide profit @ 20 % of total revenue.

[C.A., Final]

Solution :

Particulars	Cost per Annum Rs.	Cost Per Month Rs.
Fixed Expenses :		
Insurance	15,000	
Garage Rent	9,000	
Road Tax	3,000	
Administrative charges	5,000	
Depreciation (4,00,000–10,000 ÷ 5 years)	78,000	
Interest on Loan	10,000	
Total	1,20,000	10,000
Running Expenses :		
Repairs & Maintenance	15,000	1,250
Replacement of tyre tube	3,600	300
Diesel and oil cost (9000 km x Rs. 5/-)		45,000
Driver & Conductor's Salary		5,000
Total Cost per month		61,550
Add : Profit 20 % of total Revenue 25 % Total cost		15,387.50
Total Revenue		76,937.50

Rate per passenger km :

Rs. 36937.50 / 1,80,000 passenger km = 0.4274305 or 0.43 paise

Workings:

Total distance travelled by mini bus in 25 days = 60 km x 6 trips x 25 days = 9000 km

Total passenger km = 9000 km x 20 seats = 1,80,000 passengers km

Illustration 5 :

Krishna Transport Ltd. Charges Rs. 150 per ton for its 10 ton lorry load from city A to city B. the charges for the return journey are Rs. 140 per ton. No concession is made for any delivery of goods at intermediate station 'C' in January 2008. The truck made 10 outward journeys for city B with full load of which 2 ton were unloaded twice at city 'C'. The truck carried a load of 12 ton in its return journey for 4 times but once caught by police and Rs. 1500 was paid as fine. For the remaining trips it carried full load out of which all the goods on load were unloaded once at city 'C'. The distance from city A to city A and city 'B' are 150 km and 250 km respectively. Annual fixed cost are Rs. 1,20,000 and maintenance cost is Rs. 15,000. Running charges spent during January 2008 are Rs. 3500.

Calculate the cost per tone-kilometer and the profit for January 2008.

Solution:

Operating Cost and Profit Statement of Krishna Transport Ltd.

Particulars	Rs.
1. Fixed cost (12000 / 12)	
2. Maintenance charges 15000 / 12	
3. Running charges	
Total operating cost	
Cost per ton km	
Net revenue received (working note)	
Less : Total operating cost	
Profit	

Working note:**(1) Tone km on outward journeys**

From city A to C—10 journeys x 10 ton x 150 km	=	15,000	
From city C to B—8 journeys x 10 ton x 100 km	=	8,000	
2 journey x 8 ton x 100 km	=	1,600	
Total		24,600	Tone – km

(2) Tone km on return journey

From city B to A – 4 journeys x 250 km x 12ton	=	12,000	
From city B to A – 5 journeys x 250 km x 10ton	=	12,500	
From city B to C - 1 journey x 100 km x 10 ton	=	1,000	
Total		<u>25,500</u>	Tone – km

Total tone km = 24,600 + 25,500 = 50,100 ton- km

(3) Net revenue received

From city A to B–10 journeys x10 ton X Rs.150	=	15,000	
From city B to A–4 journeys x 12 ton X Rs. 140	=	6,720	
From city B to A -5 journeys x 10 ton X Rs. 140	=	7,000	
From city B to C -1 journeys x 10 ton X Rs. 140		<u>1,000</u>	
Total		29,720	Tone – km
Less : Fine Paid		<u>1,500</u>	
Net revenue received		28,220	

Illustration 6 :

Mr. Sampath owns a fleet of taxis and the following information is available from the records maintained by him.

- Number of Taxis – 10
- Cost of each Taxi – Rs. 2,00,000
- Salary of manager Rs. 6000 p.m.
- Salary of Accountant Rs. 5000 p.m
- Salary of cleaner Rs. 3000 p.m.
- Salary of Mechanic Rs. 4000 p.m.
- Garage Rent Rs 7000 p.m.
- Insurance premium 5 %
- Annual Tax Rs. 6000 per taxi
- Drivers Salary Rs. 4000 p.m.
- Annual Repairs Rs. 15,000 per taxi

Total life of a taxi is about 2,00,000 kms. A taxi runs in all 3000 kms. in a month of which 25 % its runs empty. Petrol consumption is one liter for 10 kms @ Rs. 40 per liter. Oil and other sundries are Rs. 10 per 100 kms.

Calculate the cost of running a taxi per km.

Solution:

Operating cost sheet

Particulars	Amount per month Rs.	Cost per Km Rs.
Fixed Expenses (for the whole fleet)		
Salary of manager	6000	
Salary of accountant	5000	
Salary of Cleaner	3000	
Salary of mechanic	4000	
Garage Rent	7000	
Insurance premium 5 % on Rs. 2,00000 x 10	8333	
Tax 6000 x 10 / 12	40000	
Total Fixed Expenses	5000	
Effective kilometer 3000x10x 75 % = 22,500		
Fixed expenses per km		3.48147
Running expenses (per taxi)		
Depreciation (2,00,000÷200000 x 10 x 3000)		1.33333
Repairs (15,000 x 10 ÷ 12)		0.55555
Petrol (3000 x 40) ÷ (10 x 22500)		0.53333
Oil and other sundries (10 x 3000) ÷ (100(22500))		0.13333
Cost per km		6.03701

2.5 HOSPITAL COSTING

Hospitals comes under service sector, big companies also maintain hospitals. For costing purpose the hospital service can be divided in two following categories

- (1) Outpatient department
- (2) Wards
- (3) Medical service departments such as radio therapy 'X' ray etc.
- (4) General Services such as heating, lighting, catering laundry etc.
- (5) Other services such as transport, dispensary, cleaning etc.

2.5.1 Cost Statement:

The expenses of hospital can be broadly divided into two categories i.e. (1) Capital Expenditure and (2) Maintenance Expenditure – this includes salaries and wages, provision, staff uniforms clothing, medical and surgical appliances and equipments, fuel light and power, laundry, water etc.

2.5.2 Format of a cost Sheet of a Hospital:

Particulars	Rs.	Rs.
A) Fixed standing charges		
Rent	XX	
Repairs and maintenance	XX	
General administrative expenses	XX	
Depreciation	XX	
Salaries to staff	XX	
Cost of Oxygen, X ray etc.	XX	XX
B) Running or maintenance costs		
Doctor's fees	XX	
Food	XX	
Medicines	XX	
Laundry	XX	
Hire charges	XX	XX
Total operating cost		XX

$$\text{Cost per patient day} = \frac{\text{Total Operating cost}}{\text{No of Patient Days}}$$

2.6 SOLVED PROBLEMS ON HOSPITAL COSTING

Illustration 7:

The following information is available from a intensive care unit.

Rent (including repairs) Rs. 10000 p.m.

The unit cost consists of 25 beds and 5 more beds can be accommodate when the occasion demands. The permanent staff attached to the unit is as follows:

2 supervisors each at a salary of Rs. 2000 per month.

4 nurse each at a salary of Rs. 1500 per month.

2 ward boys each at a salary of Rs. 1000 per month.

Though the unit was open for the patients all the 365 days in a year, security of accounts of 2008 revealed that only 150 days in a year the unit had the full capacity of 25 patients per day and for another 80 days it had on an average 20 beds only occupied per day. But there were occasions when the beds were full, extra beds were hired from outside at a charge of Rs. 10 per bed per day and this did not come to more than 5 beds extra above the normal capacity any one day. The total hire charges for the whole year were Rs. 4000.

The unit engaged expert doctor from outside to attend on the patients and the fees were paid on the basis of number of patients

attended at time spent by them on an average worked out to Rs. 2000 per month in 2008. The other expenses for the year were as under.

	Rs.
Repairs and maintenance	8,000
Food supplied to patients	1,00,000
Janitor and other services for patients	25,000
Laundry charges for bed linens	40,000
Medicines supplied	70,000
Cost of oxygen, x ray etc other than directly born for treatment of patients (Fixed)	90,000
General administration charges allocated to the unit	1,00,000

(1) If the unit recovered an overall amount of Rs. 200 per day on an average from each patient what is the profit per patient day made by the unit in 2008.

(2) The unit wants to work out a budget for 2009, since the number of patients is very uncertain, annuity the same revenue and expenses prevail in 2009, work out the number of patient days required break-even.

Solution:

Statement of cost and profit

Particulars		Rs.	Rs.
A)	Income received (Rs. 200 x 6150)		1,23,000
B)	Variable cost (per annum)		
	Food	1,00,000	
	Janitor and other services	25,000	
	Laundry charges	40,000	
	Medicines	70,000	
	Doctors fees (20,000 x 12)	2,40,000	
	Hire charges for extra bed	4,000	
	(B)	4,79,000	
C)	Fixed Costs		
	Salaries		
	Supervisor	4,800	
	Nurses	72,000	
	Ward boys	24,000	
	Rent (10000 x 12)	1,20,000	
	Repairs & Maintenance	8,000	
	General administration	1,00,000	
	Cost of oxygen, X ray etc.	90,000	
	(C)	4,62,000	
	Total cost (B + C)		9,41,000
	Profit		2,89,000

$$\text{Profit per patient day} = \frac{28900}{6150} = 46.91 \text{ loss Rs. } 47/-$$

Working Note: Calculation of No. of patient days in 2008

$$\begin{aligned} 25 \text{ beds} \times 150 \text{ days} &= 3750 \\ 20 \text{ beds} \times 80 \text{ days} &= 1600 \\ \text{Extra beds } 4000 \div 5 &= \underline{800} \\ &\underline{\underline{6150}} \end{aligned}$$

$$\text{Breakeven point} = \frac{\text{Fixed Cost}}{\text{Income} - \text{Variable cost}} \times \text{income} = \frac{46200}{751000} \times 1230000$$

$$= \text{Rs. } 756671 \text{ (or) } \frac{756671}{200} = 3783.25 \text{ patient days}$$

2.7 HOTEL COSTING

Hotel industry is a service industry and covers various activities such as provision for food and accommodation. It also provides other comforts like recreations, business facilities, shopping areas etc. The expenses incurred in a hotel are fixed or variable. Fixed expenses comprises of staff salaries, repairs, interior decoration, laundry contract cost, sundries and depreciation on fixed assets. The variable expenses incurred are lighting, attendants' salaries, power etc. To find out room rent to be charged from customers a notional profit is added with the cost and divided by the number of rooms available. The number of rooms available is calculated after for considering availability of suits and occupancy.

Rooms rent may be different from season to season. Sometime besides accommodation they also provide food. Then the cost of meals, other direct and indirect costs are considered to work out the costs to be charged from customers.

Operating cost sheet of a Hotel:

Particulars	Rs.	Rs.
A) Fixed Charge		
Salaries to Staff	XX	
Repairs and Renovation	XX	
Depreciation	XX	
Interior decoration	XX	
Sundries	XX	
Laundry contract cost	XX	
Rent	XX	XX
B) Running charges (Variable cost)		
Power	XX	
Attendant salaries	XX	XX
Total Operating Cost		XX
No. of Room Days		XX
Cost per Room Days		XX

2.8 SOLVED PROBLEMS ON HOTEL COSTING

Illustration 8:

A company runs a holiday home for this purpose it hired a building at a rent of Rs. 10,000 per month along with 5% of total takings. It has three types of suites for its customer's viz. single room, double room and triple rooms.

Following information is given:

Types of suite	Number	Occupancy percentage
Single rooms	100	100 %
Double rooms	50	80 %
Triple rooms	30	60 %

The rent of double room's suite is to be fixed at 2.5 times of the single room and that of triple rooms at twice of the double room suite.

The other expenses for the year 2009 are as follows:

	Rs.
Staff salaries	14,25,000
Room attendants wages	4,50,000
Lighting heating and powers	2,15,000
Repairs and renovations	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20 % on total takings and assume 360 days in a year. You are required to calculate the rent to be charged for each type of suite

[C. A. PE II]

Solution:

Calculation of room occupancy

Type of suite	Number	Occupancy %	No. of days in a year	Room occupancy days
Single Room	100	100	360	36000
Double Room	50	80	360	14400
Triple Room	30	60	360	6480

Calculation of equalant single room suits occupancy

$$36,000 \times 1 + 14400 \times 2.5 + 6480 \times 5 = 104400$$

Calculation of Total Cost :

	Rs.
Staff salaries	14,25,000
Room attendant wages	4,50,000
Lighting heating and power	2,15,000
Repair and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000
Total cost excluding building rent	25,21,000
Building rent = 10000 x 12 + 5% of taking	2,96,066
Total cost	28,17,066
Profit 20 % of takings	7,04,267
Total takings	35,21,333

Rent for a single room = $3521333 \div 104400 = \text{Rs. } 33.73$

Rent for a double room = $33.73 \times 2.5 = \text{Rs. } 84.325$

Rent for a triple room = $84.325 \times 2 = \text{Rs. } 168.65$

Illustration 9:

A lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rate during six off season months in a year. During this period, half of the full room rent is charged. The management profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending 31st March, 1996 (assume a month to be of 30 days)

(a) Occupancy during the season is 80%, while in the off season is 40% only.

(b) Expenses :

(i) Staff Salary (excluding room attendants)	Rs. 2,75,000
(ii) Repairs to buildings	Rs. 1,30,000
(iii) Laundry and linen	Rs. 40,000
(iv) Interior and tapestry	Rs. 87,500
(v) Sundry expenses	Rs. 95,400

(c) Annual depreciation is to be provided for building at 5% and on furniture and equipments at 15% on straight line basis.

(d) Room attendants are paid Rs. 5/- per room-day on the basis of occupancy of the rooms in a month.

(e) Monthly lighting charges are Rs. 120 per room, except in four months of winter when it is Rs. 30 per room and this cost is on the basis of full occupancy for a month and

- (f) Total investments in the home are Rs. 100 lakhs of which Rs. 80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months, on the basis of the foregoing information.

[I.C.W.A., Intermediate]

Solution:

Total estimated costs for the year ending 31.03.1996

Particulars	Total Rs.	Per room day (Rs.)
Salary	2,75,000	
Repairs	1,30,000	
Laundry and linen	40,000	
Interior decoration	87,500	
Depreciation: Rs.		
Building 5% on 80 lakhs =	4,00,000	
Furniture 15 % on 20 lakhs =	3,00,000	
	7,00,000	
Miscellaneous expenses	95,400	
Attendant's salary	54,000*	
Lighting charges	36,000**	
Total cost	14,18,400 / 9000	157.60
	*** full room days	
Add : Profit margin at 20% on rent or 25% of cost		197.00

During season room rent is Rs. 197 and during off-season room rent is Rs. 98.50

* Attendant' salary

For 10,800 room days @ Rs. 5 per day = Rs. 54,000

** Total light bill

Light bill during 8 months at Rs. 120 per month or $120 \div 30 =$ Rs. 4 Per room day.

Light bill during 4 months of winter at Rs. 30 per month or $30 \div 30 =$ Re. 1 per Room day.

Total light bill for full one year	Rs.
- During season @ Rs. 4 for 7,200 days	28,800
- During 2 months of off-season @ Rs. 4 for 1,200 days ($2 \div 6 \times 3,600$)	4,800
- During 4 months of winter at Re. 1 For 2,400 days ($4 \div 6 \times 3,600$)	2,400
Total	36,000

*** Number of room days in a year :

Seasons occupancy for 6 months @ 80% $(50 \times 0.8 \times 6 \times 30) = 7,200$
 room days Off season's occupancy for 6 months @ 40 % $(50 \times 0.4 \times 6 \times 30) = \underline{3,600}$ room days

Total room days during the Year	<u>10,800</u>
Total full room days in terms of rate	
Season	7,200
Off Season (in terms of 50 % rate on 3,600 days)	<u>1,800</u>
Total Full room days	<u>9,000</u> per annum

Illustration 10:

Elegant Hotel has a capacity of 100 single rooms and 20 double rooms. It has a sports centre with a swimming pool which is also used by persons other than residents of the hotel. The hotel has a shopping arcade at the basement and a specialty restaurant at the roof top. The following information is available:

- (1) Average occupancy : 75 % for 365 days of the year
- (2) Current costs are :

	Variable cost	Fixed cost
Single room	400	200
Double room	500	250
- (3) Average sales per day of restaurant Rs. 1, 00,000; contribution is at 30 %. Fixed cost Rs. 10, 00,000 per annum.
- (4) The sports centre / swimming pool is likely to be used by 50 non –residents daily; average contribution per day per non-resident is estimated at Rs. 50; fixed cost is Rs. 5,00,000 per annum.
- (5) Average contribution per month from the shopping arcade is Rs. 50,000; fixed cost is Rs. 6, 00,000 per annum.

You are required to find out:

- (a) Rent chargeable for single and double room per day, so that there is a margin of safety of 20 % on hire of rooms and that the rent for a double room should be kept at 120 % of a single room.
- (b) Evaluate the profitability of restaurant, sports centre and shopping arcade separately.

[C. A. Final]

Solution:

(a) Statement for calculating the rent chargeable for single and double room per day.

	Occupancy days in a year Refer to working note (1)	Variable cost Rs / Days (2)	Fixed cost Rs / Days (3)	Total variable cost $4 = (1) \times (2)$	Total fixed cost (Rs.) $5 = (1) \times (3)$	Total cost (Rs.) $6 = (4) \times (5)$
Single room	27,375	400	200	1,09,50,000	54,75,000	1,64,25,000
Double room	5,475	500	250	27,37,500	13,68,750	41,06,250
Add : 20 % margin of safety on hire of room or 25 % of total cost						51,32,812
Total amount of room rent to be received						2,56,64,062

Rent per day of single room 9 in Rs.) 756 (approx)

(Refer to working note 2)

(Rs. 2, 56,64,062 / 33,945)

Rent per day of double room (in Rs.) 907 (approx)

(Rs. 756 x 1.2 times)

b) Profitability of restaurant	Rs.
Total sales per annum 365 days x Rs. 1,00,000	3,65,00,000
Contribution per annum (30 % of Total Sales) : (A)	1,09,50,000
Fixed cost per annum : (B)	10,00,000
Profit [(A) – (B)]	99,50,000
Profitability of sports centre :	Rs.
Contribution of sports centre per day : (50 persons x Rs. 50)	2,500
Total contribution per annum (Rs. 2,500 x 365 days) : (A)	9,12,500
Fixed cost per annum : (B)	5,00,000
Profit : [(A) – (B)]	4,12,500
Profitability of shopping arcade :	Rs.
Contribution per annum (Rs. 50,000 x 12 months)	6,00,000
Less : Fixed Cost	6,00,000
Profit	Nil

Working Note :

1. Single room occupancy days in a year = 100 room x 365 days x 75 %

$$= 27,375$$
 Double room occupancy days in a year = 20 rooms x 365 days x 75 %

$$= 5,475$$
2. In terms of single room total room occupancy days in a year

$$= 27,375 + 1.20 \% \times 5,475 = 27,375 + 6,570$$

$$= 33,945$$

Illustration 11:

Following are the information given by an owner of a hotel. You are requested to advice him that what rent should be charge from his customers per day so that he is able to earn 25 % on cost other than interest.

- 1) Staff salaries Rs. 80,000 per annum
- 2) Room attendant's salary Rs. 2 per day. The salary is paid on daily basis and services of room attendant are needed only when the room is occupied. There is one room attendant for one room.
- 3) Lighting, heating and power. The normal lighting expenses for a room if it is occupied for the whole month is Rs. 50. Power is used only in winter and normal charge per month if occupied for a room is Rs. 20.
- 4) Repairs to building Rs. 10,000 per annum
- 5) Linen etc. Rs. 4,800 per annum
- 6) Sundries Rs. 6,600 per annum
- 7) Interior decoration and furnishing Rs. 10,000 annually
- 8) Cost of building Rs. 4,00,000; rate of depreciation 5 %
- 9) Other equipments Rs. 1,00,000; rate of depreciation 10 %
- 10) Interest @ 5% may be charged on its investment of Rs. 5,00,000 in the building and equipment
- 11) There are 100 rooms in the hotel and 80 % of the rooms are normally occupied in summer and 30 % of the rooms are busy in winter. You may assume that period of summer and winter is six month each. Normal days in a month may be assumed to be 30.

Solution :

Operating cost sheet

Rent per day

	Rs.	Per annum Rs.
1. Staff salaries		80,000
Room attendant's salaries		
Summer 2 x (100 x 80 ÷ 100) x 30 x 6	28,800	
Winter 2 x (100 x 30 ÷ 100) x 30 x 6	10,800	39,600
Lighting, heating and power		
Summer 50 x 6 x (100 x 80 ÷ 100)	24,000	
Winter 50 x 6 x 100 x (30 ÷ 100)	9,000	
Power 20 x 6 x 100 x (30 ÷ 100)	3,600	36,600
Repairs to building		10,000
Linen etc.		4,800
Sundries		6,600
Interior decoration and furnishing		10,000
Depreciation : Building	20,000	
Other equipments	10,000	30,000
Interest on investment (5% on Rs. 5,00,000)		25,000
		2,42,600
Add : 25 % profit on cost other than interest		
Rs. 2,42,600 – Rs. 25,000 interest = Rs.		
2,17,600		
Rs. 2,17,600 x 25 ÷ 100		54,400
Total cost		2,97,000

Rent per room for one day = Total Cost ÷ No. of room days
= 2,97,000 ÷ 19,800
= Rs. 15 per day

Working Notes: Calculation of room days

No. of Rooms x Percentage x days in a month x no. of months

Summer: 100 x (80 ÷ 100) x 30 x 6
80 x 30 x 6 = 14,400

Winter: 100 x (30 ÷ 100) x 30 x 6
30 x 30 x 6 = 5,400

Total room days = 19,800

Illustration 12:

SAITRAVELS owns a bus and operates a tourist service on daily basis. The bus starts from New City to Rest village and returns back to New City the same day. Distance between New city and Rest village is 250 kms. This trip operates for 10 days in a month. The bus also plies for another 10 days between New city and Shivapur and returns back to New city the same day, distance

between these two places is 200 kms. The bus makes local sightseeing trips for 5 days in a month, earning a total distance of 60 kms per day.

The following data are given.

Cost of bus	Rs.	3,50,000
Depreciation		25 5
Driver's salary	Rs.	1,200 p.m.
Conductor's Salary	Rs.	1,000 p.m.
Part time clerk's salary	Rs.	400 p.m.
Insurance	Rs.	1,800
Diesel consumption 4 kms per litre @	Rs.	8 per litre
Token tax	Rs.	2,400 p.m.
Permit fee	Rs.	1,000 p.m.
Lubricant oil	Rs.	100 for every 200 kms
Repairs and maintenance	Rs.	1,500 p.m.
Normal capacity	Rs.	50 persons

While playing to and for Rest village, the bus occupies 90% of the capacity and 80% when it plies between New city to Shivapur (both ways). In the city the bus runs full capacity passenger tax is 20 % of net takings of the "Travels" firm.

Calculate the rate to be charged to Rest village and Shivaupr from New city, per passenger, if the profit required to be earned is 33 % of net taking of firm.

[I.C.W.A., Intermediate]

Solution:

Operating cost statement for the month

	Rs.	Total Rs.	Per passenger km (total cost + 4,00,000) passenger km Rs.
Fixed charges			
Driver's salary	1,200		
Conductor's salary	1,000		
Clerk's salary	400		
Insurance (1,800 ÷ 12)	150		
Token Tax (2,400 ÷ 12)	200		
Permit fees	1,000		
Depreciation (25% of 3.5lakhs ÷ 12)	7,292		
Repairs and Maintenance	1,500	12,742	0.03185
Running charges			
Diesel cost 9,300 km ÷ 4 = 2,325 liters @ Rs. 8		18,600	0.04650
Lubricant oil 9,300km ÷ 200 = 45.5 liters @ Rs. 100		4,650	0.01163
	Total	35,992	0.08998

Add : 33 % profit on net taking or 49.25% on cost	17,726	0.04432
Net takings	53,718	0.13430
Add : 20 % for passenger tax	10,744	0.02686
Total	64,462	0.16116
	or say	0.161

Charges per passenger:

(a) to Rest village from New city : 250 x 0.161 i.e. Rs. 40.25

(b) to Shivapur from New city : 200 x 0.161 i.e. Rs. 32.20

* total kms covered p.m.

Rest village and back 2 x 250 x 10 days 5,000

Shivapur and back 2 x 200 x 10 days 4,000

Local trips @ 60 kms for 5 days 300

9,300

** Total effective passenger – km per month :

Rest village 2 x 250 x 90 % of 50 x 10 days =2,25,000 passenger km

Shivapur 2 x 200 x 80 % of 50 x 10 days =1,60,000 “ “

Local Trips 5 x 60 x 50 = 15,000 “ “

4,00,000 “ “

Illustration: 13: (Service costing – use own / company cars or hire cars)

A company is considering three alternative proposals for conveyance facilities for its sales personal who have to do considerable travelling, approximately 20,000 kilometers every year. The proposals are as follows :

- (1) Purchase and maintain its own fleet of cars. The average cost of car is Rs. 1,00,000.
- (2) Allow the executive use his own car and reimburse expenses at the rate of Rs. 1.60 paise per kilometer and also bear insurance costs.
- (3) Hire cars from an agency at Rs. 20,000 per year per car. The company will have to bear costs of petrol, taxes and tyres.

The following further details are available :

Petrol Re. 0.60 per km.

Repairs and maintenance Re. 0.20 per km

Tyre Re. 0.12 per km

Insurance Rs. 1,200 per car annum;

Taxes Rs. 800 per car per annum

Life of a car : 5 years with Annual milage of 20,000 kms.

Resale value: Rs. 20,000 at the end of the fifth year.

Work out the relative costs of three proposals and rank them

[C.A., Inter]

Solution :
Alternative proposals

	I Use of concern car		II Use of own car	III Use of hired car
	Rs. Per annum	Rs. Per km	Rs. Per km	Rs. Per km
Reimbursement (A)	--	--	1.60	1.00 @
Fixed cost (B)				
Per car per annum				
Insurance	1,200			
Taxes	800			
Depreciation (Rs.1,00,000–20,000÷ 5)	16,000			
Total	18,000			
Fixed cost per km (Rs.18,000 ÷ 20,000 km)		0.90	--	--
Running and maintenance cost (C)				
Per car per km				
Petrol		0.60	--	0.60
Repairs & Maintenance		0.20	--	--
Tyre		0.12	--	0.12
Total cost per km (A+B+C)		1.82	1.66	1.76
Cost of 20,000 km		Rs. 36,400	33,200	35,200
Ranking of alternating proposals		III	I	II

Decision II alternating i.e., use of own car will be the best alternative from company's point of view. III alternative i.e. hiring the card is 2nd best alternative. I alternative i.e. maintaining the fleet will be costliest alternative.

Rs. 1,200 ÷ 20,000 kms = Re. 0.06; (Rs. 800 ÷ 20,000 kms) = Re. 0.04 @ Rs. 20,000 ÷ 20,000 kms = Re. 1/-

Illustration 14:

The Union Transport Company has been given a twenty kilometer long route to ply a bus. The bus costs the company Rs. 1,00,000. It has been insured at 3 % per annum. The annual road tax amounts to Rs. 2,000. Garage rent is Rs. 400 per month. Annual repair is estimated to cost Rs. 2,360 and the bus is likely to last for five years.

The salary of the driver and conductor is Rs. 600 and Rs. 200 per month respectively in addition to 10% of the taking as commission to be shared equally by them. The managers salary is Rs. 1,400 per month and stationery will cost Rs. 100 per month.

Petrol and oil will cost Rs. 50 per 100 kilometers. The bus will make three round trips per day carrying on an average 40 passengers in each trip. Assuming 15% profit on takings and that the bus will ply on an average 25 days in a month.

Prepare operating cost statement on a full year basis and also calculate the bus fare to be charged from each passenger per kilometer

[C.A., Inter]

Solution:

Union Transport Company

Statement showing operating cost of the bus per annum

A. standing charges

Managers salary (Rs. 1,400 x 12)	= Rs.	16,800
Driver's salary (Rs. 600 x 12)	= Rs.	7,200
Conductor's Salary (Rs. 200 x 12)	= Rs.	2,400
Road Tax	= Rs.	2,000
Insurance (3% of Rs. 1,00,000)	= Rs.	3,000
Garage rent (Rs. 400 x 12)	= Rs.	4,800
Stationery (Rs. 100 x 12)	= Rs.	1,200
Depreciation (Rs. 1,00,000 ÷ 5 years)	= Rs.	<u>20,000</u>
		57,400

B. Maintenance Cost – Repairs = Rs. 2,360

C. Running charges

Petrol and oil (36,000 km x Rs. 50) ÷ 100	= Rs.	<u>18,000</u>
Total costs (A + B + C)	= Rs.	77,760

Add : 10 % of takings for commission of driver & conductor = Rs.

15 % profit – desired on takings = Rs. 25,920

25 % on total takings = 33 – 1/30 of cost = Rs. 1,03,680

Calculation of bus fare to be charged:

Effective passenger kilometers:

(2 x 20 km x 3 trips x 40 passengers x 25 days x 12 months) = 14,40,000

Rate to be charged per km from each passenger

Rs. 1,03,680 ÷ 14,40,000 = Re. 0.072

Calculation of total distance covered

(20 km x 2 x 3 x 25 x 12) = 36,000 km per annum

Illustration 15: (Transport Costing)

Prakash Automobiles distributes its goods to a regional dealer using a single lorry. The dealers' premises are 40 kilometers away by road. The lorry has a capacity of 10 tons and makes the journey twice a day fully loaded on the outward journeys and empty on return journey. The following information is available for a four weekly period during the year 1990.

Petrol consumption	8 km per liter
Petrol Cost	Rs. 13 per liter
Oil	Rs. 100 per week
Driver's wages	Rs. 400 per week
Repairs	Rs. 100 per week
Garage Rent	Rs. 150 per week
Cost of Lorry (excluding tyres)	Rs. 4,50,000
Life of Lorry	80,000 kilometers
Insurance	Rs. 6,500 per annum
Cost of tyres	Rs. 6,250
Life of tyres	25,000 kilometers
Estimated sale value of lorry at end of its life	Rs. 50,000
Vehicle license cost	Rs. 1,300 per annum
The lorry operates on five day week	Rs. 41,600 per annum

Required:

- A statement to show the total cost of operating the vehicle for four-weekly period analyzed into running costs and fixed costs.
- Calculate the vehicle cost per kilometer and per ton kilometer

[C.A., Inter]

Solution:

(a) Before computing the total cost, it is necessary to find out the basic data s under :

- Distance travelled in 4 week period; 40 km one way x 2 (return) x 2 trips x 5 days x 4 weeks = 3200 km
- For tone km working = empty on return and as such for tone km = $3200 \div 2 = 1,600$
- Total consumption in weeks = $3,200 \text{ km} \div 8 \text{ km} = 400 \text{ lt}$
- Tyre cost = $(\text{Rs. } 6,250 \div 25,000 \text{ km}) \times 3,200 \text{ km} = \text{Rs. } 800$
- Depreciation of lorry in 4 weeks
= $(\text{Rs. } 4,50,000 - \text{Rs. } 50,000) \div 80,000 \times 3,200 = \text{Rs. } 16,000$

Operating cost statement f a lorry of M/s. Prakash Automobiles
(for the 4 week period)

Running costs	Rs.
Cost of petrol (400 liters x Rs. 13)	5,200
Oil (Rs. 100 per week x 4)	400
Drivers wages (Rs. 400 per week x 4)	1,600
Repairs (Rs. 100 x 4)	400
Cost of tyers (as at 4 above)	800
Depreciation (as at 5 above)	16,000
Total running costs – (i)	24,400
Fixed costs	Rs.
Garage ret (Rs. 150 x 4)	600
Insurance (Rs. 6,500 ÷ 52) x 4	500
License cost (Rs. 1,300 ÷ 52) x 4	100
Other overheads (Rs. 41,600 ÷ 52) x 4	3,200
Total fixed cost - (ii)	4,400
Total (i) + (ii)	28,000

(b) Cost per tone – km = Rs. 28,800 ÷ (1600 x 10 tons) Rs. 1.80

2.9 EXERCISE

2.9.1. Objective Type

Choose the correct answer for the multiple choice questions

1. Classification and accumulation of costs by fixed and variable costs is a distinctive feature of

(a) Process costing	(b) Unit costing
(c) Operating costing	(d) Batch costing

2. Composite unit is distinctive feature of

(a) Single or output costing	(b) Process costing
(c) Job costing	(d) Operating costing

3. Electricity generating company should employ

(a) Unit costing	(b) Process costing
(c) Operating costing	(d) Multiple costing

4. Cinema houses must adopt
 - (a) Operating costing
 - (b) Job costing
 - (c) Batch costing
 - (d) Contract costing

5. For a library the best method of costing suitable is
 - (a) Output costing
 - (b) Operating costing
 - (c) Process costing
 - (d) Multiple costing

6. For an educational institutes the right method of costing is
 - (a) Output costing
 - (b) Job costing
 - (c) Operating costing
 - (d) Process costing

7. Hospitals must make use of
 - (a) Operating costing
 - (b) Batch costing
 - (c) Process costing
 - (d) Multiple costing

8. For hotels the best method of costing is
 - (a) Single or output
 - (b) Contract costing
 - (c) Process costing
 - (d) Operating costing

9. Air India Co. must make use of
 - (a) Job costing
 - (b) Operating costing
 - (c) Batch costing
 - (d) Process costing

10. Indian Railways must adopt
 - (a) Operating costing
 - (b) Unit costing
 - (c) Batch costing
 - (d) Multiple costing

11. Public utility undertakings must invariably adopt
 - (a) Operating costing
 - (b) Output costing
 - (c) Contract costing
 - (d) Multiple costing

12. Karnataka Electricity Board must make use of
 - (a) Single or output costing
 - (b) Job costing
 - (c) Process costing
 - (d) Operating cost

13. The method of costing used in case of a gas company is termed as
 (a) Job costing (b) Process costing
 (c) Operating costing
14. Mines 'A' and 'B' are at a distance of 10 kms and 15 kms from the factory. The cost per tone-km in case of mine A is Rs. 3 while it is R. 2.5 in case of mine B. The factory should procure coal from
 (a) Mine A only (b) Mine B only
 (c) Both from mines A and B in the ration of 3 : 2
15. In case of steam company, the cost per unit is calculated on the basis of
 (a) Total quantity of lbs. produced
 (b) Total quantity of kwh. generated
 (c) Total quantity of tones produced.

Answers: 13(c), 14(d), 15(c), 16(a), 17(b), 18 (b), 19(a), 20(d), 21(b), 22(a), 23(d), 24(a), 25(a)
 (c), 26 (a), 27(a)

2.9.2 Simple Questions

1. Define operating cost
2. Define operating costing
3. Distinguish between operating cost and operating costing
4. What do you mean by a composite unit?
5. List out any eight undertakings which makes use of operating costing.
6. Give the composite unit of the following undertakings :
 (a) Roadways carrying passenger
 (b) Railways carrying goods
 (c) Hospital and
 (d) College.
7. Mention the basis of classifying the cost under operating costing.
8. Mention the basis of classifying the costs under transport costing.
9. What is a log sheet ?
10. What do you mean by cost summary performance statement?
11. What do you mean by absolute tone-kilometer?
12. What do you mean by a commercial tone-kilometer?
13. Distinguish between absolute tone-kilometer and commercial tone kilometer.

14. What do you mean by “kilometer run”?
15. What do you mean by “cost per hour” under operating costing?

2.9.3 State whether each of the following statement is `True` or `False`

1. Operating costing is used in case of service undertaking.
2. Log sheet is prepared in case of power house costing.
3. The unit of cost for production of steam may be per lb.
4. Per man show cost is calculated in case of Canteen costing.
5. Fare in case of taxis is generally based on cost per passenger, km

Answer : (1) True (2) False (3) True (4) False (5) False

2.9.4. Long answer type.

1. What is service costing ? Mention the types of business in which the system would be suitable. Describe briefly a system of service costing which you would recommend for use by a passenger taxi service.
2. What are the main objects of motor transport costing? A company owns a fleet of vans and wishes to examine the cost of (a) each van, (b) the fleet as a whole. Prepare a report on the accounting arrangements that are needed and draft specimen of the forms that you recommend for presentation to the directors. Show separate rates for fixed and variable expenditure and state how these should be used.
3. Draw up a proforma cost statement for a canteen serving 1,000 workers in a factory. The canteen is subsidized by the factory.
4. What is “Operating Costing” ? State the industries where it is to be used?
5. What is a “Log sheet”? Give its proforma.
6. Your client running a canteen tends to introduce costing system in his organization. How should he classify his costs for the purpose of preparing an Operating Cost Statement ?

2.9.5 Practical problems

Illustration 1 :

A Mineral is transported from two mines – “A” and “B” and unloaded at plots in a Railway Station. Mine A is at a distance of 10kms. And B is at a distance of 15kms. from the mines. Records reveal that the lorries average a speed of 30 kms. per hour, when running and regularly take 10 minutes to unload at the railhead. At mine “A” loading time averages 30 minutes per load while at mine “B” loading time averages 20 minutes per load.

Drivers’ wages, depreciation, insurance and taxes are found to cost ` 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost ` 1.20 per km.

Draw up a statement, showing the cost per tonne-kilometer of carrying mineral from each mine.

(M.Com. Oct. 01)

(Ans.: Cost per tonne Km. Mine A: Rs. 0.72, Mine B: Rs.0.66)

Illustration 2 :

A transport company maintains a fleet of bus as follows :

Number of Buses	Carrying Capacity
20	50 passengers each
10	40 passengers each

Each bus makes 5 trips a day, covering a distance of 10 Km. in each trip. On an average 80% of the seats are occupied in each trip and 5 buses are under repair every day. Assuming that the company operates its fleet daily, ascertain the operating cost per passenger-Km. from the following :

Wages of 30 Drivers	` 3,000 each per month
Wages of 30 Cleaners	` 1,000 each per month
Petrol	` 20,000 per month
Oil, Grease etc.	` 5,000 per month
Tyres, Tubes etc.	` 2,000 per month
Repairs	` 30,000 per year
Garage Rent	` 40,000 per year
Road Licences	` 20,000 per year

Taxes	₹ 5,000 per half year
Permit Fee	₹ 25,000 per year
Salary of Operating Manager	₹ 5,000 per month
Office Overheads	₹ 10,000 per year

(M.Com, Oct 2000)

Ans: (Total Operating Cost: Rs. 19,59,000, Cost per passenger Km.: Rs.0.115)

Illustration 3 :

A company presently brings coal to its factory from a nearby yard which is located 6 kms. away to factory and the rate paid ₹ 50 per ton for transportation. The total coal to be handled in month is 24,000 tons.

The company is considering proposal to buy its own trucks and has the option of buying either a 10 ton or a 8 ton capacity trucks.

The following information is available :

Particulars		10 Ton Truck	8 ton Truck
Purchase Price (₹)	... ..	10,00,000	8,00,000
Life (Years)	... ..	5	5
Scrap value at end of 5 th year	... ..	Nil	Nil
Kms. per litre of diesel	... ..	3	4
Rep/Maint p.a. per Truck (₹)	... ..	60,000	48,000
Other Expenses fixed p.a. (₹)	... ..	60,000	36,000
Lubricants and Sundries per 100 km. (₹)	... ..	20	20

Each Truck will daily make 5 trips (to and fro) on an average for 24 days in a month.

Cost of Diesel ₹ 16 per litre.

Salary of Drivers ₹ 3,000 per month and two drivers will be required for a Truck.

Other staff expenses ₹ 1,08,000 p.a.

Present a Comparative Cost Sheet on the basis of above data showing transport cost per ton of operating 10 ton and 8 ton Truck at full capacity utilization. (M.Com. Mar. 02, adapted)

Ans: (Total Operating Cost: 10 Ton Truck: Rs. 49,635 8 Ton Truck Rs.41,381, Cost per Ton: 10 Ton Truck: Rs. 41.36, 8 Ton Truck: Rs.43.11)

Illustration 4 :

The following were the expenses incurred by CALL and MALL Company in operating two lorries (for the conveyance of Raw Materials) and a bus (for the conveyance of Staff) during the month of February, 2006 :

	Monthly Cost		
	Lorry C	Lorry M	Bus
Driver's Salaries	110	115	120
Cleaner's Wages	120	120	60
Diesel	170	240	110
Oil	18	25	20
Repairs	150	150	100
Depreciation	330	220	350
Office Overheads	70	70	70
Servicing Charges	130	110	75
Road and Wheel Tax	45	45	30
Sundry Expenses	35	40	20

The above vehicles carried the following Raw materials and Passengers during the month :

Lorry C 100 Tonnes of Raw Material

Lorry M 120 Tonnes daily for 25 days

Respective mileage of the vehicles during the month :

Lorry C 3,000

Lorry M 4,500

Bus 2,000

From the above statistics prepare an Operating Cost Sheet in summary for the three vehicles. Also explain the unit of costing selected.

Ans: (Total Operating Cost: Lorry C: Rs. 1,178, Lorry M: Rs. 1,135, Bus: Rs. 955, Total Tonnes or Passenger Miles: Lorry C: 12,000, Lorry M: 21,600, Bus: 50,000)

Illustration 5:

An entrepreneur owns a bus which runs from Mumbai to Pune and back for 25 days in a month. The distance from Mumbai to Pune is 170 kms. The bus completes the trip from Mumbai to Pune and back on the same day. Calculate the fare to be charged to passengers if a profit of $33\frac{1}{3}\%$ on cost is expected.

The following further information is available :

Particulars		Rs.
Cost of Bus	.....	3,00,000
Salary of Driver per month	.....	1,050
Salary of Conductor	.....	700
Fixed Office Overheads	.....	480
Insurance p.a.	.....	6,720
Diesel consumption 16 kms. per litre costing	.....	25 per litre
Local Taxes p.a.	.....	1,200
Oil and Lubricants per 100 kms.	.....	20
Repairs and Maintenance p.a.	.....	1,000
Licence Fees p.a.	.....	2,840
Normal Seating Capacity	.....	50 passengers
Depreciation Rate	.....	20% p.a.

The bus usually runs full upto 90% of its capacity both ways. Permit fee is payable on the cost of bus at 10% p.a.

(M.Com. April 05)

Ans: (Total Operating Cost: Rs. 3,08,295, Total passenger Km.: 45,90,000)

Illustration 6 :

KKK Automobiles distributes its goods to a regional trader using a single lorry. The trader's premises are 40 kms away by road. The lorry has a capacity of 10 tonnes and makes the journey twice a day fully loaded on the outward journeys and empty on return journeys.

You are given data for 4 weekly periods during the year 2003.

Petrol consumption 8 kms per litre

Petrol cost Rs. 13 per litre

Oil Rs. 100 per week

Driver's wages Rs. 400 per week

Repairs Rs. 100 per week

Garage rent Rs. 150 per week

Cost of lorry Rs. 4,50,000 (excluding tyres)

Life of lorry 80,000 kms.

Insurance Rs. 6,500 p.a.

Cost of tyres Rs. 6,250

Life of tyres 2,500 kms

Estimated Scrap value of lorry at the end of its life ` 50,000

Vehicle licence cost Rs. 1,300 p.a.

Other overhead cost Rs. 41,600 p.a.

The lorry operates on a Five-day week

Required :

- a) A statement to show the total cost of operating the vehicle for the 4 weekly periods analysed into running costs and fixed costs.
- b) Calculate vehicle cost per km. and per tonne km.

(M. Com, Oct. 04, adapted)

Ans: (Total Operating Cost: Rs. 28,800, Effective Km- Tonne :16,000 Effective Km. 1600)

Illustration 7 :

A person owns a bus which runs between Delhi and Chandigarh and back for 10 days in a month. The distance between Delhi and Chandigarh is 150 kms. The bus completes the trip from Delhi and Chandigarh and back on the same day.

The bus goes to Agra for another 10 days. The distance between Delhi and Agra is 120 kms. The trip is also completed on the same day. For the rest 4 days of its operation, it runs in Delhi. The daily distance covered is 40 kms.

Calculate the charges to be made if a profit of $33\frac{1}{3}\%$ is to be earned on his takings.

The other available information given to you is :

Cost of the bus Rs. 60,000.

Depreciation 20% p.a.

Salary of Driver Rs. 350 p.m.

Salary of Conductor Rs. 350 p.m.

Salary of Cleaner Rs. 160 p.m.

Insurance Rs. 1,680 p.a.

Diesel consumption is 4 kms per litre. Diesel costs Rs. one per litre.

The token tax is Rs. 600 p.a.

Lubricants Rs. 10 per 100 kms; repairs and maintenance Rs. 300 p.m.; permit fee Rs. 284 p.m. and the normal capacity is 50 persons.

The bus generally has 90% of its capacity occupied when it goes to Chandigarh, 80% when it goes to Agra. It is always full when it runs within the city. Passenger tax is 20% of his net takings.

(M. Com, Oct. 04, adapted)

Ans: (Total Operating Cost per month: Rs. 4,580, Cost per passenger Km. Rs.0.034)

Illustration 8 :

A person owns a bus that runs between Mumbai and Lonavala and back, for 10 days in a month. The distance from Mumbai to Lonavala is 150 kms. The bus completes the trip from Mumbai to Lonavala and return in the same day. The bus goes another 10 days in a month towards Alibagh. The distance from Mumbai to Alibagh is 120 kms. The trip is also completed on the same day. For the rest 4 days of its operation in a month it runs locally in Mumbai, covering daily distance of 40 kms. Calculate the rate that the person should charge from passenger when he wants to earn the profit of 25% on his takings and also calculate the charge per passenger for both the out-station trips. The other information is given as follows :

Cost of the bus (Depreciation @ 20% p.a.; Normal Capacity : 50 persons) 6,00,000

Salary : Driver	5,000 per month
Salary : Conductor	5,000 per month
Fixed Office Overheads	2,000 per month
Insurance	7,200 per month
Fuel (Consumed @ 4 kms/litre)	35 per litre
R.T.O. tax	600 per annum
Lubricant Oil	10 per 100 kms
Repairs and Maintenance	500 per month
Permit Fee	300 per month

Passenger tax is 20% of the net takings. The bus is occupied 90% of its capacity while on Lonavala trip and 80% of its capacity while on Alibagh trip, but is fully occupied in its local journey.

(M. Com, April n08, adapted)

Ans: (Total Operating Cost: Rs. 72,656, Total Passenger Km. 2,39,000, Cost per passenger Km.: Rs.48.64)

Illustration 9

A transport company supplies the following details in respect of a truck of 5 tonne capacity which carries goods to an from the city covering a distance of 50 kms each way.

	Rs.
Cost of truck	1, 80,000
Diesel, oil, grease (per trip each way)	30
Repairs and maintenance (per month)	1,500
Driver's (monthly) wages	1,500
Cleaner-cum-attendant's wages (monthly)	750
Insurance (per year)	9,000
Road license (per year)	3,000
General Supervision charges (per year)	6,000
Estimated life (years)	10

While going to the city, freight is available for a full load of the truck and on its return journey it can fetch freight only upto 20 percent of its capacity.

On the assumption that the trucks runs on an average 25 days a month, you are required to determine the following :

- i) Operating cost per tone-km,
- ii) Rate per tone per trip that the company should charge if profit if 50 percent on cost is to be earned, and
- iii) What freight should the company charge if one wants to engage the truck for one day for a trip to the city and back?

(M.Com , April 09, adapted)

Ans: (Total Operating Cost: Rs. 8,250, Cost per Tonne Km.: Rs.1.100)

Illustration 10 :

From the following information relating to a Hotel, calculate the room rent to be charged to give a profit of 25% on cost excluding interest charged on Loan for the year ended 31st March, 2008 :

1. Salaries of office staff Rs. 50,000 per month.
2. Wages of the room attendant: Rs. 20 per day per room when the room is occupied.
3. lighting, Heating and Power :
 - a) The normal lighting expenses for a room for the full month is Rs. 500, when occupied.
 - b) Power is used only in winter and the charges are 200 for a room, when occupied.
4. Repairs to Beds and other furniture: Rs. 30,000 per annum.
5. Repairs to Hotel building: Rs. 50,000 per annum.
6. Licence fees: Rs. 12,400 per annum.
7. Sundries: ` 10,000 per month.
8. Interior decoration and furnishing: Rs. 1,00,000 per annum.
9. Depreciation @ 5% p.a. is to be charged on Building costing 20,00,000/- and @ 10% p.a. on Equipments.
10. There are 200 rooms in the Hotel, 80% of the rooms are generally occupied in summer, 60% in winter and 30% in rainy season.

The period of summer, winter and rainy season may be considered to be of 4 months in each case. A month may be assumed of 30 days of an average (M. Com. Oct. 08, adapted)

Ans: (Total Earnings: Rs. 33,18,000, Total Room Days: 40,800. Cost per Day: Rs.81.32)

Illustration 11:

Relax Hotel has a capacity of 100 single rooms and 20 double rooms. The average occupancy of both single and double rooms is expected to be 80% throughout the year of 365 days. The rent for the double room has been fixed at 125% of the rent of the single room. The costs are as under:

Variable Costs	:	Single rooms Rs. 220 each per day
		Double rooms Rs. 350 each per day
Fixed Costs	:	Single rooms Rs. 120 each per day
		Double rooms Rs. 250 each per day

Calculate the rent chargeable for single and double rooms per day in such a way that the hotel earns on overall profit of 20% on hire charges of rooms. (M. Com. April 09, adapted)

Ans: (Total Earnings: Rs. 1,67,90,000, Total Room Days: Single room: 29,200 Double room : 5,840.)

Illustration 12:

A hospital is run by a Company. For this purpose it has hired a building at a rent of Rs. 5,000 per month plus it would bear the repair charges also.

The hospital is having 25 beds and 5 more beds can be accommodated when the need arises.

The staff of the hospital is as follows :

2 Supervisors each at a salary of Rs. 500 per month

4 Nurses each at a salary of Rs. 300 per month

2 Ward boys, each at a salary of Rs. 150 per month

Although the hospital is open for patients all the 365 days in a year, records for the year 2004 disclose that only for 120 days in the year, the unit had the full capacity of 25 patients per day and

when the beds were full, extra beds were hired at a charge of ` 5 per bed per day and this did not come to more than 5 beds extra above the normal capacity on any one day. The total hire charges for the extra beds incurred for the whole year were Rs. 2,000.

The Unit engaged expert doctors from outside to attend on the patients and the fees was paid on the basis of the number of patients attended and time spent by them which on an average worked out to Rs. 10,000 per month in 2004.

The other expenses for the year were as under:

Repair and Maintenance	Rs. 3,600
Food supplied to patients	Rs. 44,000
Sanitary and Other services for patients	Rs. 12,500
Laundry Charges	Rs. 28,000
Medicines supplied	Rs. 35,000

Cost of oxygen, X-ray, etc. other than directly borne for treatment of patients Rs. 54,000.

General Administration Charges allocated to hospital Rs. 49,550.

If the hospital recovered an amount of Rs. 100 per day on an average from each patient, compute the profit per patient – day made by the hospital as per operating cost sheet for the year 2004.

(M. Com. Oct.06, adapted)

Ans: (Total Earnings: Rs.61,350, Total Number of Patient days: 5000.)



INTEGRATED AND NON – INTEGRATED ACCOUNTS

Unit Structure

- 3.0 Learning Objectives.
- 3.1 Introduction
- 3.2 Non-Integral or cost ledger accounting system (interlocking system)
- 3.3 Ledger Maintained under Interlocking System
- 3.4 Solved Problems
- 3.5 Integral(or Integrated) accounting
- 3.6 Advantages of Integral accounting
- 3.7 Essential features of Integral Accounting
- 3.8 Questions
- 3.9 Exercise

3.0 LEARNING OBJECTIVES

After studying this chapter one should able understand

- The need for integrated and non integrated account
- Distinguish between the two cost book keeping systems
- The required journal and ledger accounts to be prepared
- The advantages of these systems

3.1 INTRODUCTION

Just as financial accounting system is maintained with certain objectives in view, cost accounting system is often distinctively maintained with a view to achieve its objectives. All transactions are collected from the same invoices vouchers or receipts which are also common for financial account. Costs are then classified according to functions, departments, or products. Though real accounts and nominal accounts are of direct relevance in ascertaining the cost of products. Personal accounts and cash or bank account are not directly related to cost ascertainment. When cost accounting system is maintained it involves maintenance of certain bulks for recording day to day transactions. It is not necessary to maintain cost accents' under double entry stated of book keeping. However, in order to ensure arithmetical accuracy of data often the principles of double entry system of bulk keeping is followed.

3.2 NON-INTEGRAL OR COST LEDGER ACCOUNTING SYSTEM (INTERLOCKING SYSTEM)

There are two systems of maintaining cost records viz., interlocking system and integral accounting system. Under interlocking system cost records are maintained in a separate set of books independent of financial accounts. The ICMA terminology defines interlocking system of accounting as “a system in which the cost accounts are distinct from the financial accounts, the two sets of accounts being kept continuously in agreement or readily recognizable”

The following are some of the advantages of interlocking accounting system:

a) When separate set of costing books are maintained it facilitates ready accomplishment of its objectives’) If avoids the complications or recording the entries if it is integrated with financial accounts.

b) It can be maintained according to convenience as it need not be statutorily maintained

The following are some of the limitations

a) When cost accounts are independently maintained, it amounts to duplication of expenses along with financial accounts.

b) The profit shown by cost books may vary with that shown by financial accounts. This requires reconciliation which involves time and effort

3.3 LEDGER MAINTAINED UNDER INTERLOCKING SYSTEM

3.3.1 Subsidiary books maintained under interlocking system of accounting:

The following are some of the subsidiary books maintained under interlocking system of accounting:

1) Stores ledger; this ledger is used to record both the quantity and amount of receipts, issues and balance of materials and supplies. The basis for recording the transactions are (a) Materials received note (b) Material transfer note, and (d) Material returned note.

- 2) Payroll and wage analysis book; this ledger is used to record the wages. The basis for recording the transactions are (a)clock cards,(b)time tickets, and (c)piece work tickets
- 3) Job ledger: this ledger is used to record the material cost, wages, and overheads incurred in respect of a job.
- 4) Finished goods stock ledger: This ledger is used to record the receipt of finished goods from production department, the sale and stock of finished goods both in terms of quantity and value. The basis for recording the transactions is delivery note issued by the production departments, sales returns note and sales order requisitions.
- 5) Standing order ledger: This ledger is used to record overheads incurred.

3.3.2 Accounts Maintained Under Cost Books

The following important accounts are maintained under cost books:

- 1) General ledger adjustment account: This ledger is also known as cost ledger control account or nominal ledger control account. In this accounts transactions with only one entry is recorded and contra appears in financial book. On the credit side of this account are recorded
 - a) Opening Balance of materials, work in progress and finished stock, (b)expenses of material, wages and overheads on the credit side, (c)on the debit side returns of materials to the supplier, (d) sales income: and (e)on the debit side balancing entries of P&L accountant closing stock.
- 2) Stores ledger control account: the total of stores ledger is entered in this account.
- 3) Wages control account: In this account the wages accrued and paid and allocation of wages in this account are recorded.
- 4) Work in progress control account: This account represents cost ledger in summary form.
- 5) Finished goods stock ledger control account: This account represents finished goods stock ledger transactions in total form.
- 6) Selling, distribution, and administration overhead control account: "This account represents selling, distribution and administration overheads

7) Capita and repair account: This account represents capitalized and repair expenses

8) Cost of sales account: The total cost to make and sell the finished goods is recorded in this account

9) Costing Profit and loss account: This account reveals the profit or los as per cost accounts.

10) Material control account: This account serves as a transitional account which is closed subsequently to stores ledger control account. It helps in reconciling invoiced stock and accepted stock accounted in stores.

11) Overhead adjustment account: This account is used to record over or under absorption of overheads.

Entries to Record Transactions under Interlocking System

- 1) Materials purchased for stock

Stores ledger control account	Dr
To General ledger adjustment a/c	
- 2) Material purchased for a special job

Work in progress control a/c	Dr.
To general ledger adjustment a/c	
- 3) For issue of direct materials to production department

Work in progress control a/c	Dr
To stores ledger control account	
- 4) For issue of indirect materials to production departments

Overhead control a/c	Dr.
To stores ledger control a/c	
- 5) For returning materials to supplier

General ledger adjustment a/c	Dr
To stores ledger control a/c	
- 6) For materials returned from production department

Stores ledger control a/c	Dr
To Work in progress control a/c	
- 7) For materials transferred from job to job

No entry is passed in control account. In work in progress ledger the following

Entry is passed

Transferee job a/c	Dr
To transferor job a/c	

- 8) For total salary and wages paid
Wages control a/c Dr.
To general ledger adjustment a/c
- 9) For allocation of direct and indirect labour
Work in progress control a/c Dr.
Overhead control a/c Dr.
To wages a/c
- 10) For recording direct expenses
Work in progress control a/c Dr.
To general ledger adjustment a/c
- 11) For recording overhead incurred and accrued
Overhead control a/c Dr
To general ledger adjustment a/c
- 12) When overheads are received Dr
Work in progress control a/c Dr.
Cost of sales a/c
To overhead control a/c
- 13) For adjusting under or over absorption overheads
The overhead control account is closed by transferring to overhead suspense account.
- 14) For recording finished stock produced
Finished goods stock ledger control account Dr.
To Work in progress control a/c
- 15) When finished goods are sold at cost
Cost of sales a/c Dr
To finished goods are sold at cost
- 16) When finished goods are sold at total sales value
General ledger adjustment a/c Dr
To Costing Profit and loss a/c
- 17) For recording sales returns
Costing Profit and loss a/c Dr.
To general ledger adjustment a/c
- 18) For recordings repair work
Repair order a/c Dr
To work in progress control a/c
- 19) For allocation of repair work
Overhead control a/c Dr.
To Repair order a/c
- 20) For recording special orders completed and sold at total sales value
Cost of sales a/c Dr
To Work in progress control a/c

- | | | |
|----|--|----|
| 21 | For recording special orders completed and sold immediately at factory cost
General ledger adjustment a/c
To costing profit and loss a/c | Dr |
| 22 | For recording total cost to make and sell
Cost of sales
To costing profit and loss a/c | Dr |
| 23 | For recording under absorption of overheads which is not yet adjusted
Costing profit and loss a/c
To Overhead suspense a/c | Dr |
| 24 | For recording over absorption of overheads which is not yet adjusted
Overhead suspense a/c
To Costing Profit and loss a/c | Dr |
| 25 | For recording profit
Costing profit and loss a/c
To General ledger adjustment a/c | |

Check Your Progress:

1. Which ledgers have been maintained under Non-integral Accounting system?
2. Give Journal entries for following transactions under Interlocking system.
 - a) Material Purchased for stock
 - b) Issue of Direct Material to Production Department
 - c) Return Materials to suppliers
 - d) Material transferred from Job A to Job B.
 - e) Total Salary & Wages paid.
 - f) Recording sales return
 - g) Recording overheads incurred & accrued.

3.4 SOLVED PROBLEMS

Illustration 1 :

The profit and Loss Account as shown in the financial books of a company for the year ended 30.09.2002 together with a statement of reconciliation between the profit as per financial and cost accounts is given below:

Profit and Loss Account for the year ended 30.09.2002

	Rs.	Rs.		Rs.	Rs.
Opening stock			Sales		15,00,000
Raw Material	90,000		Closing Stock		
Work-in-progress	50,000		Raw Material	98,000	
Finished goods	70,000	2,10,000	Work-in Progress	53,000	
Raw material			Finished goods	72,000	2,23,000
		5,00,000			
Purchased			Miscellaneous		
Direct wages		2,00,000	Receipts		45,000
Factory overheads		2,00,000			
Administration Expenses		1,70,000			
Selling and Distribution Exp.		2,20,000			
Preliminary Exp.					
Written off		75,000			
Debenture Interest		30,000			
Net profit		1,63,000			
		17,68,000			17,68,000

Statement of Reconciliation of Profit as per Financial and Cost Accounts

	Rs.	Rs.
Profit as per financial accounts		1,63,000
(a) Difference in valuation of stock		
Add : Raw materials – closing stock	1,200	
Work in progress – opening stock	1,300	
Finished goods – opening stock	2,000	
Closing stock	1,000	
Total (A)	5,500	
Less Raw materials – opening stocks	1,650	
Work in progress – closing stock	750	
Total (B)	2,400	

(b) Other items (A – B)		3,100
Add : Preliminary expenses written off	75,000	
Debenture interest	30,000	
	1,05,000	
Less Miscellaneous receipts	45,000	60,000
:		
Profit as per Cost Accounts		2,26,100

You are required to prepare the following accounts as they were appearing in the cost ledger:

- (1) Raw Material Control A/c.
- (2) Work-in-Progress Control A/c.
- (3) Finished Goods Control A/c.
- (4) Cost of Sale A/c. and
- (5) Costing Profit and Loss A/c.

[ICWA, Inter]

Solution:

Basis calculation
Computation of items as per Cost Accounts

Particulars	As per financial accounts Rs.	Valuation difference Rs.	As per cost accountants Rs.
Raw materials			
Opening Stock	90000	+ 1650	91650
Closing Stock	98000	+ 1200	99200
Work – in – Process			
Opening Stock	50000	- 1300	48700
Closing stock	53000	- 750	52250
Finished Goods			
Opening Stock	70000	- 2000	68000
Closing Stock	72000	+ 1000	73000

Raw Material Control Account

Particulars	Rs.	Particulars	Rs.
To Balance b/d	91650	By WIP Control A/c.	492450
To G. L. Adj. A/c.	500000	(balance figure)	
		By Balance c/d.	99200
	591650		591650

WIP Control Account

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	48700	By Finished Goods Control A/c.	
To Raw Material Control A/c.	492450	(balancing figure)	888900
To Wages Control A/c.	200000	By Balance C/d.	52250
To Factory Overheads Control A/c.	200000		
	941150		941150

Finished Goods Control Account

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	68000	By Costing Sales A/c.	
To WIP Control A/c.	888000	(balancing figure)	1053900
To Admin. Overheads Control A/c.	170000	By Balance C/d.	73000
	1126900		1126900

Cost of Sales Account

Particulars	Rs.	Particulars	Rs.
To Finished goods Control A/c.	1053990	By General Ledger Adjustment A/c.	1500000
To Selling and Distribution Control A/c.	220000		
To Profit Taken to Costing P & L A/c.	226100		
	1500000		1500000

Costing Profit & Loss Account

Particulars	Rs.	Particulars	Rs.
To Balance Transferred To General Ledger Adjustment A/c.	226100	By Cost of Sales A/c.	226100
	226100		226100

Illustration 2:

The following figures have been extracted from the cost records of a manufacturing unit:

	Rs.
Stores : Opening balance	30,000
Purchases	1,60,000
Transfers from Work-in-Progress	80,000
Issues to work-in-progress	1,60,000
Issues to repairs and maintenance	20,000
Deficiencies found in stock taking	6,000
Work-In-Progress :	
Opening Balances	60,000
Direct wages applied	60,000
Overheads applied	2,40,000
Closing balance	40,000

Finished products : Entire output is sold at a profit of 10% on actual cost from work-in-progress.

Other wages incurred Rs. 70,000; overheads incurred Rs. 2,50,000.

Items not included in cost records: Income from Investments Rs. 10,000; loss in sale of capital assets Rs. 20,000.

Draw up stores control account, Work-In-Progress Control Account, Costing Profit and Loss A/c., Profit and Loss Account and Reconciliation Statement.

[ICWA, Inter]

Solution:**(a) Costing Book****(i) Stores Control Account**

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	30000	By Work-in-Progress Control Account	160000
To General Ledger Adjustment A/c.	160000	By Work Overhead Control A/c.	20000
To Work – in – Progress Control A/c.	80000	By Stores Control A/c.	6000
		By Costing Profit & Loss c/d.	84000
	270000		270000

(ii) Work-in-progress Control Account

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	60000	By Stores Control A/c.	80000
To Stores Control A/c.	160000	By Costing Profit and Loss A/c.	
To Direct Wages Control A/c.	60000	(cost of sales)	400000
To Work Overheads control A/c	240000	By Balance c/d.	40000
	520000		520000

(iii) Costing Profit and Loss Account

Particulars	Rs.	Particulars	Rs.
To Work-in-Process Control A/c. (cost of sales)	400000	By General Ledger Adjustment A/c.	
To Works Overheads Control A/c.	30000	(sales)	400000
To Stores Control A/c.		By Cost of Sales	
(shortage)	6000	10 %	40000
To Profit	4000	profit	
	440000		440000

(iv) Works overheads control Account

Particulars	Rs.	Particulars	Rs.
To General ledger		By Work-in-progress Account	240000
Adjustment A/c.	250000	By Costing Profit & Loss A/c.	30000
To Stores Ledger Control A/c.	20000	(under – recovery)	
	270000		270000

Note: It has been presumed that under recovery of overheads has been transferred to Costing Profit and Loss Account

(b) Financial Books
Profit & Loss Account

Particulars	Rs.	Rs.	Particulars	Rs.	Rs.
To Opening Stock			By Sales		440000
Stores	30000		By Closing Stock :		
Work-in-progress	60000	90000	Stores	84000	
To Purchases		160000	Work-in-Progress	40000	124000
To Wages Incurred		70000	By Income from		
To Overheads Incurred		250000	Investments		10000
To Loss on sales of Capital Assets		20000	By Loss		16000
		590000			590000

Reconciliation Statement

	(Rs. +)	(Rs. -)
Profit as per costing records	4000	
Less : Under absorption of wages		10000
Items not included in cost accounts	10000	
Add : Income from investment		20000
Less : Loss on sale of capital assets	14000	
Loss as per financial books	16000	
	30000	30000

Illustration 3:

A company operates on historic job cost accounting system, which is not integrated with the financial accounts. At the beginning of a month, the opening balances in cost ledger were:

	Rs. (lakhs)
Stores Ledger Control A/c.	80
Work – In – Progress Control A/c.	20
Finished Goods Control A/c.	430
Building Construction A/c.	10
Cost Ledger Control A/c.	540
During the month the following transactions took place	Rs.

	(lakhs)
Materials :	-
Purchased	40
Issued to production	50
Issued to general maintenance	6
Issued to building construction	4
Wages	-
Gross Wages paid	150
Indirect wages	40
For building construction	10
Work overhead	-
Actual amount incurred (excluding items shown above)	160
Absorbed in building construction	20
Under absorbed	8
Royalty paid	5
Selling, distribution and administration overheads sales	25
Sales	450

At the end of the month, the stock of raw material and work-in-progress was Rs. 55 lakhs and Rs. 25 lakhs respectively. The loss arising in the raw material account is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20 % on sales. Prepare the relevant control account to record the above transactions in the cost ledger of the company.

[C.A. Inter]

Solution:

Cost Ledger Control A/c.
[Rs. Lakhs]

Particulars	Rs.	Particulars	Rs.
To Costing Profit & Loss A/c.	450	By Balance b/d.	540
To Stores Ledger Control A/c.	55	By Stores Ledger Control A/c.	40
To WIP Control A/c.	25	By Wages Control A/c.	150
To Building Construction A/c.	44	By Work Overheads Control A/c.	160
To Finished Goods Control A/c.	403	By Royalty a/c.	5
		By S & D and admin. Overheads A/c.	25
		By Costing Profit & Loss A/c.	57
	977		977

Stores Ledger Control A/c.
[Rs. Lakhs]

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	80	By WIP Control A/c.	60
To Cost Ledger Control A/c.	40	By Works Overheads Control A/c.	6
		By Building Construction A/c.	4
		By Closing Balance	55
		By Works Overheads Control A/c. (loss)	5
	120		120

Work – in – Progress Control A/c.

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	20	By Finished Goods Control A/c.	333
To Stores Ledger Control A/c.	50	By Closing Balance	25
To Wages Control A/c.	100		
To Works Overhead Control A/c.	183		
To Royalty A/c.	5		
	358		358

Finished Goods Control A/c

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	430	By Cost of Goods Sold A/c.	360
To WIP Control A/c.	333	By Balance c/d.	403
	763		763

Cost of Sales A/c

Particulars	Rs.	Particulars	Rs.
To Cost of Goods Sold A/c.	360	By Costing Profit and Loss A/c.	385
To Selling, Distribution & Administration Overheads A/c.	25		
	385		385

Costing Profit & Loss A/c.

Particulars	Rs.	Particulars	Rs.
To Cost of Sales A/c.	385	By Cost Ledger Control A/c.	450
To Work Overhead Control A/c.	8		
To Cost Ledger Control A/c. (profit)	57		
	450		450

Building Construction A/c.

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	10	By Cost Ledger Control A/c.	44
To Stores Ledger Control A/c.	4		
To Wage Control A/c.	10		
To Works Overhead Control A/c.	20		
	44		44

Works Overhead Control A/c

Particulars	Rs.	Particulars	Rs.
To Stores Ledger Control A/c.	6	By Building Construction A/c.	20
To Wage Control A/c.	40	By WIP Control A/c.	183
To Cost Ledger Control A/c.	160	By Balance (Costing Profit & Loss A/c.)	8
	211		211

Wages Control A/c

Particulars	Rs.	Particulars	Rs.
To Cost Ledger Control A/c.	150	By Works Overhead Control A/c.	40
		By Building Construction A/c.	10
		By WIP Control A/c.	110
	150		150

Royalty A/c

Particulars	Rs.	Particulars	Rs.
To Cost Ledger Control A/c.	5	By WIP Control A/c.	5
	5		5

Cost of Goods Sold A/c

Particulars	Rs.	Particulars	Rs.
To Finished Goods Control A/c.	360	By Cost of Sales A/c.	360
	360		360

Selling Distribution and Administration Overheads A/c.

Particulars	Rs.	Particulars	Rs.
To Cost Ledger Control A/c.	25	By Cost of Sales A/c.	25
	25		25

Trial Balance

Particulars	Dr.	Cr.
Stores Ledger Control A/c.	55	
WIP Control A/c.	25	
Finished Goods Control A/c.	403	
Cost Ledger Adjustment A/c.		483
	483	483

Working Note :

If selling price is Rs. 100 then cost price = Rs. 80/-

If selling price is Rs. 450 then cost price = Rs. 80/Rs. 100 x Rs. 450 lakhs
= Rs. 360 lakhs

Illustration 4 :

A company operates separate cost accounting and financial system. The following is the list of opening balances as on 1-4-2009 in the cost ledger:

Particulars	Debit Rs.	Credit Rs.
Stores Ledger Control Account	53,375	
WIP Control Account	1,04,595	
Finished Goods Control Account	30,780	
General Leger Adjustment Account	--	1,88,750

Transactions for the quarter ended 30-6-2009 are as under:

	Rs.
Material purchased	26,700
Material issued to production	40,000
Materials issued for factory repairs	900
Factory wages paid (including indirect wages Rs. 23,000)	77,500
Production overheads incurred	95,200
Production overheads under – absorbed and written – off	3,200
Sales	2,56,000

The company's gross profit is 25% on factory cost at the end of the quarter, WIP stocks increased by Rs. 7,500/-.

Prepare the relevant Control Account, Costing Profit and Loss Account and General Ledger Adjustment Account to record the above transactions for the quarter ended 30-6-2009.

[C.A. Inter]

Solution:

General Ledger Adjustment A/c.

Particulars	Rs.	Particulars	Rs.
To Sales	2,56,000	By Balance b/d	1,88,750
To Balance C/d.	1,80,150	By Stores Ledger Control A/c.	26,700
		By Wages Control A/c.	77,500
		By Overheads Control A/c.	95,200
		By Costing Profit & Loss A/c.	48,000
	436150		4,36,150

Stores Ledger Control A/c

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	53,375	By WIP Control A/c.	40,000
To General Ledger Adjustment A/c.	26,700	By Factory Overheads Control A/c.	900
		By Balance C/d.	39,175
	80,075		80,075

WIP Control A/c

Particulars	Rs.	Particulars	Rs.
To Balance b/d.	1,04,595	By Finished Goods Control A/c.	2,02,900
To Stores Ledger Control A/c.	40,000	By Balance c/d	1,12,095
To Wages Control A/c.	54,000		
To Factory overheads Control A/c.	1,15,900		
	3,14,995		3,14,995

Finished Goods Control A/c.

Particulars	Rs.	Particulars	Rs.
To Stores Ledger Control A/c.	900	By Costing Profit & Loss A/c.	3200
To Wages Control A/c.	23,000	By WIP Control A/c.	1,15,900
To General Ledger Adjustment A/c.	95000		
	1,19,100		1,19,100

Cost of Sales A/c

Particulars	Rs.	Particulars	Rs.
To Finished Goods Control A/c.	2,04,800	By General ledger Adjustment A/c.	2,04,800

Sales A/c

Particulars	Rs.	Particulars	Rs.
To Costing Profit & Loss A/c.	2,56,000	By General Ledger Adjustment A/c.	2,56,000

Wages Control A/c

Particulars	Rs.	Particulars	Rs.
To General Ledger Adjustment A/c.	77,500	By Factory Overheads Control A/c.	23,000
		By WIP Control A/c.	54,500
	77,500		77,500

Closing Profit & Loss A/c

Particulars	Rs.	Particulars	Rs.
To Factory O.H. Control A/c.	3,200	By Sales A/c.	2,56,000
To Cost of sales A/c.	2,04,800		
To General Ledger Adj. A/c.	48,000		
	256000		2,56,000

Trial Balance (as on 30-6-2009)

Particulars	Dr.	Cr.
Stores Ledger Control A/c.	39,175	
WIP Control A/c.	1,12,095	
Finished Goods Control A/c.	28,880	
General Ledger Adjustment A/c.		1,80,150
	1,80,150	1,80,150

Illustration 5:

As of 31st March, 2008 the following balances existed in a firm's cost ledger, which is maintained separately on a double entry basis :

Particulars	Debit	Credit
Stores Ledger Control A/c.	3,00,000	
Work – in – Progress Control A/c.	1,50,000	
Finished Goods Control A/c.	2,50,000	
Manufacturing overheads Control A/c.		15,000
Cost Ledger Control		6,85,000
	7,00,000	7,00,000

During the next quarter, the following items arose:

	Rs.
Finished product (at cost)	2,25,000
Manufacturing overhead incurred	85,000
Raw material purchased	1,25,000
Factory wages	40,000
Indirect Labour	20,000
Cost of sales	1,75,000
Materials issued to production	1,35,000
Sales returned (at cost)	9,000
Materials returned to suppliers	13,000
Manufacturing overhead charged to production	85,000

You are required to prepare the cost ledger control A/c., Stores Ledger Control A/c., Work-in-Progress Control A/c., Finished Stock Ledger Control A/c. Manufacturing Overheads Control A/c.

Wages Control A/c. Cost of Sales A/c. and the Trial Balance at the end of the quarter.

[C.A., PCE]

Solution:

Cost Ledger Control A/c

Particulars	Rs.	Particulars	Rs.
To Stores Ledger Control A/c.	13,000	By Opening Balance	6,85,000
To Balance c/d	9,42,000	By Stores Ledger Control A/c.	1,25,000
		By Mfg. Overheads Control A/c.	85,000
		By Wages Control A/c.	60,000
	9,55,000		9,55,000

Stores Ledger Control A/c

Particulars	Rs.	Particulars	Rs.
To Opening Balance	3,00,000	By WIP Control A/c.	1,35,000
To Cost Ledger Control A/c.	1,25,000	By Cost Ledger Control A/c. (returns)	13,000
		By Balance c/d.	2,77,000
	4,25,000		4,25,000

WIP Control A/c

Particulars	Rs.	Particulars	Rs.
To Opening Balance	1,50,000	By Finished Stock Ledger Control A/c.	2,25,000
To Wages Control A/c.	40,000	By Balance c/d.	1,85,000
To Stores Ledger Control A/c.	1,35,000		
To Mfg. Overheads Control A/c.	85,000		
	4,10,000		4,10,000

Finished Stock Ledger Control A/c

Particulars	Rs.	Particulars	Rs.
To Opening Balance	2,50,000	By Costs of Sales	1,75,000
To WIP Control A/c.	2,25,000	By Balance c/d.	3,09,000
To Cost of Sales A/c. (Sales returns)	9,000		
	4,84,000		4,84,000

Manufacturing Overhead Control A/c

Particulars	Rs.	Particulars	Rs.
To Cost Ledger Control A/c.	85,000	By Opening Balance	15,000
To Wages Control A/c.	20,000	By WIP Control A/c.	85,000
		By Under Recovery C/d.	5,000
	1,05,000		1,05,000

Wages Control A/c

Particulars	Rs.	Particulars	Rs.
To Cost Ledger Control A/c. (transfer)	60,000	By WIP Control A/c.	40,000
		By Mfg. Overheads Control A/c.	20,000
	60,000		60,000

Cost of Sales A/c

Particulars	Rs.	Particulars	Rs.
To Finished Stock Ledger Control A/c.	1,75,000	By Finished stock Ledger Control A/c. (sales return)	9,000
		By Balance c/d.	1,66,000
	1,75,000		175000

Trial Balance

Particulars	Rs.	Particulars	Rs.
To Stores Ledger Control A/c.	2,77,000	By Cost Ledger Control A/c.	9,42,000
To WIP Control A/c.	1,85,000		
To Finished Goods Ledger Control A/c.	3,09,000		
To Mfg. Overheads Control A/c.	5000		
To Cost of Sales A/c.	166000		
	942000		942000

Illustration 6:

X Ltd; operates batch costing system fully integrated with financial accounts. The information is furnished to you:

Balance at beginning of the month:

	Rs.
Stores Ledger Control A/c.	24,175
Work – in – Progress Control A/c.	19,210
Finished goods Control A/c.	34,170
Pre-payment of factory overheads brought from the last month	2,100

Transactions during the month :

Materials purchased	76,150
Issued to production	26,350
Issued for maintenance	3,280
Transferred between batches	1,450

	Debit	Credit
Total wages paid – net	17,600	3,300
Employees deduction	4,400	825
Direct wages charged to batches from work tickets	15,400	
Recorded non-productive time of direct workers	6,600	
Wages paid to workers engaged in production of capital equipment	2,670	
Selling and distribution overheads incurred	5,240	
Other production overheads incurred	12,200	
Sales	75,400	
Cost of finished goods sold	59,830	
Cost of goods completed and transferred to finished goods store during the month	62,130	

The production overhead absorption rate is 150 % of direct wages. This overhead absorption rate would also be charged to cost of production of capital equipment in the factory.

Required:

- 1) Stores ledger control account
- 2) Work-in-progress control account
- 3) Finished goods control account
- 4) Production overhead control account
- 5) Profit and Loss Account

Solution :

Stores Ledger Control A/c.

Particulars	Rs.	Particulars	Rs.
Balance b/d	24175	Work-in-progress control A/c.	26350
Creditors – material Purchased	76150	Production overheads Control A/c.	3280
		Balance c/d.	70695
	100325		100325

Work-in-Progress Control A/c.

Particulars	Rs.	Particulars	Rs.
Balance b/d.	19210	Finished goods Control A/c.	62130
Stores Ledger Control A/c.	26350	Balance c/d.	21930
Wages Control A/c. - Direct Wages	15400		
Production Overheads Control A/c. (Rs. 15400 x 15 %)	23100		
	84060		84060

Finished Goods Control A/c

Particulars	Rs.	Particulars	Rs.
Balance b/d.	34170	Profit & Loss A/c. cost of sales	59830
Work-in-Progress Control a/c.	62130	Balance c/d.	36470
	96300		96300

Production Overhead Control Account

Particulars	Rs.	Particulars	Rs.
Payment B/d.	2100	Work-in-progress	
Stores Ledger Control A/c.	3280	Control A/c.	23100
Wages Control A/c.		(15% of Rs. 15400)	
- Indirect Wages	4125	Capital equipment – under	
Wages Control A/c.		Absorbed production	
Idle time of direct workers	6600	Overheads	4005
Cash creditors – other		(150 % of Rs. 15400)	
Production overheads incurred	12200	Profit and Loss A/c. (under Absorbed overheads – bal Figure)	1200

Profit and Loss A/c

Particulars	Rs.	Particulars	Rs.
Cost of goods sold	59830	Sales	75400
Gross profit c/d	15570		
	75400		75400
Selling and Distribution Overheads	5240	Gross Profit b/d.	15570
Production Overheads Control A/c.	1200		
Unabsorbed Overheads			
Net profit c/d	9130		
	15570		15570

3.5 INTEGRAL(OR INTEGRATED) ACCOUNTING

The reconciliation of cost and financial accounts is frequently a task calling for considerable expenditure of time and effort, much of which can be avoided if books are suitably designed and the concept of separate Profit and loss accounts for financial and costing purposes discarded in favour of a unified account which will serve both financial and costing purposes. Such a system of accounting is referred to as integral or integrated. Thus, integral accounting is a system of recording financial and costing transactions in one self contained ledger, called the integrated Ledger.

3.6 ADVANTAGES OF INTEGRAL ACCOUNTING

The following are the main advantages of integral accounting:

1. There is no need to reconcile the profit ascertained by the cost accounts with that of financial accounts since only one profit and loss account is prepared from the information recorded in the cost accounts.
2. There is no duplication of recording and effort as in non integral system and as such this system is simple and economical.
3. This system tends to coordinate the functions of different selections of the accounts department since all efforts are integrated and directed towards achievement of one aim that is providing a high level of efficiency.
4. The accounting procedures can be simplified and the system can be centralised with the object of achieving a greater control over the organization.
5. The system creates conditions which are eminently suitable for the introduction of mechanized accounting.
6. There is no possibility of overlooking any expense under the system .
7. As cost accounts are posted straight from the books of original entry, there is no delay in obtaining the data.
8. There is automatic check on the correctness of the cost data. It ensures that all legitimate expenditure is included in Cost accounts and reliable and proved data is provided to the management for its decisions'.
9. Integrated accounting widens the outlook of the accountant and his staff ad they can take broader view of things.
10. From psychological point of view, it shows the complimentary status of cost and financial accountant which need to be considered as separate water light compartments.

Principles of (or Pre requisites for) an Integral accounting System

The following principles shall be taken into consideration while designing such a system:

1. The degree of integration must be determined. Some undertakings find it satisfactory merely to integrate upto the stage of prime cost or factory cost while other concerns integrate the whole of the records in which cost and financial accounts cannot be distinguished.
2. The degree of integration will determine the classification of expenditure. The expenditure classified here according to function as office expenses, selling expenses etc., and not according to nature. However, control accounts are maintained for each element of cost. A suitable coding system should be available to serve the accounting purposes of financial and cost accounts.
3. Full details of items posted to the control accounts are supplied to the cost office at convenient intervals. This information is then dealt with by the cost office in accordance with the system of costing in force.
4. The amount of detail recorded in the ledger is usually kept to a minimum. Full information regard in each department or process being contained in tabulators prepared by the cost office. These tabulations are sometimes referred to as third entries to emphasize that they are not part of double entry system.
5. For preparation of interim accounts there must be an agreed routine for treatment after accruals, prepaid expenses and other necessary adjustments.
6. There should be perfect coordination between the staff responsible for the financial and cost aspects to ensure an efficient processing of accounting documents.

3.7 ESSENTIAL FEATURES OF INTEGRAL ACCOUNTING

3.7.1 The following are the essential features of an integral an accounting system:

1. This system records financial transactions not normally required for cost accounting be sided recording internal costing transaction prepayments and accruals are opened.
2. Stores transactions are recorded in the stores control account. This account is debited with the cost of stores purchased corresponding credit being given to cash or sundry creditors depending whether the purchase is made for cash or on credit.

5.	Material transferred from one Job to another job	Transferee job A/c. To Transferor job A/c.	Dr.
6.	Salary and wages paid-direct and indirect	Wages control A/c. To Cash	Dr.
7.	Direct expenses	Work-in-progress A/c. To Cash	Dr.
8.	Overhead incurred	Relevant overhead A/c To cash	Dr.
9.	Overhead recovered	Work-in-progress A/c (For production overhead recovered) Finished Stock A/c (for Admn. overhead recovered) Cost of Sales A/c. (For selling and Distribution overhead Recovered) To relevant overhead A/c	Dr. Dr. Dr.
10.	Overhead on work-in-progress	Work-in-progress A/c To production overhead A/c	Dr.
11.	Finished goods produced	Finished good A/c. To work-in-progress A/c	Dr.
12.	Goods sold (At cost)	Cost of Sales A/c To finished goods A/c.	Dr.
13.	For Sales	Debtors A/c To Sales A/c	Dr.
14.	Sales returned	Sales A/c To Debtors A/c	Dr.
15.	Capital Work	Sundry Assets A/c To work-in-progress A/c	Dr.
16.	Repair work	Relevant overhead A/c To work-in-progress A/c	Dr.
17.	Under-absorbed overhead	P & L A/c. To relevant overhead A/c	Dr.
18.	Over-absorbed overhead	Relevant overhead A/c To P & L A/c.	Dr.

Check Your Progress:

1. Which are the pre requisites of an Integral Accounting System.
2. Give the Journal entries for the following transactions under Integral Accounting System.
 - a) Direct Material issued to production

- b) Production overheads charged to production
- c) Wages paid
- d) Selling and Distribution Expenses incurred
- e) Cost of production of Completed job.
- f) Amount received from customers.
- g) Office & Administration expenses charged to production

3.8 SOLVED PROBLEMS OF INTEGRAL ACCOUNTING

Illustration-1

Following transactions took place in Willu & Co. during the month of March, 1993 :

1.	Raw material purchased on credit	Rs.	40,000
2.	Direct material issued to production		30,000
3.	Wage paid (30% indirect)		24,000
4.	Manufacturing expenses incurred (cash)		16,800
5.	Manufacturing overhead charged to production		16,000
6.	Selling and distribution cost (cash)		4,000
7.	Finished goods at cost		40,000
8.	Sales		58,000
9.	Receipts from debtors		13,800
10.	Payments to creditors		22,000

You are required to journalise the above transactions presuming that integrated system of accounting is followed by Willu & Co.

Solution

Willu & Co. Journal (Integral Accounting System)

		Dr.	Cr.
1.	Stores Control A/c	Dr. 40,000	
	To Creditors A/c		40,000
	(Being the raw material purchased on credit)		
2.	Work-in-progress A/c	Dr. 30,000	
	To Stores Control A/c		30,000
	(Being the material issued to jobs)		
3. (a)	Wages Control A/c	Dr. 24,000	
	To Cash		24,000
	(Being the entry for direct and indirect wages paid)		

(b)	Work-in-progress A/c	Dr.	16,800	
	Production overhead A/c	Dr.	7,200	
	To Wages Control A/c			24,000
	(Being the entry for direct and indirect wages)			
4.	Production overhead A/c	Dr.	16,800	
	To Cash			16,800
	(Being the production overhead incurred)			
5.	Work-in-progress A/c	Dr.	16,000	
	To Production overhead A/c			16,000
	(Being the overhead charged to production)			
6.	Selling and Distribution overhead A/c	Dr.	4,000	
	To Cash			4,000
	(Being the selling and distribution expenses Incurred)			
7.	Finished goods A/c	Dr.	40,000	
	To work-in-progress A/c			40,000
	(Being the cost of production of finished goods)			
8.	Debtors A/c	Dr.	58,000	
	To Sale A/c			58,000
	(Being the amount of sale)			
9.	Bank A/c	Dr.	13,800	
	To Debtors A/c			13,800
	(Being the receipt from debtors)			
10.	Sundry Creditors A/c	Dr.	22,000	
	To Cash			22,000
	(Being the amount paid to creditors)			

Illustration-2:

ABC Manufacturing Company has the following balances in its integrated ledger as on 1st January, 1993 :

	Rs.
Share Capital	2,00,000
Reserves	50,000
Sundry debtors	40,000
Plant and machinery	2,50,000
Sundry creditors	60,000
Bank overdraft	80,000
Raw materials	1,00,000

Transactions during the year ended 31st December, 1993 were as follows :

Raw material purchased on credit	1,60,000
Raw material issued to production	2,00,000
Raw materials on hand on 31/12/93	52,000
Direct wages – incurred	1,90,000
- charged production	1,86,000
Manufacturing expenses – incurred	1,75,000
- charged to production	1,86,000
Selling and distribution expenses	20,000
Finished Stock – Production (at cost)	3,82,000
- Sales (at selling price)	5,72,000
Payment to creditors	1,70,000
Receipts from debtors	6,00,000

You are required to –

- Write up and close off the ledger accounts.
- Prepare a trial balance of the closing balances, and
- Prepare profit and loss account and a balance sheet.

Integral Ledger

Dr	Store Control A/c.		Cr.
	Rs.		Rs.
To Balance b/d	1,00,000	By Work-in-progress A/c	2,00,000
To Creditors A/c	1,60,000	By Inventory Adj. A/c	8,000
		By Balance c/d	<u>52,000</u>
	<u>2,60,000</u>		<u>2,60,000</u>
To Balance b.d	52,000		

Dr.	Work-in-progress A/c		Cr.
	Rs.		Rs.
To Stores Control A/c	2,00,000	By Finished stock A/c	3,82,000
To Wages Control A/c	1,86,000	By Balance c/d	1,90,000
To Production overhead A/c	<u>1,86,000</u>		
	<u>5,72,000</u>		<u>5,72,000</u>
To Balance b/d	1,90,000		

Dr.	Finished Goods A/c		Cr.
To Work-in-progress A/c	<u>3,82,000</u>	By Cost of sales A/c	<u>3,82,000</u>
	<u>3,82,000</u>		<u>3,82,000</u>

Dr.	Wages Control A/c		Cr.
	Rs.		Rs.
To Bank	1,90,000	By W.I.P. A/c	1,86,000
		By Balance c/d	<u>4,000</u>
	<u>1,90,000</u>		<u>1,90,000</u>
To Balance b/d	4,000		

Dr.	Production Overhead A/c		Cr.
	Rs.		Rs.
To Bank	1,75,000	By Work-in-progress A/c	1,86,000
To Balance c/d	<u>11,000</u>		
	<u>1,86,000</u>		<u>1,86,000</u>
		By balance b/d	11,000

Dr.	Selling and Distribution Expenses A/c		Cr.
	Rs.		Rs.
To Bank	<u>20,000</u>	By cost of Sales A/c	<u>20,000</u>
	<u>20,000</u>		<u>20,000</u>

Dr.	Cost of Sales A/c		Cr.
	Rs.		Rs.
To Finished stock A/c	3,82,000	By Balance c/d	4,02,000
To Selling and Distribution Overhead A/c	<u>20,000</u>		
	<u>4,02,000</u>		<u>4,02,000</u>
To Balance b/d	<u>4,02,000</u>		

Dr.	Sales A/c		Cr.
	Rs.		Rs.
To Balance c/d	<u>5,72,000</u>	By Debtors A/c	<u>5,72,000</u>
	<u>5,72,000</u>	By Balance b/d	<u>5,72,000</u>

Dr.	Share Capital A/c		Cr.
	Rs.		Rs.
		By Balance b/d	2,00,000

Dr.	Reserve A/c		Cr.
	Rs.		Rs.
		By Balance b/d	50,000

Dr.	Plant and Machinery A/c		Cr.
	Rs.		Rs.
To Balance b/d	2,50,000		

Dr.	Sundry Debtors A/c		Cr.
	Rs.		Rs.
To Balance	40,000	By Bank A/c	6,00,000
To Sales	<u>5,72,000</u>	By Balance c/d	<u>12,000</u>
	<u>6,12,000</u>		<u>6,12,000</u>
To Balance b/d	12,000		

Dr.	Sundry Creditors A/c		Cr.
	Rs.		Rs.
To Bank	1,70,000	By Balance b/d	60,000
To Balance c/d	<u>50,000</u>	By Stroes Control A/c	<u>1,60,000</u>
	<u>2,20,000</u>		<u>2,20,000</u>
		By Balance b/d	50,000

Dr.	Bank Account		Cr.
	Rs.		Rs.
To Sundry Debtor's A/c	6,00,000	By Balance b/	80,000
To Balance c/d	35,000	By Wages control A/	1,90,000
		By Wages Control A/c	1,75,000
		By Wages Control A/	20,000
		By Sundry Creditor's	
		A/c	<u>1,70,000</u>
	<u>6,35,000</u>		<u>6,35,000</u>
To Balance b/d	35,000		

Dr.	Inventory Adjustment A/c		Cr.
	Rs.		Rs.
To Store Ledger control A/c	<u>8,000</u>	By Balance c/d	<u>8,000</u>
	<u>8,000</u>		<u>8,000</u>
To Balance b/d	8,000		

(b) **Trial balance as on 31st December, 1993**

	Dr.	Cr.
1. Share Capital		2,00,000
2. Reserve Account		50,000
3. Sundry Debtors	12,000	
4. Sundry Creditors		50,000
5. Plant and Machinery A/c	2,50,000	
6. Bank Account		35,000
7. Stores Ledger Control A/c	52,000	
8. Work-in-progress A/c.	1,90,000	
9. Wages Control Account	4,000	
10. Production Overhead A/c		11,000
11. Inventory Adjustment A/c	8,000	
12. Cost of Sales Account	4,02,000	
13. Sales Account	-----	<u>5,72,000</u>
	<u>9,18,000</u>	<u>9,18,000</u>

Dr.			Cr.
To Cost of Sales A/c	4,02,000	By Sales A/c	5,72,000
To Inventory Adjustment A/c	8,000	By Production overhead A/c	11,000
To Wages control A/c	4,000		
To Net profit	1,69,000		
	<u>5,83,000</u>		<u>5,83,000</u>

Balance Sheet
As at 31st December, 1993

Liabilities	Amount	Assets	Amount
Share Capital	2,00,000	Plant and machinery	2,50,000
Reserve	50,000	Stock of :	
Profit	<u>1,69,000</u> 4,19,000	Finished good	52,000
Sundry Creditors	50,000	W.I.P.	<u>1,90,000</u> 2,42,000
Bank overdraft	35,000	Sundry Debtors	12,000
	<u>5,04,000</u>		<u>5,04,000</u>

Illustration – 3

Journalise the following transactions assuming that cost and financial accounts are integrated.

	Rs.
Raw material purchased	1,50,000
Direct materials issued to production	1,12,500
Wages paid (30% Indirect)	90,000
Wages charged to production	75,000
Manufacturing expenses incurred	63,000
Manufacturing overhead charged to production	69,000
Selling and Distribution costs	15,000
Finished Product at cost	1,50,000
Sales	2,25,000
Receipts from customers	52,500
Paid to creditors	82,500
Closing Stock	NIL

Sr. No	Particulars	Amount	Amount
1	Stores Ledger Control A/c Dr To Bought Ledger Control A/c (Being raw materials bought)	1,50,000	1,50,000
2	Work-in-progress Ledger Control A/c Dr To Stores Ledger Control A/c (Being materials issued for production)	1,12,500	1,12,500
3	Wages Control A/c Dr Factory Overhead Control A/c Dr. To Bank A/c (Being wages paid)	63,000 27,000	90,000
4	Work-in-progress Ledger Control A/c Dr. To Wages Control A/c To Factory Overhead Control A/c (Being allocation of wages to production)	75,000	52,500 22,500
5	Factory Overhead Control A/c Dr. To Bank A/c (Being the manufacturing expenses incurred)	63,000	63,000
6	Work-in-progress Ledger Control A/c Dr. To Factory Overhead Control A/c (Being overheads charged to production)	69,000	69,000
7	Selling & Distribution overhead Control A/c To Bank A/c (Being selling and distribution cost incurred)	15,000	15,000
8	Finished Stores Ledger Control A/c Dr. To Work-in-progress Ledger Control A/c (Being cost of production of completed jobs)	1,50,000	1,50,000
9	Cost of Sales A/c Dr. To Finished Stock Ledger Control A/c To selling & Distribution overhead Control A/c (Being the cost of production sold)	1,65,000	1,50,000 15,000
10	Sales Ledger Control A/c Dr. To Sales (Being the amount of sales)	2,25,000	2,25,000
11	Bank A/c Dr. To Sales Ledger Control A/c (Being amount received from customers)	52,500	52,500
12	Bought Ledger Control A/c Dr. To Bank A/c (Being amount paid to Creditors)	82,500	82,500

Illustration - 4 :

From the following information you are requested to pass journal entries and prepare necessary accounts under the system of integrated accounts.

Material purchased on credit	1,48,000
Wages paid	1,68,000
Wages productive	1,48,000
Wages unproductive	20,000
Material issued to production	1,28,000
Works expenses incurred	65,000
Works expenses charged to production	86,000
Office and administration expenses paid	44,000
Office and administration expenses charged to production	43,500
Selling overhead paid	45,000
Selling overheads charged to sales	45,000
Sales Credit	3,90,000

Journal

Particulars	Rs.	Rs.
Stores ledger control A/c Dr. To Creditors (Being the stores purchased on credit)	1,48,000	1,48,000
Wages control A/c Dr. To cash (Being wages paid)	1,68,000	1,68,000
Work-in-progress control A/c Dr. To Wages control A/c (Being the wages charged to production)	1,48,000	1,48,000
Works expenses control A/c Dr. To Wages control A/c (Being the wages charged to work expenses Since these are indirect payments)	20,000	20,000
Work-in-progress control A/c Dr. To Stores ledger control A/c (Being materials issued to production)	1,28,000	1,28,000
Works expenses control A/c Dr. To cash (Being works expenses paid during the year)	65,000	65,000

Work-in-progress control A/c To works expenses control A/c (Being the works expenses charged to production)	Dr.	86,000	86,000
Office and adm. Expenses control A/c To cash (Being amount paid for office expenses)	Dr.	44,000	44,000
Work-in-progress control A/c To office and Adm. Expenses control A/c (Being office and adm. Exp. charged to production)	Dr.	43,500	43,500
Cost of sales A/c To work-in-progress control A/c (Being the finished product transferred)	Dr.	3,00,000	3,00,000
Selling expenses control A/c To cash (Being the selling expenses incurred)	Dr.	45,000	45,000
Cost of sales A/c To Selling expenses control A/c (Being selling expenses charged to sales)	Dr.	45,000	45,000
Debtors A/c To Sales A/c (Being sales made on credit)	Dr.	3,90,000	3,90,000

Stores Ledger Control A/c

To Creditors	Rs. 1,48,000	By Work-in-progress control A/c	Rs. 1,28,000
		By Balance c/d	20,000
	----- 1,48,000 -----		----- 1,48,000 -----

Wages Control A/c

To Creditors	Rs. 1,68,000	By Work-in-progress control A/c	Rs. 1,48,000
		By work expense control A/c	20,000
	----- 1,68,000 -----		----- 1,68,000 -----

Works Expenses Control A/c

	Rs.		Rs.
To Wages control A/c	20,000	By work-in-progress control A/c	86,000
To Cash	65,000		
To Balance c/d	1,000		
	-----		-----
	<u>86,000</u>		<u>86,000</u>

Office & Administrative Expenses Control A/c

	Rs.		Rs.
To Cash A/c	44,000	By work-in-progress control A/c	43,500
		By Balance c/d	500
	-----		-----
	<u>44,000</u>		<u>44,000</u>

Selling Expenses Control A/c

	Rs.		Rs.
To Cash A/c	45,000	By Cost of Sales A/c	45,000

Work – in- Progress Control A/c

	Rs.		Rs.
To Wages control A/c	1,48,000	By cost of sales A/c	3,00,000
To Stores ledger A/c	1,28,000	By Balance c/d	1,05,500
To Works expenses A/c	86,000		
To office & adm. Expenses	43,500		
	-----		-----
	<u>4,05,500</u>		<u>4,05,500</u>

In addition to these, Cash A/c, Creditors A/c and Cost of Sales A/c are to be prepared

Illustration 5 :

From the following particulars, pass journal entries in an integrated system of accounting in the books of Big `B' Ltd.

	Rs.
Raw materials purchased (80% on credit)	5,90,000
Materials issued to production	4,45,000
Tools wages paid	2,50,000
Wages charged to production	1,80,000
Factory overheads incurred	1,90,000
Factory overheads charged to production	1,60,000
Office overhead incurred	1,10,000
Office overheads applied to Finished Goods	85,000
Selling and Distribution overheads incurred	48,000
Selling and Distribution overheads applied to cost of sales	36,000
Finished goods produced	5,00,000
Materials lost by fire	10,000
Materials issued for construction of building	40,000

Journal Entries in the books of Big B Ltd.

Sr.No	Particulars	Dr. Rs.	Cr. Rs.
1	Stores Ledger Control A/c Dr. To Creditors A/c To Bank A/c (Being raw materials purchased)	5,90,000	4,72,000 1,18,000
2	WIP Control A/c Dr. To Stores Ledger Control A/c (Being direct materials issued for production)	4,45,000	4,45,000
3	Wages Control A/c Dr. To Cash / Bank / A/c (Being payment of wages)	2,50,000	2,50,000
4	WIP Control A/c Dr. To Wages Control A/c (Being wages charged to production)	1,80,000	1,80,000
5	Factory Overhead Control A/c Dr. To Cash / Bank A/c (Being factory overhead incurred)	1,90,000	1,90,000
6	WIP Control A/c Dr. To Factory Overhead Control A/c (Being factory overhead charged to production)	1,60,000	1,60,000
7	Office Overhead Control Dr. To Cash / Bank A/c (Being administrative overhead incurred)	1,10,000	1,10,000
8	Finished Goods Control A/c Dr. To office overhead Control A/c (Being office overhead applied to finished goods)	85,000	85,000
9	Selling and Distribution Control A/c Dr. To Cash / Bank A/c (Being selling and distribution overhead paid)	48,000	48,000
10	Cost of Sales A/c Dr. To Selling and Distribution overhead control A/c (Being cost selling overhead charged to cost of sales A/c)	36,000	36,000

11	Finished Goods Control A/c To WIP Control A/c (Being production cost of finished goods transferred to finished stock A/c)	Dr.	5,00,000	5,00,000
12	Costing P & L A/c To Stores Ledger Control A/c (Being material lost by fire)	Dr.	10,000	10,000
13	Building A/c To Stores Ledger Control A/c (Being material issued for construction of building)	Dr.	40,000	40,000

3.9 EXERCISE

A. Objective type.

Choose the correct answers for the following multiple choice questions

- Materials Requisition Note
 - Authorizes and records the issue of materials for use
 - Records the return of unused materials.
 - Records the transfer of materials from one store to another
 - A classified record of materials, issues, returns and transfers.
- Materials Transfer Note
 - Authorizes and records the issue of materials for use
 - Records the return of unused materials.
 - Records the shifting of materials from one store to another.
 - A classified record of materials, issues, returns and transfers.
- A document which is a classified record of material issues, returns and transfers.
 - Materials Requisition Note
 - Material Return Note
 - Materials Transfer Note
 - Materials issue Analysis sheet
- This is essential to make the cost ledger 'self-balancing'
 - General Ledger Adjustment Account
 - Stores Ledger Control Account
 - Work-in-progress Ledger
 - Finished Goods Control Account

5. This is debited with all purchases of materials for the stores and credited with all issues of materials.
 - (a) General Ledger Adjustment Account
 - (b) Stores Ledger Control Account
 - (c) Work-in-progress Ledger
 - (d) Finished Goods Control Account

6. In this, cost of materials, wages and overheads of each job undertaken is posted.
 - (a) General Ledger Adjustment Account
 - (b) Stores Ledger Control Account
 - (c) Work-in-progress Ledger
 - (d) Finished Goods Control Account

7. In non-integrated system of accounting, the emphasis is on

(a) Personal accounts	(b) Real accounts
(c) Nominal accounts	(d) All of these

8. Cost and financial accounts are required to be reconciled under

(a) Integral system	(b) Cost control accounts
system	
(c) Under both (a) and (b)	(d) None of these

9. Purchases for special jobs is debited to
 - (a) Work-in-progress ledger control account
 - (b) Cost ledger control account
 - (c) Stores ledger control account

10. Notional costs
 - (a) May be included in interlocking accounts
 - (b) May be included in integrated accounts
 - (c) Cannot be included in interlocking accounts
 - (d) Neither (a) nor (b) or (c)

Answer : 1 (a), 2(c), 3(d), 4(a), 5(b), 6(c), 7(c), 8(b), 9(a), 10(a)

B. Short notes

1. Write short notes on 'Integrated Accounts'.
2. Write short notes on 'Cost Ledger Control Account.'
3. State the essential pre-requisites of integrated accounting system.
4. List three main advantages of integrated accounts.
5. Write short notes on 'Integrated accounting'
6. What are the advantages of integrated accounting ?

C. Long questions

1. Define integrated accounting system and briefly explain the same highlighting the advantages of the system.
2. What are the advantages of maintaining a cost ledger?
3. Enumerate the principal ledgers that are to be maintained in a system of cost control accounting.
4. Write short notes on Integrated accounting system.
5. Write short notes in 'Integrated Accounting system'.

Illustration 1:

Costman Ltd. maintains separate set of books for financial accounts and cost accounts. The following information is furnished for the year 2003.

Particulars	Rs.
Material Control A/c	60,000
Work-in-progress Control A/c	90,000
Finished Good Control A/c	1,40,000
Cost Ledger Control A/c	2,90,000
Transactions for the year are :	
Materials purchased	6,60,000
Materials issued as :	
Direct materials	4,50,000
Indirect materials	1,20,000
Wages paid allocated as :	
Direct cost	2,70,000
Indirect cost	90,000
Production expenses	2,40,000
Value of finished goods produced	10,80,000
Closing Stock of finished goods	1,20,000
Administration expenses	2,40,000
Selling expenses	1,80,000
Sales	18,00,000

Prepare the necessary control accounts in books of costing records.

Illustration 2:

On 31st March 2005 the following balances were extracted from the books of Turf and Surf Company.

Particulars	Dr. Rs.	Cr. Rs.
Stores Ledger Control A/c	3,50,000	-
Work-in-Progress Control A/c	3,80,000	-
Finished Goods Control A/c	2,50,000	-
Cost Ledger Control A/c	--	9,80,000
Total	9,80,000	9,80,000

The following transactions took place in March, 2005 :

Particulars	Rs.
Raw materials : Purchased	9,50,000
Returned to Suppliers	30,000
Issued to Production	9,80,000
Returned to stores	30,000
Productive Wages	4,00,000
Indirect Labour	2,50,000
Factory Overheads	5,00,000
Selling and Distribution Overheads	4,00,000
Cost of finished goods transferred to warehouse	21,30,000
Cost of goods sold	21,00,000
Sales	30,00,000

Factory Overheads are applied to production at 150% of Direct Wages, any under / over absorbed overhead being carried forward

for adjustment in the subsequent months. All selling and distribution overheads are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.

Show the necessary Control Accounts, Costing Profit and Loss A/c and the Trial Balance.

(M.Com. Oct. 05, adapted)

Illustration 3:

As on 31st March, 2005, the following balances existed in Sharad Co. Ltd.'s Cost Ledger.

Particulars	Dr. Rs.	Cr. Rs.
Stores Ledger Control A/c	6,02,870	-
Work-in-Progress Control A/c	2,44,730	-
Finished Stock Ledger Control A/c	5,03,890	-
Manufacturing Overhead Control A/c	-	21,050
Cost Ledger Control A/c	-	13,30,440
Total	13,51,490	13,51,490

During the next three months, the following items arose:

Particulars	Rs.
Finished Product (At Cost)	4,21,670
Manufacturing Overhead incurred	1,83,020
Raw Materials Purchased	2,46,000
Factory Wages	1,01,060
Indirect Labour	43,330
Cost of Sales	3,71,780
Materials issued to Production	2,54,630
Sales return at cost	10,760
Materials returned to Suppliers	5,800
Manufacturing Overhead Charged to Production	1,54,400

You are required to write up:

- a) Cost Ledger Control Account
- b) Stores Ledger Control Account
- c) Overhead Control Account
- d) Work in Progress Control Account
- e) Finished Stock Ledger Control Account
- f) Trial Balance (indicating, in brief, what each balance represents)
- g) Cost of sales A/c

(M.Com., Mar. 06, Adapted)

Illustration 4 :

A Ltd. follows non-integrated system of Accounting. Following is the Trial Balance as on 01-01-2004 :

Particulars	Dr. Rs.	Cr. Rs.
Stores Ledger Control A/c	2,50,000	-
Work-in-Progress Control A/c	2,00,000	-
Finished Goods Control A/c	3,50,000	-
Financial Ledger Control A/c	-	8,00,000
Total	8,00,000	8,00,000

Following were the transactions during the month of January :

Material Purchased	Rs. 7,50,000
Materials issued to Production	Rs. 3,00,000
Factory	Rs. 40,000
Office	Rs. 10,000
Total Wages Paid	Rs. 3,00,000
Direct Wages charged to Production	Rs. 2,50,000
Indirect Wages	Rs. 50,000
Office Overheads Paid	Rs. 30,000
Office Overheads applied to Finished Goods	Rs. 38,000
Selling and Distribution Overheads incurred	Rs. 30,000
Selling and distribution Overheads applied to Cost of Sales	Rs. 31,000
Factory Overheads charged to Production @ 35% of Direct	

Wages

Finished Goods Produced	Rs. 8,00,000
Cost of Finished Goods Sold	Rs. 10,00,000
Sales	Rs. 12,00,000

Prepare the following accounts for the month:

- Store Ledger Control A/C
- Work-in- Progress Control A/c
- Finished Goods Ledger Control A/c
- Factory Overheads Control A/c
- Financial Ledger Control A/c
- Office Overhead Control A/c
- Selling and Distribution Overhead Control A/c
- Profit and Loss A/c

(M.Com. Oct. 07, adapted)

Illustration 5:

As on 31st March, 2007, the following balances were extracted from books of the Supreme Manufacturing Company, which follows Non-integrated System of Cost Accounting :

Particulars	Dr. Rs.	Cr. Rs.
Stores Ledger Control A/c	56,000	-
Work-in-Progress Control A/c	60,800	-
Finished Goods Control A/c	40,000	-
General Ledger Control A/c		1,56,800
Total	1,56,800	1,56,800

The following transactions took place in April 2007 :

Particulars	Rs.	Particulars	Rs.
Raw Materials :		Indirect labour	40,000
i) Purchased	1,52,000	Factory overhead expenses incurred	80,000
ii) Returned to suppliers	4,800	Selling and administrative expenses	64,000
iii) Issued to production	1,56,800	Cost of finished goods transferred to warehouse	3,40,800
iv) Returned to stores	4,800	Cost of goods sold	3,36,000
Productive wages	64,000	Sales	4,80,000

Factory overheads are applied to production at 150% of direct wages, any under/over-absorbed overheads being carried forward for adjustment in the subsequent months. All administrative and selling expenses are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.

Show the following accounts in the Company's books:

- a) General Ledger Control A/c
- b) Stores Ledger Control A/c
- c) Work-in-progress Control A/c
- d) Finished Goods Stock Control A/c
- e) Factory Overhead Control A/c
- f) Costing Profit and Loss A/c
- g) Trial Balance as at 30th April, 2007

(M. Com., Oct. 08, adapted)

Illustration 6:

Bangalore Petro -Chemicals Co. keeps books on Integral Accounting System. The following balances appear in the books of the company as on 1st January 2004.

Particulars	Dr. Rs.	Cr. Rs.
Stores Control A/c	18,000	-
Work-in-Progress	17,000	-
Finished Goods A/c	13,000	-
Bank A/c	10,000	-
Creditors A/c	-	8,000
Fixed Assets A/c	55,000	-
Debtors A/c	12,000	-
Share Capital A/c	-	80,000
Depreciation Provision A/c	-	5,000
Profit and Loss A/c	-	32,000
Total	1,25,000	1,25,000

Transactions for the year ended 31st December, 2004 were as under:

Particulars	Rs.	Rs.
Wages – Direct	87,000	
Indirect	<u>5,000</u>	92,000
Purchase of materials (on Credit)		1,00,000
Materials issued to production		1,10,000
Materials for repairs		2,000
Goods finished during the year (At cost)		2,15,000
Sales (on Credit)		3,00,000
Cost of Goods sold		2,20,000
Production overheads absorbed		48,000
Production overheads incurred		40,000
Administration overheads incurred		12,000
Selling overheads incurred		14,000
Payments to Creditors		1,01,000
Payments from Debtors		2,90,000
Depreciation of Machinery		1,300
Prepaid Rent (included in factory overheads)		300

Write up accounts in the integrated ledger and prepare a trial balance.
(M. Com., Mar. 05, adapted)

Illustration 7:

Octega Ltd. maintains integrated Accounts of Cost and Financial Accounts. From the following details write up Control Accounts in the general ledger of the factory and prepare a Trial Balance:

Particulars	Rs.
Share Capital	30,00,000
Reserves	20,00,000
Sundry Creditors	50,00,000
Plant and Machinery	57,50,000
Sundry Debtors	20,00,000
Closing Stock	15,00,000
Cash and Bank Balances	7,50,000
Transactions During the year	Rs.
Stores Purchased	1,00,00,000
Stores issued to production	1,05,00,000
Stores in Hand	9,50,000
Direct Wages incurred	65,00,000
Direct Wages charged to production	60,00,000
Manufacturing Expenses incurred	30,00,000
Manufacturing Expenses charged to production	27,50,000
Selling and Distribution Expenses	10,00,000
Finished Stock Production (at cost)	1,80,00,000
Sales	2,20,00,000
Closing Stock	9,50,000
Payment to Creditors	1,10,00,000
Receipt from Debtors	2,10,00,000

(M.Com. Oct. 06, adapted)

Illustration 8:

From the following particulars, pass journal entries in an integrated system of accounting in the books of ABC Ltd.

	Rs.
Raw materials purchased (75% on credit)	` 9,80,000
Materials issued to production	` 7,40,000
Total wages paid	` 4,00,000
Wages charged to production	` 3,00,000
Factory overheads incurred	` 3,10,000
Factory overheads charged to production	` 2,60,000
Office overheads incurred	` 1,80,000
Office overheads applied to finished goods	` 1,40,000
Selling and Distribution overheads incurred	` 76,000
Selling and Distribution overheads applied to cost of sales	` 60,000
Finished goods produced	` 8,00,000
Materials issued for construction of Building	` 50,000

(M.Com. Oct. 07, adapted)

Illustration 29:

Dutta Enterprises operates an integral system of accounting. You are required to pass the Journal Entries for the following transactions that took place for the year ended 30-6-2003. (Narrations are not required).

Particulars	Rs.
Raw materials purchased (50% on credit) 	6,00,000
Materials issued to production 	4,00,000
Wages paid (50% Direct) 	2,00,000
Wages charged to production 	1,00,000
Factory overheads incurred 	80,000
Factory overheads charged to production 	1,00,000
Selling and Distribution overheads incurred 	40,000
Finished goods at cost 	5,00,000
Sales (50% Credit) 	7,50,000
Closing Stock 	NIL
Receipts from Debtors 	2,00,000
Payments to Creditors 	2,00,000

(M.Com. Apr. 09, adapted)



MARGINAL COSTING AND ABSORPTION COSTING

Unit Structure

- 4.0 Learning objectives
- 4.1 Absorption Costing
- 4.2 Limitations of absorption costing
- 4.3 Marginal Costing
- 4.4 Marginal v/s Absorption costing
- 4.5 Contribution analysis
- 4.6 Solved Illustrations
- 4.7 Questions

4.0 LEARNING OBJECTIVES

After studying this chapter, the student should be able to understand -

- Meaning of absorption costing
- The distinction between marginal costing and absorption costing
- The meaning of the terms- breakeven point, margin of safety, p/v ratio, angle of incidence and cost indifference point.
- How to prepare profit statements based on marginal costing and absorption costing.
- the assumptions underlying CVP analysis
- How to Calculate break-even points for multi-product situations.

4.1 ABSORPTION COSTING

Absorption costing is a principle whereby fixed as well as variable costs are allocated to cost units and total overheads are absorbed according to activity level. It is the practice of charging all costs irrespective of fixed and variable and direct and indirect expenses are charged. It is a simple and fundamental method of ascertaining the cost of a product or service. This method is familiar since many companies still follow this approach for pricing

decisions. This the oldest and widely used system. This method is also called as '*cost plus*' costing.

4.2 LIMITATIONS OF ABSORPTION COSTING

Absorption costing suffers from the following limitations.

- In practice this method employs highly arbitrary method of apportionment of overhead. This reduces the practical utility of cost data for control purposes.
- Under absorption costing, fixed cost relating to closing stock is carried forward to the next year. Similarly, fixed cost relating to opening stock is charged to current year instead of previous year. Thus under this method, all the fixed cost is not charged against the revenue of the year in which they are incurred. It is unsound practice.
- Under absorption costing collection and presentation of cost data is not very useful for decision making, because process of assigning product cost a reasonable share of fixed overhead obscures cost volume profit relationship.
- Under absorption costing, behavioral pattern of costs is not highlighted and thus many situations, which can be utilized under marginal costing, are likely to go unnoticed in absorption costing.
- The complaint is sometimes made that absorption costing often deals only with production costs and ignores selling and administration costs.
- The decision maker needs to know the costs that will vary as a result of his decision, and the costs that will remain unchanged. Absorption costing does not provide a convenient basis for making such calculations. Its main purpose is to provide cost information for stock valuation and the measurement of reported profits

4.3 MARGINAL COSTING

The term 'Marginal Cost' is defined as the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit. It is a variable cost of one unit of a product or a service i.e. a cost which would be avoided if that unit was not produced or provided.

4.3.1 Definition and Meaning:

Marginal costing is a principle whereby variable costs are charged to cost units and fixed costs attributable to the relevant period is written off in full against the contribution for that period. Marginal Costing is the ascertainment of marginal cost and the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable cost.

CIMA defines marginal as “the accounting system in which variable cost are charged to the cost units and fixed costs of the period are written off in full against the aggregate contribution.

Marginal Costing is not a distinct method of costing like job costing or process costing. It is a technique which provides presentation of cost data in such a way that true cost volume profit relationship is revealed. Under this technique, it is presumed that costs can be divided in two categories, i.e., fixed cost and variable cost. Fixed cost is charged to contribution of the period in which it is incurred and is considered period cost.

4.3.2 Features of marginal costing:

- a. Costs are divided into two categories, i.e. fixed costs and variable costs.
- b. Fixed cost is considered period cost and remains out of consideration for determination of product cost and value of inventories.
- c. Prices are determined with reference to marginal cost and contribution margin.
- d. Profitability of department and products is determined with reference to their contribution margin.
- e. In presentation of cost data, display of contribution assumes dominant role.
- f. Closing stock is valued on marginal cost

4.3.3 Advantages of Marginal costing

- a. It avoids the complications of over or under absorption of fixed cost by excluding it from cost of production.
- b. The technique provides useful data for managerial decision making.
- c. By not carrying forward fixed cost from period to period, it facilitates cost comparison.
- d. The impact of profit on sales fluctuations are clearly shown under marginal costing.
- e. The technique is flexible in the sense it can be used along with other techniques such as budgetary control and standard costing.

- f. It establishes a clear relationship between cost, sales and volume of put and break even analysis which shows the effect of increasing an decreasing production activity on the profitability of the company.
- g. It provides useful data for the management in determination of policies regarding future
- h. te production and sales.
- i. Stock of work in progress and finished goods are valued at marginal cost, which is uniform.

4.3.4 Limitations:

- a. The segregation of semi variable costs often poses a problem
- b. Closing stock of work in progress and finished goods are understated which is not acceptable to tax authorities.
- c. With the change technology and owing to automation of industries, it results in more fixed cost. Marginal costing fails to reflect the exact change because of adoption of new technology.
- d. It does not provide any yardstick to exercise control. So an effective means of control cannot be exercised.
- e. The technique is not suitable under cost plus contract because of technique ignores fixed cost in calculating total cost.
- f. V ariable cost per unit remains constant only in the short run but not in the long run.
- g. Cost comparison of two jobs will be difficult. Though marginal costing may be same for both the jobs.
- h. When sales are based on marginal cost or marginal cost with some contribution, it may result in losses or low profit.

4.4 MARGINAL V/S ABSORPTION COSTING

Absorption Costing	Marginal costing
1.All costs are charged to the cost of production	1. Only variable cost is charged to cost of production. Fixed costs are recovered from contribution.
2. Stock of work in-progress and finished goods are valued at full or total cost. Fixed cost is carried over from one period to another period which distorts cost comparison.	2. Stock of work in progress and finished goods are valued at marginal cost. This facilitates cost comparison.
3. The difference between sales and total cost constitute profit.	3. The excess of sales revenue over variable cost is known as contribution when fixed cost is deducted from contribution, it results in profit.

Profit at a given sales volume
 Contribution = Sales x P/V Ratio
 Profit = Contribution- Fixed Cost
 Profit at a given sales level = (Sales Revenue x P/v Ratio)-
 Fixed cost.

4.5.3 Breakeven Point:

The point which breaks the total cost and the selling price evenly to show the level of output or sales at which there shall be neither profit nor loss, is regarded as break even point. At this point, the income of the business exactly equals its expenditure. If production is enhanced beyond this level, profit shall accrue to the business, and it is decreased from this level, loss shall be suffered by the business.

$$\text{Breakeven point (in units)} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

$$\text{Break-even Point (in Rs.)} = \frac{\text{Fixed Cost} \times \text{sales}}{\text{Contribution per unit}}$$

4.5.4 Margin of safety:

Total sales minus the sales at breakeven point is known as the margin of safety

Thus, the formula is:

Margin of Safety = Total Sales-Break even sales
 Margin of Safety can also be computed according to the following formula:

$$\text{Margin of safety} = \frac{\text{Net profit}}{\text{P/V Ratio}}$$

Margin of safety can also be expressed as a percentage of sales:

$$= \frac{\text{Margin of Safety}}{\text{Total Sales}} \times 100$$

Check Your Progress:

- 1) Define the following terms.
 - a) Absorption Costing
 - b) Marginal costing
 - c) Contribution
 - d) Break Even Point
 - e) Margin of Safety

- 2) Give Formulas
- Contribution
 - Profit Volume Ratio
 - Profit at a given sales levels
 - Break Even point in units
 - Margin of safety.

4.6 SOLVED ILLUSTRATIONS

Illustration-1:

Prepare Income statements under Absorption Costing and under Marginal costing from the following information relating to the year 2001-02:

Opening Stock = 1,000 units valued at Rs. 70,000 including variable cost of Rs. 50 per unit.

Fixed cost = Rs. 1, 20,000

Variable cost = Rs. 60 per unit

Production = 10,000 units

Sales = 7,000 units @ Rs. 100 unit

Stock is valued on the basis of FIFO

Solution:

INCOME STATEMENT (Under Absorption Costing)

		Rs.	Rs.
	Sales (7,000 units @ Rs. 100 per unit)		7,00,000
Less :	Cost of Goods Manufactured :		
	Variable cost (10,000 unit @ Rs. 60 per unit)	6,00,000	
	(Rs. 1,20,000)	1,20,000	
	Fixed cost (10,000 units = Rs. 12 per unit)	7,20,000	
		70,000	
Add :	Value of Opening Stock	7,90,000	
Less :	Value of Closing Stock (4,000 units @ Rs. 72 per unit)	2,88,000	
			5,02,000
	Profit		1,98,000

INCOME STATEMENT (Under Marginal Costing)

		Rs.	Rs.
	Sales		7,00,000
	Variable cost	6,00,000	
Add:	Value of Opening Stock (1,000 units @ Rs. 50 per unit)	50,000	
		6,50,000	
Less :	Value of Closing Stock (4,000 units @ Rs. 60 per unit)	2,40,000	
			4,10,000
	Contribution		2,90,000
Less :	Fixed Cost		1,20,000
	Profit		1,70,000

Illustration- 2

Your Company has a production capacity of 12,500 units and normal capacity utilisation is 80%. Opening inventory of finished goods on 1-1-1999 was 1,000 units. During the year ending 31-12-1999, it produced 11,000 units while it sold only 10,000 units.

Standard variable cost per unit is Rs, 6.50 and standard fixed factory cost per unit is Rs. 1.50. Total fixed selling and administration overhead amounted to Rs. 10,000. The company sells its product at Rs. 10 per unit.

Prepare Income Statements under Absorption Costing and Marginal Costing. Explain the reasons for difference in profit, if any.

Solution:**INCOME STATEMENT (Absorption Costing)**

		Rs.	Rs.
	Sales (10,000 units @ Rs. 10)		1,00,000
	Variable factory cost (11,000 units @ Rs. 6.50)	71,500	
	Fixed factory cost (11,000 units @ Rs. 1.50)	16,500	
		88,000	
		8,000	

Add :	Opening stock (1,000 units @ Rs. 8)	96,000	
		16,000	
Less :	Closing stok (2,000 units @ Rs. 8)	80,000	
Less :	Over-absorption (1,000 units @ Rs. 1.50)	1,500	
		78,500	
Add :	Selling and administration overhead	10,000	
	Total cost		88,500
	Profit		11,500

INCOME STATEMENT (Marginal Costing)

		Rs.	Rs.
	Sales (10,000 units @ Rs. 10)		1,00,000
	Variable cost (11,000 units @ Rs. 6.50)	71,500	
Add :	Opening Stock (1,000 units @ Rs. 6.50)	6,500	
		78,000	
Less :	Closing Stok (2,000 units @ Rs. 6.50)	13,000	
	Variable cost of Manufacture		65,000
	Contribution		35,000
Less :	Fixed cost – Factory (10,000 x Rs. 1.50)	15,000	
	Selling and Administration	10,000	
			25,000
	Profit		10,000

The difference in profits Rs. 1,500 (i.e. Rs. 11,500 – Rs. 10,000) as arrived at under absorption costing and marginal costing is due to the element of fixed factory cost included in the valuation of opening stock and closing stock as shown below :

	Opening Stock Rs.	Closing Stock Rs.
Absorption Costing	8,000	16,000
Marginal Costing	6,500	13,000
	-----	-----
	1,500	3,000
	-----	-----
Net Difference = Rs. 3,000 – Rs. 1,500		Rs. 1,500

Illustration 3 :

If the Budgeted output is 80,000 units, Fixed cost is Rs. 4,00,000, Selling price per unit is Rs. 20 and variable cost per unit is Rs. 10, find out BEP sales, BEP in units, P/V ratio and indicate the margin of safety.

Solution :

		Rs. Per Unit	
Selling Price		20	
Less : Variable Cost		10	

Contribution		10	
P/V Ratio	=	Contribution 10	
		----- = ---- = 0.5	
		Sales 20	
Break Even Sales (Rs.)	=	Fixed Cost	

		P/V Ratio	
		Rs. 4,00,000	
	=	-----	
		0.5	
	=	Rs. 8,00,000	
Break Even Sales (Units)	=	Fixed Cost	

		Contribution Per Unit	
	=	Rs. 4,00,000	

		Rs. 10	
	=	40,000 Units	
Margin of Safety Sales	=	Budgeted Output– Break Even Sales	
Margin of Safety (Units)	=	80,000 – 40,000 = 40,000 Units	
Margin of Safety Sales (Rs.)	=	Margin of Safety Units x Selling Price Unit	
	=	40,000 x 10	
	=	Rs. 4,00,000	

Illustration- 4 :

- (a) From the following information calculate :
- (a) Break – Even Point.
 - (b) P/V Ratio
 - (c) Profit
 - (d) Profit at 75% capacity,
 - (e) Profit at 100% capacity
- (1) Budgeted Sales Rs. 2,00,000 (80% capacity)
 - (2) Direct Materials 30% of Sales.
 - (3) Direct labor 20% on sales.
 - (4) Variable Overheads (Factory) 10% on sales.
 - (5) Variable Overheads (Administration) 15% of sales.
 - (6) Fixed Cost Rs. 30,000

Solution :

Particulars	Activity Level		
	75% Rs.	80% Rs.	100% Rs.
Sales	1,87,5000	2,00,000	2,50,000
Less : Variable Cost :			
Direct Material (30%)	56,250	60,000	75,000
Direct Labour (20%)	37,500	40,000	50,000
Factory Overheads (10%)	18,750	20,000	25,000
Administration Overheads (15%)	28,125	30,000	37,500
Total Variable Expenses	1,40,625	1,50,000	1,87,500
Contribution	46,875	50,000	62,500
Less : Fixed Cost	30,000	30,000	30,000
(3) Profit	16,875	20,000	32,500
(1) BEP	<u>Fixed Cost</u>	30,000	30,000
(in Rs.)	P/V Ratio	0.25	0.25
		1,20,000	1,20,000
	<u>Contribution</u>	<u>46,875</u>	<u>50,000</u>
(2) P/V Ratio	Sales	1,87,500	2,00,000
		= 0.25	= 0.25

Illustration -5 :

Company X and Company Y, both under the same management, makes and sells the same type of product. This budgeted Profit and Loss Accounts for January – June, 2005, are as under :

	Company 'X'		Company 'Y'	
Particulars	Rs.	Rs.	Rs.	Rs.
Sales		6,00,000		6,00,000
Less : Variable Cost	4,80,000		4,00,000	
Fixed Cost	60,000	5,40,000	1,40,000	5,40,000
Profit		60,000		60,000

You are required to :

- (i) Calculate the Break-Even Point for each company.
- (ii) Calculate the sales volume at which each of the two companies with profit of Rs. 20,000.
- (iii) Calculate margin of Safety for both the companies.

Marginal Cost Sheet

Particulars	X	Y
Sales	6,00,000	6,00,000
Less : Variable Cost	4,80,000	4,00,000
Contribution	1,20,000	2,00,000
Less : Fixed Cost	60,000	1,40,000
Profit	60,000	60,000

$$(1) \text{ P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

X	Y
$\frac{1,20,000}{6,00,000}$	$\frac{2,00,000}{6,00,000}$
= 0.2	= 0.33

$$(2) \text{ BEP (Rs.)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

X	Y
$\frac{60,000}{0.2}$	$\frac{1,40,000}{0.33}$
= Rs. 3,00,000	= Rs. 4,20,000

$$(3) \text{ Sales required to earn a desired profit} = \frac{\text{Fixed cost} + \text{Target Profit}}{\text{P / V Ratio}}$$

$\begin{array}{c} X \\ \frac{60,000 + 20,000}{0.2} \\ = \text{Rs. } 4,00,000 \end{array}$	$\begin{array}{c} Y \\ \frac{1,40,000 + 20,000}{0.33} \\ = \text{Rs. } 4,80,000 \end{array}$
---	--

$$(4) \text{ MOS (Rs.)} = \frac{\text{Profit}}{\text{P / V Ratio}}$$

$\begin{array}{c} X \\ \frac{60,000}{0.2} \\ = \text{Rs. } 3,00,000 \end{array}$	$\begin{array}{c} Y \\ \frac{60,000}{0.33} \\ = \text{Rs. } 1,80,000 \end{array}$
--	---

Illustration- 6.

- (a) X Ltd. has earned contribution of Rs. 2,00,000 and net profit of Rs. 1,50,000 on sales of Rs. 8,00,000. What is its margin of safety ?
- (b) If margin of safety is Rs. 2,40,000 (40% of sales) and P/V Ratio is 30% of AB Ltd., calculate its
 - (i) Break even sales and (ii) Amount of profit on sales of Rs. 9,00,000.
- (c) A company sells its product at Rs. 15 per unit. In a period, if it produces and sells 8,000 units, it incurs a loss of Rs. 5 per unit. If the volume is raised to 20,000 units, it earns a profit of Rs. 4 per unit. Calculate break-even point both in terms of rupees as well as in units.
- (d) A company earned a profit of Rs. 30,000 during the year 1994-95. If the marginal cost and selling price of a product are Rs. 8 and Rs. 10 per unit respectively, find out the amount of 'Margin of Safety'.
- (e) The profit volume (P/V) ratio of B B & Co. dealing in precision instruments is 50% and the margin of safety is 40%.

You are required to work out the break-even point and the net profit if the sale volume is Rs. 50 lakhs.

- (f) Comment on the economic soundness of the following firms :

	Firm A	Firm B
Current Sales Volume	3,00,000	3,00,000
Break Even Sales Volume	2,00,000	2,00,000
Margin of Safety	1,00,000	1,00,000
Fixed Cost	1,00,000	60,000

- (g) A company has a P/V Ratio of 40 per cent. By what percentage must sales be increased to offset :
- 10 per cent reduction in selling price and
 - 20 per cent reduction in selling price

SOLUTION

$$(a) \quad \text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs. } 2,00,000}{\text{Rs. } 8,00,000} \times 100 = 25\%$$

$$\text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}} = \frac{\text{Rs. } 1,50,000}{25\%} = \text{Rs. } 6,00,000$$

$$(b) \quad \text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

$$\text{or Profit} = \text{Margin of Safety} \times \text{P/V Ratio} = \text{Rs. } 2,40,000 \times 30\% = \text{Rs. } 72,000$$

$$\frac{\text{Margin of Safety}}{40\%} = \frac{\text{Rs. } 2,40,000}{40\%} = \text{Rs. } 6,00,000$$

$$\text{Contribution} = \text{Sales} \times \text{P/V Ratio} = \text{Rs. } 6,00,000 \times 30\% = \text{Rs. } 1,80,000$$

$$\text{Fixed cost} = \text{Contribution} - \text{Profit} = \text{Rs. } 1,80,000 - \text{Rs. } 72,000$$

$$= \text{Rs. } 1,08,000$$

$$(i) \quad \text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs. } 1,08,000}{30\%} = \text{Rs. } 3,60,000$$

$$(ii) \quad \text{Profit} = (\text{Sales} \times \text{P/V Ratio}) - \text{Fixed Cost} = (\text{Rs. } 9,00,000 \times 30\%) - \text{Rs. } 1,08,000 = \text{Rs. } 2,70,000 - \text{Rs. } 1,08,000 = \text{Rs. } 1,62,000$$

- (c) Average cost at 8,000 units volume
 = Selling price per unit + loss component per unit = Rs. 15 + Rs. 5 = Rs. 20
 Average cost at 20,000 units volume = Rs. 15 - Rs. 4 = Rs. 11
 Total cost at 8,000 units volume = Rs. 8,000 x Rs. 20 = Rs. 1,60,000
 Total cost at 20,000 units volume = Rs. 11 x 20,000 = Rs. 2,20,000

Change in total cost $\frac{\text{Rs. } 60,000}{\text{Change in volume of production } 12,000} = \text{Rs. } 5$

Fixed cost = Total cost – Variable cost = Rs. 1,60,000 – Rs. 40,000
= Rs. 1,20,000

P/V Ratio $\frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs. } 10}{\text{Rs. } 15} \times 100 = 66 \frac{2}{3} \%$

Break Even Point (Rupees) $\frac{\text{Fixed cost}}{\text{P/V Ratio}} = \frac{\text{Rs. } 1,20,000}{66 \frac{2}{3} \%} = \text{Rs. } 1,80,000$

Break Even Point (in units) $\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{\text{Rs. } 1,20,000}{\text{Rs. } 10} = 12,000 \text{ units}$

Alternative Solution :

We know the following relationship :

Sales = TC + P/L : Sales = TC + P/L
Rs. 15 = x + Rs. (5) : Rs. 15 = x + Rs. 4
Rs. 20 = x : Rs. 11 = x

TC = 8,000 x Rs. 20 per unit = 1,60,000;
TC = 20,000 x Rs. 11 per unit = Rs. 2,20,000

Variable Cost per unit $\frac{\text{Difference in cost}}{\text{Difference in Activity}} = \frac{\text{Rs. } 60,000}{12,000 \text{ units}} = \text{Rs. } 5 \text{ per unit}$

TC = Fixed Cost + VC per unit x Activity
Rs. 1,60,000 = x + Rs. 5 x 8,000
Rs. 1,20,000 = x

B.E.P. (unit) $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{\text{Rs. } 1,20,000}{(\text{Rs. } 15 - \text{Rs. } 5)} = 12,000 \text{ units}$

B.E.P. (Sales Rs.) = Fixed Cost x $\frac{\text{S}}{\text{C}}$ Per unit $\frac{15}{10}$
= Rs. 1,80,000

	Rs.	
(d) Selling price	10	
Less : Marginal cost	<u>8</u>	
Contribution	2	

	<u>Rs. 2</u>	
P/V Ratio	Rs. 10 x 100 = 20%	
Margin of Safety	<u>Profit</u>	<u>Rs. 30,000</u>
	P/V Ratio	20%
	Rs. 1,50,000	

(e)	Calculation of Sales at Break-even point	
	Sales	Rs. 50,00,000
	Less : Margin of Safety 40% (i.e. 50,00,000 x $\frac{40}{100}$)	
		20,00,000

Sales at Break Even Point = 30,00,000

P/V Ratio 50%

Therefore, Contribution or fixed Expenses at B.E.P.
 (50% of Rs. 30,00,000) = Rs. 15,00,000
 Calculation of Net Profit at Sales Volume of Rs.50,00,000

Contribution on Rs. 50,00,000 Sales
 (Sales x P/V Ratio i.e. Rs. 50,00,000 x $\frac{50}{100}$)=Rs.25,00,000

Less : Fixed Expenses	=15,00,000
Profit	=10,00,000

(f)	Firm A	Firm B
Break Even Sales	2,00,000	2,00,000
Fixed cost or Contribution (At B.E.P. contribution is Equal to Fixed Cost)	1,00,000	60,000
	50%	30%

	$\frac{\text{Contribution}}{\text{Sales}} \times 100 =$	$\frac{1,00,000}{2,00,000} \times 100$	$\frac{60,000}{2,00,000}$
P/V Ratio =			

	Rs.	Rs.
Current Sales Volume	<u>3,00,000</u>	<u>3,00,000</u>
Contribution on Current Sales Volume (i.e. Sales x P/V Ratio)	1,50,000 (3,00,000 x 50%)	90,000 (3,00,000 x 30%)
Less : Fixed cost	1,00,000	60,000
Profit	50,000	30,000

Comment : Firm A is more sound as compared to Firm B because it gives excess profit of Rs. 20,000 (i.e. Rs. 50,000 – Rs. 30,000). It is because of higher P/V ratio of 50%. Higher the P/V ratio, better it is. Firm A will start earning profit @ 50% on sales after B.E.P. whereas firm B will earn profit @ 30% on sales in excess of break even sales.

(g) Suppose selling price per unit is Re. 1 and units sold are 100.

	Present Position	After reduction of 10% in selling price	After reduction of 20% in selling price
	Rs.	Rs.	Rs.
Sales	100	90	80
Less : Variable cost	60	60	60
Contribution	40	30	20
Total sales in order to offset decrease in selling price		-	
<u>Sales x Present Contribution</u>	<u>90</u>	<u>80</u>	
New Contribution	30 x 40	20 x 40	
% Increase in Sales	= Rs. 120 20%	= Rs. 160 60%	

Illustration- 7 :

A company has annual fixed costs of Rs. 14,00,000. In 2001 sales amounted to Rs, 60,00,000 as compared with Rs. 45,00,000 in 2000 and profit in 2001 was Rs. 4,20,000 higher than in 2000 :

- (i) At what level of sales does the company break-even ?
- (ii) Determine profit or loss on a present sales volume of Rs. 80,00,000.
- (iii) If there is reduction in selling price in 2002 by 10% and the company desires to earn the same profit as in 2001, what would be the required sales volume ?

Solution

$$\frac{\text{Change in profit}}{\text{Change in sales}} \times 100 = \frac{\text{Rs. 4,20,000}}{\text{Rs. 15,00,000}} \times 100 = 28\%$$

$$(i) \text{ Break Even Point} = \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{\text{Rs. 14,00,000}}{28} \times 100$$

$$= \text{Rs. 50,00,000}$$

$$(ii) \text{ Profit} = (\text{Sales} \times \text{P/V ratio}) - \text{Fixed cost}$$

$$(\text{Rs. 80,00,000} \times 28\%) - \text{Rs. 14,00,000}$$

$$= \text{Rs. 8,40,000}$$

(iii) Contribution in 2001 = 28% x Rs. 60,00,000 = Rs. 16,80,000

This has to be maintained.

In 2002, the sales volume and contribution consequent upon 10% reduction in price are :

	Rs.
Sales (Rs. 60,00,000 – 10%)	54,00,000
Contribution (Rs. 16,80,000 – 10% of Rs. 60,00,000)	Rs. 10,80,000
	<u>Rs. 10,80,000</u>
P/V ratio	Rs. 54,00,000 x 100 = 20%

$$\text{Required Sales Volume} = \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{\text{Rs. 16,80,000}}{20\%}$$

$$= \text{Rs. 84,00,0}$$

4.7 Exercise

4.7.1 Simple Questions

1. Define cost-volume-analysis.
2. State any four objectives of cost volume profit analysis.
3. State any four assumptions of cost volume profit analysis.
4. State any four limitations of cost volume profit analysis.
5. What is Contribution ? How is it different from profit ?
6. Give Marginal Costing Equation.
7. Give three ways by which P/V Ratio can be improved.
8. What is Margin of Safety? How can it be improved?
9. Why are P/V Ratio and Marginal of Safety calculated?
10. Distinguish BE charts from P/V charts.
11. Write a note on Cash Break-even chart.

4.7.2 Objective questions

From the following choose the most appropriate answer:

i) Contribution margin is also known as

- a) Variable cost
- b) Gross Profit
- c) Net Income

ii) Period cost means

- a) Variable cost
- b) Fixed cost,
- c) Prime cost

iii) The break even point is the point at which:

- a) There is no profit no loss

- b) Contribution margin is equal to total fixed cost:
 c) Total revenue is equal to total cost:
 d) All of the above
- iv) Production cost under marginal costing include
 (a) Prime cost only
 (b) Prime cost and variable overhead
 (c) Price cost and fixed overhead
 (d) Price cost, variable overhead and fixed overhead
- v) One of the primary difference between marginal costing and absorption costing is regarding the treatment of :
 (a) Direct material (c) Fixed overhead
 (b) Variable overhead (d) Overhead costs
- vi) Period costs are :
 (a) Variable costs (c) Prime cost
 (b) Fixed cost (d) Overhead cost
- vii) Absorption costing differs from marginal costing in the
 (a) Fact that standard costs can be used with absorption costing but not with marginal costing.
 (b) Amount of fixed costs that will be incurred
 (c) Kind of activities for which each can be use
 (d) Amount of costs assigned to individual units of products.
- viii) To obtain the break-even point in rupee sales value, total fixed costs are divided by :
 (a) Variable cost per unit
 (b) Contribution margin per unit
 (c) Fixed cost per unit
 (d) Profit / volume ration.
- ix) The break-even point is the point at which
 (a) There is no profit no loss
 (b) Contribution margin is equal to total fixed cost,
 (c) Total revenue is equal to total cost
 (d) All of the above.
- x) Margin of safety is referred to as :
 (a) Excess of actual sales over fixed expenses
 (b) Excess of actual sales over variable expenses
 (c) Excess of actual sales over break-even sales
 (d) Excess of budgeted sales over fixed costs.

Answer : i (b), ii(a), iii (a), iv (b), v(c), vi (c), vii (d), viii(d), ix (d), x(c).

4.7.3 Essay type questions:

- 1) What do you mean by differential costs and incremental revenue?
- 2) State the managerial decision which can be taken with the help of Differential cost Analysis?
- 3) Explain the importance of the marginal cost technique in managerial decision making.
- 4) In the context of cost volume profit analysis, what is meant any limiting factor? Discuss its utility.
- 5) Explain briefly the circumstances under which selling prices below marginal cost may be justified.
- 6) How does cost volume profit analysis help control of cost?
- 7) "Cost Volume Profit analysis is helpful for profit planning". Explain.
- 8) What is 'analysis of margin of contribution' ? Discuss the need for it.
- 9) Define marginal costing, What are the features of marginal costing ?
- 10) "Cost-volume profit analysis is a very useful technique to management for cost control, profit planning and decision making". Explain.
- 11) In the context of cost-volume profit analysis, what is meant by limiting factor? Discuss its utility.
- 12) Define cost-volume profit analysis and explain its main features and useful contribution to the management in decision making.
- 13) How does cost-volume profit analysis help control of cost?

4.7.4 Practical Problems**Illustration 1:**

You are supplied with the information relating to sales and costs of sales of a manufacturing company. you are required to find out :

- 1) a) P. V. Ratio.
 b) Break even Point.
 c) Margin of safety in 2002.
 d) Profit when sales are Rs. 1, 20,000.
 e) Sales required earning a profit of Rs. 75,000
- 2) Calculate the revised P. V. ratio, break even point in each of the following cases :
 a) Decrease of 10% in selling price.
 b) Increase of 10% in variable costs.
 c) Increase of sales volume to 4000 units and increase in fixed costs by Rs. 40,000.

- d) Increase of Rs. 18,000 in fixed costs.
 e) Increase of 20% in selling price and increase of Rs. 8,000 in fixed costs.

3) The sales and cost of sales during the two years were as follows:

Year	Sales Rs.	Costs of Sales Rs.	Units
2001	6,00,000	5,60,000	2,400
2002	7,50,000	6,80,000	3,000

(M.Com., Apr. 03, Adapted)

(Ans: P/V Ratio 20%, Fixed Cost- Rs. 80,000)

Illustration 2 :

You are given the following information for the next year.

Year	Units
Sales (10,000 units)	1,20,000
Variable Cost	48,000
Fixed Cost	60,000

- 1) Find out the P. V. Ratio, Break-even point and the margin of safety.
- 2) Evaluate the effect of following on P. V. Ratio, Break-even point and the margin of safety.
 - a) 10% increase in Variable Cost.
 - b) 10% decrease in Variable Cost.
 - c) 10% increase in Fixed Cost.
 - d) 10% decrease in Fixed Cost.
 - e) 10% increase in Physical Sales Volume.
 - f) 10% decrease in Physical Sales Volume.
 - g) 5% increase in Selling Price.
 - h) 5% decrease in Selling Price.
 - i) 10% increase in Selling Price and 10% decrease in Physical Sales Volume.
 - j) 5% decrease in Selling Price and 10% increase in Physical Sales Volume.

(M.Com., Oct 96, Adapted)

(Ans: P/V Ratio 60%, BEP- Rs.1,00,000, MOS- Rs. 20,000)

Illustration 3:

AB Ltd. and LM Ltd. are manufacturing the same product. The Profit & Loss details are as under :

Particulars	AB Ltd. Rs.	LM Ltd. Rs.
Sales	10,00,000	10,00,000
Less : Variable Cost	4,00,000	6,00,000
	6,00,000	4,00,000
Less : Fixed Cost	3,00,000	1,00,000
Profit	3,00,000	3,00,000

You are required to:

- 1) Calculate Contribution / Sales ratio for each company.
- 2) Calculate BEP for each company.
- 3) Profits of each company if sales increase by 20%.
- 4) Profits of each company if sales decrease by 20%.
- 5) Comment on the profitability of both companies.

(M.Com. Apr 04, Adapted)

(Ans: P/V Ratio AB Ltd. 60%, LM Ltd. 40% BEP- AB Ltd. Rs. 5,00,000, LM.Ltd- Rs. 2,50,000)

Illustration 4:

The Vijaya Electronics Co. furnishes you the following income information of the year 1995.

Particulars	First Half	Second Half
Sales	4,05,000	5,13,000
Profit	10,800	32,400

From the above table you are required to compute the following assuming that the fixed cost remains the same in both the periods.

- a. P/V Ratio
- b) Fixed Cost
- c) Break-even point
- d) Variable Cost for first and second half of the year
- e) The amount of Profit or Loss where sales are Rs. 3,24,000.
- f) The amount of sales required to earn a profit of Rs. 54,000.

(M.Com. Apr 08, Adapted)

(Ans: P/V Ratio 20%, Fixed Cost Rs. 1, 40,000, BEP- Rs. 7, 02,000)

Illustration 5:

National Plastic Ltd. manufacturing chairs provides the following information:

Fixed cost Rs. 50,000 for the year

Variable cost Rs. 20 per chair

Capacity Rs. 2,000 chairs per year

Selling price Rs. 70 per chair

From the above mentioned information:

- i) Find the Breakeven point
- ii) Find the number of chairs to be sold to get a profit of Rs. 30,000
- iii) Find out Breakeven point and sales if the selling price changes to Rs. 60 per chair.
- iv) If the company can manufacture 600 chairs more per year with an additional fixed cost of Rs. 2,000, what should be the selling price to maintain profit per chair as at (ii) above?

(M.Com. Oct 04, Adapted)

(Ans: P/V Ratio 71.43% BEP- 1,000 Chairs)

Illustration 6 :

Sunil Ltd. had prepared the following budget estimates for the year 2004 :

Sales Units	Rs. 15,000
Fixed Expenses	Rs. 34,000
Sales Value	Rs. 1, 50,000
Variable Costs	Rs. 6 per unit

You are required to:

- i) Find out the P/V Ratio, Break Even Point and Margin of Safety.
- ii) Calculate the revised P/V Ratio, Break Even Point and Margin of Safety in each of the following cases :
 - a) Decrease of 10% in the selling price
 - b) Increase of 10% in the variable costs
 - c) Increase of sales volume by 2,000 units
 - d) Increase of ` 6,000 in fixed costs.

(M.Com. Oct 05, Adapted)

(Ans: P/V Ratio 40%, BEP- Rs.85, 000, MOS- Rs. 65,000)



MANAGERIAL DECISIONS

Unit Structure

- 5.0 Learning Objectives
- 5.1 Introduction
- 5.2 Long –term and Short-term decisions
- 5.3 Application s of Marginal Costing
- 5.4 Solved Problems
- 5.4 Illustration
- 5.5 Questions

5.0 LEERING OBJECTIVES

After Studying this chapter, you should be able to:

- Explain distinction between a) relevant cost and irrelevant cost's) marginal cost and differential cost c) breakeven point and cost indifference point; d) relevant cost and opportunity cost and g) traceable cost and common cost.
- Explain the importance of qualitative factors in decision making
- Construct the statements of relevant costs and relevant revenues for such Problem as:
 - A) Deleting a segment; b) special selling price decisions;
 - c) make or buy decision and d) accepting or rejecting an export order.
- Explain and consider the impact of opportunity cost, shadow price or incremental opportunity cost and imputed cost on decision making.
- Distinguish between situation of decision making (i.e. choice among the alternatives) and performance evaluation (i.e. evaluation of managerial performance with reference to overall contribution to companies' profit.)
- Explain the short term decision making and long term decision making
- Advise the management the best course of action after proper evaluation of all the available information

5.1 INTRODUCTION

Decision making involves choice between alternatives. Many quantitative and qualitative factors have to be taken into account in decision making. The term cost is very elusive; it has different meanings in different situations. A cost accountant examines each situation in depth to decide the kind of cost concepts to be used and plays an important role in decision making by making precise and relevant data available to management. In cost studies, a cost accountant should always consider four points for decision makings; (i) he must establish why a choice is necessary (ii) he must separately analyze each available alternatives,(iii) specific effort should be made to determine how every alternative alters or influences decision makers choice, and (iv)choice of a particular course of action from among the alternatives. Decision making involves prediction, which cannot change the past, but it is expected to influence the future.

5.2 LONG –TERM AND SHORT-TERM DECISIONS

Decision making involves two types of decisions i.e. long term decisions and short term operating decisions. The long term decisions force management to look beyond the current year. Time value of money and return on investment are major considerations in long term decisions. Short run operating decisions involves the selection of alternatives that can be implemented within a one year period. These short run operating decisions involve many special non recurring decisions such as: i) make or buy: ii)sell or process further; iii) accept or reject an order and countless other decisions

5.3 APPLICATION S OF MARGINAL COSTING

The technique of marginal costing is largely use in the managerial decision making process. The application of marginal costing I the day to day decision making process are as follows.

5.3.1 Make or Buy decision:

Very often management is confronted with the problem of deciding whether to buy a component or product from an outside source or to manufacture the same if it is economical as compared to the price quoted by a supplier. In deciding the absorption costing would mislead. If the decision is to buy from an external source the price quoted by the supplier should be less than marginal cost. If the decision is to make within the organization, the cost of production should include all additional cost such as depreciation on new plant interest on capita, etc., If this cost of production is less than the quotation price, it should be decided making the product rather than procure it from an external source.

Factors that influence make or buy decision:

In a make or buy decision the following cost and non cost factors must be considered specifically.

a) Cost factors

1. Availability of plant facility.
2. Quality and type of item which affects the production schedule
3. The space required for the production of item.
4. Any special machinery or equipment required.
5. Any transportation involved due to the location of production
6. Cost of acquiring special know how required for the item.

b) Replacing existing machinery with new machinery

Sometimes with a view to derive maximum efficiency an existing plant may have to be replaced by a new one. Again the guiding factors mentioned earlier will help in such decision making process.

Items of differential costs

- i) Capital equipment and associated costs, viz., interest, depreciation., etc.,
- ii) Loss on sale of old equipment
- iii) Increased in fixed overhead costs.

Items of differential benefits

- i) Saving in operating costs.
- ii) Increased volume and value of production
- iii) Realizable value of old machine
- iv) Tax benefits, if any.

c) Alternative use of plant or productive facility-

To take advantage of alternative use of production facility or alternative use of plant it is necessary to know the contribution margin. That alternative which yields highest contribution margin shall be selected.

d) Product Mix, Profit planning and profit maximization-

Companies manufacturing varieties of products often have to decide which product mix is more profitable. That product mix which gives maximum contribution is to be considered as best product mixes. Similarly, profit planning is often considered so as to earn reasonable profit if not maximum profit. The profit planning is affected by factors such as i) volume of output, ii) Product mix, iii)costs to be incurred, iv)Prices to be charged and so on. Marginal costing techniques guide the management in this regard.

e) Avoidable and unavoidable cost

Avoidable costs are those which can be eliminated if a particular product or department with which they are directly related, is discontinued. Unavoidable cost is that cost which will not be eliminated with the discontinuation of a product or department.

f) Relevant Cost and Irrelevant Cost

A cost that is relevant to a decision is called relevant cost. Past costs are not generally relevant costs because they are sunk costs or costs already incurred. Thus the book value of an asset or depreciation charged in accounts in respect of an asset is not relevant cost. On the other hand, the fall in the resale value of an asset as a result of using it, as also the running expenses incurred to make use of the asset are relevant costs.

g) Profitability of the department or products;

The preparation of a departmental profit and loss account under marginal costing is useful in determining which department is making profit and which department is incurring a loss. This enables the management to decide whether a particular department, must continue operation or it should be eliminated. The decision is taken by referring to the contribution made or loss incurred by the department or product.

5.3.2 Selling at or below marginal cost:

Some time it may become necessary to sell the goods at a price below the marginal cost some such situations are as follows:

- a) Where materials are of perishable nature
- b) Where large quantities of stock are accumulated and whose market prices have fallen. This will save the carrying cost of stocks.
- c) In order to popularize a new product.
- d) In order to increase sales of those products having higher margin or profits.

If the selling price is below the total cost but above the marginal cost, the contribution will leave on under recovering of fixed cost. If the selling price fixed is equal to marginal cost, there will be a loss which is equal to fixed cost. However, where the selling price is fixed is lesser than the marginal cost, the loss will be greater than fixed cost.

5.3.3 Determination of selling price and volume of output :

The determination of selling price and volume of output is based on differential costing. The difference is total cost due to difference in sales volume is known as differential costing. The increase in sales volume is known as incremental revenue. The analysis of differential cost and incremental revenue helps in determining selling price which will yield the optimum profit. So long as incremental revenue is more than the differential cost it is

advantages to increase the output. But as soon as incremental revenue equals the differential cost further increase in output is not advantages. Different cost analysis thus helps to determine the selling price and the level of activity which are expected to yield the highest profit.

5.3.4 Shut Down or Continue:

A business is sometimes confronted with the problem of suspending its business operations for a temporary period or permanently closing down. Permanent closure of the business is a very drastic decision and should be carried out only in extreme circumstances.

Temporary shut down

The following items of costs and benefits should be considered while deciding about the temporary shutdown of plant.

Items of cost

- i) Effect on fixed overhead costs.
- ii) Packing and storing of plant and equipment costs.
- iii) Setting up costs.
- IV) Loss of goodwill/market.
- v) Lay off or retrenchment compensation to workers

Check Your Progress:

- 1) Why the goods are sold at or below the Marginal Cost?
- 2) Distinguish between
 - a) Long Term Decisions and short Term Decisions.
 - b) Relevant Cost and Irrelevant cost

5.4 SOLVED PROBLEMS

Illustration: 1

A company which sells four products, some of them unprofitable proposes discontinuing the sales of one of them. The following information is available regarding its income, cost and activities for a year.

	Products			
	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
Sales	3,00,000	5,00,000	2,50,000	4,50,000
Cost of sales at purchase price	2,00,000	4,50,000	2,10,000	2,25,000
Area of storage (sq. ft.)	50,000	40,000	80,000	30,000
No. of parcels sent	1,00,000	1,50,000	75,000	1,75,000
No. of invoices sent	80,000	1,40,000	60,000	1,20,000

Its overhead cost and basis of allocation are :

Fixed costs	Rs.	Basis of allocation
Rent and insurance	30,000	Sq. ft.
Depreciation	10,000	Parcel
Salesman's salaries and expenses	60,000	Sales volume
Administrative wages and salaries	50,000	No. of invoices
Variable costs		
Packing, wages and materials		20 p. per parcel
Commissions		4 % of sales
Stationery		10 p. per invoice

You are required to:

- Prepare a profit and loss statement showing percentage profit or loss to sales for each product.
- Compare the profit in the company discontinues sales of product B with the profit if it discontinues product C.

[I.C.W.A., Inter]

Solution:

(a) Profit and Loss Statement:

Product	A	B	C	D	Total
	Rs.	Rs.	Rs.	Rs.	Rs.
Sales (A)	3,00,000	5,00,000	2,50,000	4,50,000	15,00,000
Variable costs :					
Cost of sales at Purchase Price	2,00,000	4,50,000	2,10,000	2,25,000	10,85,000
Commission @ 4% of sales	12,000	20,000	10,000	18,000	60,000
Packing, wages & materials @ 20 p. per parcel	20,000	30,000	15,000	35,000	1,10,000
Stationery @ 10 p. per invoice	8,000	14,000	6,000	12,000	40,000
Total variable costs (B)	2,40,000	5,14,000	2,41,000	2,90,000	12,85,000
Contribution (A) – (B)	60,000	(-) 14,000	9,000	1,60,000	2,15,000

Fixed Costs :					
Rent and insurance @ 15 p. per sq. ft.	7,500	6,000	12,000	4,500	30,000
Depreciation @ 2 p. per parcel	2,000	3,000	1,500	3,500	10,000
Salesmen's salaries & expenses @ 4 p. per Re. of sales	12,000	20,000	10,000	18,000	60,000
Administrative wages & Salaries @ 12.5 p. per invoice	10,000	17,500	7,500	15,000	50,000
Total Fixed Cost (Y)	31,500	46,500	31,000	41,000	1,50,000
Profit & Loss (X)-(Y)	28,500	(-) 60,500	(-) 22,000	1,19,000	65,000
Percentage of Profit or loss on sales	9.5	(-) 12.1	(-) 8.8	26.4	4.3

(b) If either product B or product C is discontinued then the result will be as follows:

Contribution	Product B if discontinued Rs.	Product C if discontinued Rs.
Product A	60,000	60,000
Product B	--	--
Product C	9,000	(-) 14,000
Product D	1,60,000	1,60,000
Total Contribution	2,29,000	2,06,000
Less : Fixed Costs	1,50,000	1,50,000
Total Profit	Rs. 79,000	Rs. 56,000

Thus, if product B is discontinued the total profit may rise to Rs. 79,000 whereas if product C is discontinued the total profit may fall to Rs. 56,000.

Illustration - 2

A company produces and sells four types of dolls for children. It also produces and sales a set of dress kit for the dolls. The company has worked out the following estimates for the next year.

Doll	Estimated demand	Standard Material cost (Rs.)	Standard Labour Cost (Rs.)	Estimated sale price per unit (Rs.)
A	50,000	20	15	60
B	40,000	25	15	80
C	35,000	32	18	100
D	30,000	50	20	120
Dress Kit	2,00,000	15	5	50

To encourage the sale of dress kits, a discount of 20 % in its price is offered if it were to be purchased along with the doll. It is expected that all the customers buying dolls will also buy the dress kit.

The company's factory has effective capacity of 2, 00,000 labour hours per annum on a single shift basis and it produces all the products on that basis the labour hour rate is Rs. 15. Overtime of labour has to be paid at double the normal rate.

Variable cost works out to 40% of direct labour cost fixed costs are Rs. 30 lakhs per annum.

There will be no inventory at the end of the year.

You are draw a conservative estimate of the year's profitability.

[C.A., Inter]

Solution :

Statement of conservative estimate of the year's profitability

	Doll A	Doll B	Doll C	Doll D	Dress Kit
Estimated Demand (Units)	50,000	40,000	35,000	30,000	2,00,000
	Rs.	Rs.	Rs.	Rs.	Rs.
Selling Price per unit (A)	60	80	100	120	50
Marginal cost per unit					
Material Cost	20	25	32	50	15
Labour Cost	15	15	18	20	5
Variable Cost (40% of labour cost)	6	6	7.20	8	2
Total marginal cost : (B)	41	46	57.20	78	22
Contribution per unit: (C) = [(A) – (B)]	19	34	57.20	78	22
Total contribution on Estimated demand	9,50,000 (50,000 x Rs. 19)	13,60,000 (40,000 x Rs. 34)	14,98,000 (35,000 x Rs. 42.80)	12,60,000 (30,000 x Rs. 42)	56,00,000 (2,00,000 x Rs. 28)

Less : Discount on dress kits	--	--	--	--	15,50,000
Net contribution	9,50,000	13,60,000	14,98,000	12,60,000	40,50,000
Total net contribution (Rs.)		91,81,000			
Less:Overtime Premium (Rs.)(38,666 hrs x Rs. 15)		5,79,990			
Less : Fixed Cost (Rs.)		30,00,000			
Profit (Rs.)		55,38,000			

* Total labour hours required to meet estimated demand of four types of dolls and their dress kit.

Doll (a)	Estimated demand (Units) (b)	Std. labour time P.U. (Std. labour cost ÷ 15) (c)	Total labour hours (d) = (b) – (c)
A	50,000	1 hr.	50,000.00
B	40,000	1 hr.	40,000.00
C	35,000	1.2 hrs	42,000.00
D	30,000	1.3333 hrs.	40,000.00
Dress kit	2,00,000	0.33333 hrs.	66,666.00
Total labour hours to meet estimated demand			2,38,666.00

Since the total available hours are only 20,000, therefore 38,666 hours will be utilized by employing the labour on overtime basis.

** Total discount on the sale of dress kit.

Out of 2, 00,000 dress kits, 1, 55,000 were sold along with four types of dolls. Each unit of sale of dress kit along with a unit of doll is entitled for a discount of 20 % of Rs. 50 i.e., Rs. 10. The total discount amount on the sale of 1,55,000 dress kit comes to Rs. 15,50,000.

Illustration :3

The following particulars are extracted from the records of ELLORA SALES LTD.

Direct wages per hour is Rs. 5.

Particulars	Product A	Product B
Sales (per unit)	Rs. 100	Rs. 120
Consumption of material	2 kgs	3 kgs
Material cost	Rs. 10	Rs. 15
Direct wage cost	Rs. 15	Rs. 10
Direct expenses	Rs. 5	Rs. 6
Machine hours used	3 hrs	2 hrs.
Overhead expenses		
Fixed	Rs. 5	Rs. 10
Variable	Rs. 15	Rs. 20

(a) Comment on the profitability of each product (both use the same raw material) when (i) Total Sales potential in units is limited; (ii) Total sales potential in value is limited; (iii) Raw material is in short supply; and (iv) Production capacity (in term of machine hours) is the limiting factor.

(b) Assuming raw material as the key factor, availability of which is 10,000 kg and maximum sales potential of each product being 3,500 units, find out the product mix which will yield the maximum profit.

[I.C.W.A., Inter]

Solution :

(a) Marginal Cost Statement

	Product	
	A	B
	Rs / Per Unit	Rs / Per Unit
Selling Price	100	120
Direct Materials	10	15
Direct Wages	15	10
Direct Expenses	5	6
Variable Overheads	15	20
Marginal Cost	45	51
Contribution margin	55	69
P/V ratio	55 %	57.5 %
Contribution per kg. of material	27.5	23
Contribution per machine hour	18.3	34.5

Comments:

- (1) When total sales potential in units is a limiting factor, B is more profitable as it is making a larger contribution margin per unit as compared to A.
- (2) When total sales potential in value is a limiting factor, still B is more profitable as its P / V ratio is more than that of A.
- (3) When raw material is in short supply, A is more profitable as its contribution per kg of material is more than that of product B.
- (4) When production capacity is limited, B is more profitable as it makes larger contribution per machine hour than A.
(Note: Best position is reached when contribution per unit of key factor is maximum)
- (b) When raw material is a key factor, A is more profitable to produce as its contribution per kg of material is higher than B. If 3,500 units of A are manufactured, total material consumption will be 7,000 kg (i.e. 35,00 x 2 kg). The balance 3,000 kg of material can be used to manufacture 1,000 units (3000 kg ÷ 3) of B. The total contribution by this product mix will be :

	Contribution
Product A, 3,500 units @ Rs. 55 each	Rs. 1, 92,500
Product B, 1,000 units @ Rs. 69 each	<u>Rs. 69,000</u>
Total	<u>Rs. 2, 61,500</u>

This sales-mix would give maximum contribution, therefore maximum profit. Profit figure cannot be calculated as total fixed cost is not given in the question.

Illustration: 4

A company produces a single product which is sold by it presently in the domestic market at Rs. 75 per unit. The present production and sales is 40,000 units per month representing 50 % of the capacity available. The cost data of the product are as under:

Variable costs per unit Rs. 50
Fixed costs per month Rs. 10 lakhs

To improve the profitability, the management has 3 proposals on hand as under :

- (a) to accept an export supply order for 30,000 units per month at a reduced price of Rs. 60 per units, incurring additional variable costs of Rs. 5 per unit towards export, packing, duties etc.

(b) to increase the domestic market sales by selling to a domestic chain stores 30,000 units at Rs. 55 per unit, retaining the existing sales at the existing price.

(c) to reduce the selling price for the increased domestic sales as advised by the sales department as under :

Produce selling price per unit by Increase in sales expected	
Rs.	(in units)
5	10,000
8	30,000
11	35,000

Prepare a table to present the results of the above proposals and give your comments and advice on the proposals.

[I.C.W.A., Intermediate]

Solution :

	Proposal (a) Present + export Level order		Proposal (b) Present + export Level order		Proposal (c) Price reduction over present levels I or II or III		
Selling price per unit (Rs.)	75	60	75	55	70	67	64
Less : Variable cost Per unit (Rs.)	50	55	50	50	50	50	50
Contribution per unit (Rs.)	25	5	25	5	20	17	14
Sales (in units)	40,000	30,000	40,000	30,000	50,000	70,000	75,000
Contribution (Rs. In lakh)	10	1.5	10	1.5	10	11.9	10.5
Total Contribution (Rs. In lakhs)	11.5		11.5		10	11.9	10.5

Note: Fixed cost has been excluded as they would remain the same under all alternatives.

Comment & Advise:

- (1) Proposal to sell 70,000 units (under proposal 'C' II) at a reduced price of Rs. 67 is most profitable, as it would give maximum contribution of Rs. 11.9 lakhs.
- (2) Between proposal (a) and (b) there is no difference in profitability. However, it is advisable to accept to accept export order as there is no danger of competition in the domestic market. It may happen that domestic chain stores may starts selling at lower price.
- (3) There is a profitability of going wrong in estimating sale demand at reduced prices; we may not be able to achieve sales of 70,000 units at reduced price of Rs. 67. Therefore, it is advisable to go for export order.

Illustration - 5

Sports Specialists Ltd. are famous for specialized manufacture of quality ches boards sets. Presently, the company is working below chess boards sets in the national market at Rs. 150 per unit. During April, 1994, 600 units were sold which is the regular sales volume for each month all through the year. The unit cost of production is :

Direct Materials	Rs. 60
Direct Labour	Rs. 30
Factory Overhead	Rs. 30
Selling and administration Overhead	Rs. 15

The company has received an export order on 20-4-1994 for supply of 600 units to be dispatched by 30-6-1994. However, the order stipulates the price per unit at Rs. 100 only. The cost analysis indicated that the cost of direct material and direct labour that are to be incurred on the export order would be same amount per unit as the regular line of production. However an amount of Rs. 2,000 will have to be incurred on special packing, labeling get up etc. No additional factory selling or administrative overhead costs would be incurred in executing the export order since the firms is operating below normal capacity.

Using differential cost analysis method, prepare the income statement to show whether the acceptance of the export order would be profitable to the company. Assumptions and comments if any may be given separately.

[I.C.W.A., Intermediate]

Solution :

	Existing Position without export order	Export order differential figures	Proposed position with export order
Units for 2 months (nos.)	1,200		
	Rs.	Rs.	Rs.
Selling price per unit	150	100	--
Sales (A)	1,80,000	60,000	2,40,000
Direct Material @ Rs. 60 p.u.	72,000	36,000	1,08,000
Direct Labour @ Rs. 30 p.u.	36,000	18,000	54,000
Factory Overheads	36,000*	--	36,000
Special packing, labeling etc.	--	2,000	2,000
Selling & Admin. Overheads @ Rs. 15 p.u. (for 2 months)	18,000	--	18,000
Total Cost (B)	1,62,000	56,000	2,18,000
Profit (A – B)	18,000	4,000	22,000

600 units p.m. x Rs. 30 x 2 months = Rs. 36,000

Assumptions & Comments :

- (1) As there is no change in factory, selling or administrative overheads costs, these overheads has been taken as fixed. Hence, they are irrelevant to the decision of accepting export order.
- (2) The company can manufacture 600 units for export order in May and June 1994 as it has a spare capacity of 800 units in two months.

Conclusion:

The export order should be accepted as it would give additional profit of Rs. 4000.

Illustration: 6

X Ltd. has two factories, one at Lucknow and another at Pune producing 7,200 tons and 10,800 tonnes of a product against the maximum production capacity of 9,000 and 11,880 tons respectively at Lucknow and Pune.

10% of the raw material introduced is lost in the production process. The maximum quantity of raw material available locally is 6,000 and 13,000 tons at Rs. 720 and Rs. 729 per tones at Lucknow and Pune respectively. For the additional needs a supplier of Bhopal is ready to supply raw material at a factory site at Rs. 792 ton.

Other variable costs of the production process are as 22.32 lakhs and Rs. 32.94 lakhs and fixed costs are Rs. 18 lakhs and Rs. 24.84 lakhs respectively for Lucknow and Pune factory.

The output is sold at a selling price of Rs. 1,450 and Rs. 1,460.

You are required to compute the cost per tone and net profit earned in respect of each factory.

Can you suggest any other alternative production plan for both the factories without any change in present total output of 1,80,000 tons whereby the company may earn optimum profit.

[C.A. Final]

Solution :

Statement of cost per tone and net profit earned in respect of each factory

	Lucknow	Pune
Present Production (tones)	7,200	
	Rs.	Rs.
Cost of raw material (Rs. In lakhs) (Refer to working note 1)	59.04	87.48
Other variable costs (Rs. In lakhs)	22.32	32.94
Fixed costs (Rs. In lakhs)	18.00	24.84
Total cost (Rs. In lakhs)	99.36	145.26
Cost per ton(Rs.):total cost/production in tones	1,380	1,345
Selling price (Rs.) per tone	1,450	1,460
Net profit per ton (Rs.) : (S.P.–cost per ton)	70	115
Total net profit (Rs. In lakhs)	Rs.(70 x 7,200 tons)	(Rs. 115 x 10,800 tons)

Total profit of the company (Rs. 5.04 lakhs + Rs. 12.42 lakhs)
= Rs. 17.46 lakhs

Computation of contribution per ton of output

	Lucknow	Pune
Maximum production capacity (tones)	9,000	11,880
Present production (tones)	7,200	10,800
Cost per ton of output :	Rs.	Rs.
Cost per ton of output manufactured from		
Locally purchased raw material (Refer to working note 2)	800	810
Cost per ton of output manufactured from		
Material purchased from Bhopal (Refer to working note 3)	880	880
Other variable cost (Rs.)	310	305
	(Rs.22.32 lakhs ÷ 7,200tons)	(Rs. 32.94 lakhs ÷ 10,800 tons)
Total variable cost (when material is purchased locally)	1,110	1,115
Total variable cost (when material is purchased from Bhopal)	1,190	1,185
Selling Price per ton (Rs.)	1,450	1,460
Contribution per ton of output : (S – V) (Locally purchased raw material)	340 (1,450 – 1,110)	345 (1,460 – 1,115)
Contribution per ton of output (S – V) (when material was purchased from Bhopal)	260 (1,450 – 1,190)	275 (1,460 – 1,185)

The priority to produce 18,000 of total output depends on contribution per ton from

	Contribution per unit	Priority
Pune factory (local purchase of raw material)	345	I
Lucknow factory (local purchase of raw material)	340	II
Pune factory (raw material purchased from Bhopal)	275	III
Lucknow factory (raw material purchased from Bhopal)	260	IV

Suggested alternative production plan to earn optimal profit

Production priority		Raw material input (in tones)	Output (in tones)		
			Lucknow	Pune	Total
I	11,700 tons	13,000	--	11,700	11,700
II	5,400 tons	6,000	5,400	--	5,400
III	(11800 – 11700) 180 tons	200		180	180
IV	720 tons (balancing figure) (18,000 – 17,280 tons)	800	720	--	720
		20,000	6,120	11,880	18,000

Working Note :

		Lucknow	Pune
1)	Present production output (formal)	7,200	10,800
	Total raw material required for Present production (tons)	8,000	12,000
		[7,200 x 100 ÷ 90]	[10,800 x 100 ÷ 90]
	Raw material procured locally (tones)	6,000	12,000
	Raw material procured from Bhopal	2,000	--
	Cost of raw material purchased Locally and from Bhopal (Rs. In lakhs)	59.04 (Rs. 720 x 6,000 + Rs. 792 x 2,000)	87.48 (12,000 x Rs. 729)
2)	Cost per ton of output Manufactured from locally	800	810
	Purchased raw material (in Rs.)	[Rs.720 x 100÷90]	[Rs.729 x 100÷90]
3)	Cost per ton of output Manufactured from material	880	880
	Purchased from Bhopal (in Rs.)	[Rs. 792 x 100÷90]	

Illustration - 7

ZED Ltd. manufacturing two products P and Q and sells them at Rs. 215 and Rs. 320 per unit respectively. The variable costs per unit are as under:

Particulars	Product P Rs.	Product Q Rs.
Raw Materials :		
Material – X	22.00	28.00
Material – Y	8.00	32.00
Direct wages (Rs. 6 per labour hour)		
Department – A	36.00	54.00
Department – B	18.00	36.00
Department – c	54.00	--
Department – D	--	72.00
Variable overheads	23.00	14.30

The company procures raw materials against import license. The company operates at single shift a day of 8 hours for 300 days in a year. The number of workmen engaged is 30, 16, 18 and 24 in department A, B, C and D respectively. Neither the workers are subject to transfer from one department to another nor is any new recruitment possible at present. Fixed costs are Rs. 12,000 per month.

You are required to find out the following :

- the product mix to yield maximum profit.
- The most profitable product if only one product is to be manufactured. Whether the answer will differ if license to import raw material is released only for Rs. 1,80,000

[C.A., Final]

Solution:

Product wise contribution per direct labour hour

	Product P Rs.	Product Q Rs.
Selling price per unit	215	320
Total Raw material cost per unit (Rs. 22 x Rs. 8) (Rs. 28 + Rs. 32)	30	60
Direct Wages per unit (Rs. 36 + Rs. 18 + Rs. 54) (Rs. 54 + Rs. 36 + Rs. 72)	108	162

Variable overheads per unit	23	14.30
Total variable cost per unit	160	236.30
Contribution per unit (Sp – Vc)	54	83.70
Direct labour hours per unit	18	27
Contribution per direct labour hour (contribution per DLH per unit)	3	3.10

Through the contribution per direct labour hour of production Q is better but there is a limitation that workers in each department can neither be interchanged nor newly recruited, hence due to this following two alternatives are possible and company will have to choose between the two.

Alternative – I : Procuring 4,800 units of product Q and utilizing the remaining available hours of labour for making units of product P as number of hour in department D are only 57,600 sufficient to produce only 4,800 units of product Q

Alternative – II : Producing 4,800 units of product P and utilizing the remaining available hours of labour for making units of product Q as number of hours in department C are only 43,200 sufficient to produce only 4,800 units of product P.

Statement of product mix under alternative I

Department	Available Hours	Hours required for 4,800 units of Q	Remaining hours	Hrs / units of product P	Units of product P
	(a)	(b)	c = (a) – (b)	(d)	(e)=(c) / (d)
A	72,000 WN 1	43,200	28,800	6 WN2	4,800
B	38,400	28,800	9,600	3	3,200
C	43,200	--	43,200	9	4,800
D	57,600	57,600	NIL	--	--

The above table shows that out of the available hours under alternative 1; 4,800 units of product Q and 3,200 units of Product P can be made. This would result in 9,600 idle hours in department A and 14,400 idle hours in Department D.

Statement of Product mix under alternative II

Department	Available Hours	Hours required for 4,800 units of P	Remaining hours	Hrs / units of product Q	Units of product P
	(a)	(b)	c = (a) – (b)	(d)	(e)=(c) / (d)
A	72,000	28,800	43,200	9 WN 2	4,800
B	38,400	14,400	24,000	6	4,000
C	43,200	43,200	--	--	--
D	57,600	--	57,600	12	4,800

The above table shows that out of the available hours under alternative II; 4,800 units of product P and 4,000 units of product Q can be made. This would result in 7,200 idle hours in department A and 9,600 idle hours in department D

Profit statement under above alternatives.

Product	First alternative			Second alternative		
	Unit	Contribution P.U. (Rs.)	Amount (Rs.)	Unit	Contribution P.U. (Rs.)	Amount (Rs.)
P	3,200	54.00	1,72,800	4,800	54.00	2,59,200
Q	4,800	83.70	4,01,760	4,000	83.70	3,34,800
Total contribution			5,74,660			
Less : fixed cost P.A.			1,44,000			
PROFIT			4,30,560			

Comments, although contribution per direct labour hour is more in case of product Q, it is not advisable to produce 4,800 units of Q first as it would result in more idle hours in some departments, viz., department A and D as compared to that of second alternative. It is, therefore, second alternative has given higher profit figure. Hence second alternative is the most profitable product mix.

Statement of most profitable product if only one product is to be manufactured.

	Product P Rs.	Product Q Rs.
Contribution per unit (Rs.) : (a)	54.00	83.70
Maximum possible output (in units) : (B)	4,800	4,800
Total contribution = (A) x (B)	2,59,200	4,01,760

Product Q is to be preferred as it would give more contribution.

Statement of most profitable product if only one product is to be manufactured and license to import the raw material is only worth Rs. 1, 80,000.

	Product P	Product Q
Raw material required P.U. (Rs.)	30	60
Permissible output (in units) out of imported material of Rs. 1,80,000	6,000	3,000
Maximum output possible in the available hours	4,800	4,800
Output possible keeping in view the availability of imported material and labour hours (units)	4,800	3,000
Contribution per unit (Rs.)	54	83.70
Contribution per rupees of material	1.80	1.395
Total contribution : (Rs.)	2,59,200 (4,800 units x Rs. 54.00)	2,51,100 (3,000 units x Rs. 83.70)

Product P is to be preferred (i.e. answer differs) because it gives higher contribution per rupee of material, which is a limiting factor.

Working notes :

1) Computation of total Labour hours available:

Departments (a)	No. or workmen (b)	Days (c)	Hrs / days (d)	Total Hours (e) = (b) x (c) x (d)
A	30	300	8	72,000
B	16	300	8	38,400
C	18	300	8	43,200
D	24	300	8	57,000

2) Computation of hours required per unit of each product

Department	First alternative			Second alternative		
	Wages (Rs.) (a)	Wages / Hr (Rs.) (b)	Hrs (c) = (a) ÷ (b)	Wages (Rs.) (d)	Wages / Hr (Rs.) (e)	Hrs (f) = (d) ÷ (e)
A	36	6	6	54	6	9
B	18	6	3	36	6	6
C	54	6	9	--	--	--
D	--	--	--	72	6	12
Total hours per unit			18			27

Illustration :8

A multi product company has the following costs and output data for the last year.

Particulars	Product		
	X	Y	Z
Sales mix	40 %	35 %	25 %
	Rs.	Rs.	Rs.
Selling price	20	25	30
Variable cost per unit	10	15	18
Total fixed cost			1,50,000
Total sales			5,00,000

The company proposes to replace product Z by product S.

Estimated cost and output data are :

Sales mix	50 %	30 %	20 %
Selling price	20	25	28
Variable cost per unit	10	15	14
Total fixed costs			1,50,000
Total sales			5,00,000

Analyze the proposed change and suggest what decision the company should take.

[I.C.W.A., Inter]

Solution :

(1) Computation of Present Profit and BEP

Particulars	Product			
	X Rs.	Y Rs.	Z Rs.	
Selling Price	20	25	30	
Variable cost	10	15	18	
Contribution	10	10	12	
P/V Ratio	50 %	40 %	40 %	
Sales Mix	40 %	35 %	25 %	100 %
Contribution per rupee of sales (P/V ratio x sales mix)	20 %	14 %	10 %	44 %
Sales			Rs.	500000
Total contribution (Rs. 5,00,000 x 44 ÷ 100)			Rs.	220000
Fixed Costs			Rs.	150000
Profit			Rs.	70000
Break-even point (Rs. 1,50,000 x 100 ÷ 44)			Rs.	340909

(2) Computation of Proposed Profit and BEP

Particulars	Product			
	X Rs.	Y Rs.	Z Rs.	
Selling Price	20	25	28	
Variable cost	10	15	14	
Contribution	10	10	14	
P/V Ratio	50 %	40 %	50 %	
Sales Mix	50 %	30 %	20 %	100 %
Contribution per rupee of sales (P/V ratio x sales mix)	25 %	12 %	10 %	47 %
Sales			Rs.	500000
Total contribution (Rs. 5,00,000 x 47 ÷ 100)			Rs.	235000
Fixed Costs			Rs.	150000
Profit			Rs.	85000
Break-even point (Rs. 1,50,000 x 100 ÷ 47)			Rs.	319149

A comparison of the present situation and the proposed situation shows that if product Z is replaced by product S, profit would increase by Rs. 15,000 and breakeven point will reduce by Rs. 21760/-. This change is beneficial and therefore product Z may be dropped, provided all other relevant factors remain constant.

Illustration : 9. (Make or Buy)

Auto Parts Ltd. has an annual production of 90,000 units for a motor component. The component's cost structure is as below :

	Rs.
Material	270 per unit
Labour (25 % fixed)	180 per unit
Expenses	
Variable	90 per unit
Fixed	135 per unit
Total	675 per unit

- (a) The purchase manager has an offer from a supplier who is willing to supply the component at Rs. 5.40. should the component be purchased and production stopped ?
- (b) Assume the resources now used for this components manufacture are to be used to product another new product for which the selling price is 485.

In the latter case the material price will be Rs. 200 per units 90,000 units of this product can be produced on the same cost basis above for labour and expenses. Discuss whether it would be advisable to divert the resources to manufacture the new products on the footing that the component presently being produced would instead of being produced, be purchased from the market.

[C.A. Inter]

Solution :

- (a) Statement showing the variable cost and purchase cost of component. Used by Auto Parts Ltd.

Variable cost	Per Unit Rs.	Total for 90,000 units Rs.
Materials	270	2,43,00,000
Labour	135	1,21,50,000
Expenses	90	81,00,000
Total Variable cost (when component is produced)	495	4,45,50,000
Cost of purchase (when component is purchased)	540	4,86,00,000
Difference, excess of purchase price over variable cost	45	40,50,000

Fixed expenses not being affected, it is evident from the above statement that if the component is purchased from the outside supplier, the company will have to spend Rs. 45 per unit more and on 90,000 units the company will have to spend Rs. 40,50,000 more. Therefore, the company should not stop the production of the component.

- (b) The following statement shows the cost implications of the proposal to divert the available facilities for a new product.

Statement showing the contribution per unit if the existing resources are used for the production of another new product.

	Rs.	Rs.
Selling price of the new product per unit		485
Less : Material cost	200	
Labour (variable)	135	
Expenses (variable)	90	425
Contribution per unit		60
Loss per unit if the present component is purchased		
Purchase price of the existing product		540
Less : Total Variable cost of producing the existing component		495
Excess cost		45

Thus, if the company diverts its resources for the production of another new product, it will benefit by Rs. 15, i.e. Rs. 60 – 45 per unit. On 90,000 units the company will save Rs. 13,50,000. Therefore, it is advisable to divert the resources to manufacture. The new product and the component presently being produced should be purchased the market. This is also brought out by the following figures :

	Rs.
Total cost producing the component (90,000 x 675) (A)	6,07,50,000
Cost of purchasing the component (90,000 x 540)	4,86,00,000
Fixed Expenses, not having been saved (90,000 x 180 i.e. 675 – 495)	1,62,00,000
	6,48,00,000
Less : Contribution from the new product (90,000 x 60)	54,00,000
Total cost if component is purchased and new product is made (B)	5,94,00,000
Savings (A – B)	13,50,000

Illustration : 10. (Export proposals)

Vinayak Ltd. opening at 75 % level of activity produces and sells two products A and B. the cost sheets of the two products are as under :

	Product A	Product B
Units produced and sold	600	400
Direct Materials	Rs. 2.00	Rs. 4.00
Direct Labour	4.00	4.00
Factory overheads (40 % fixed)	5.00	3.00
Selling and administration overheads (60% fixed)	8.00	5.00
Total cost per unit	19.00	16.00
Selling price per unit	23.00	19.00

Factory overheads are absorbed on the basis of machine hour which is limiting (key) factory. The machine hour rate is Rs. 2 per hour.

The company receives an offer from Canada for the purchase of product A at a price of Rs. 17.50 per unit.

Alternatively, the company has another offer from the Middle East for the purchase of product B at a price of Rs. 15.50 per unit.

On both the cases, a special packing charge of 50 p. per unit has to be borne by the company.

The company can accept either of the two export order and in either case the company can supply such quantities as may be possible to be produced by utilizing the balance of 25% of its capacity.

You are required to prepare:

- (a) A statement showing the economics of the two export proposals giving your recommendations as to which proposal should be accepted.
- (b) A statement showing the overall profitability of the company offer incorporating the export proposal recommended by you.

[C. A. Inter]

Solution:

- (i) Economics of the two Export Proposals

	Order from Canada for Product A Rs.	Order from Middle East for Product B Rs.
Marginal Cost per unit		
Materials	2.00	4.00
Labour	4.00	4.00
Variable factory overheads	3.00	
Variable selling and admin.	3.20	2.00
Overheads		
Special Packing charges	0.50	0.50
Total variable cost	12.70	12.30
Export price per unit	17.50	15.50
Contribution per unit	4.80	3.20

Since machine hour is the limiting (Key) factor, the contribution should be linked with the machine hours. This has been worked out as follows:

Machine hour per unit	2.5 hour	1.5 hour
Contribution per machine hour	Rs. 1.92	Rs. 2.13

Product B yield a better contribution per machine hour. The order from the Middle East should therefore be accepted as compared to the Canadian offer.

Working Note	A	B	Total
Factory overheads per unit	Rs. 5	Rs. 3	
Machine hour rate per hour	Rs. 2	Rs. 2	
Machine hour per unit	2.5	1.5	
Units produced	600	400	
Machine hour utilized	1,500	600	2,100
Lever of activity		75 %	

Maximum hours at 100% activity; $2100 \div 75 \times 100 = 2,8000$ hours

Capacity hours available for export $2,800 - 2100 = 700$ hours

(ii) Statement of overall profitability

Units	Product A 600 Rs.	Product B 867 Rs.	Total Rs.
Materials	1,200	3,468	4,668
Labour	2,400	3,468	5,868
Factory Overheads :			
Variable	1,800	1,561	3,361
Fixed	1,200	480	1,680
Selling and admin. Overheads :			
Variable	1,920	1,734	3,654
Fixed	2,880	1,200	4,080
Special Packing			
Total Costs	11,400	12,145	22,545
Sales	13,800	14,839	28,639
Profit	2,400	2,694	5,094

Working notes:

1) Number of Units of B :

Sales in the home market	400
Export market $700 / \text{hr} / 1.5$	<u>467</u>
Total	<u>867</u>

2) Sales value of B :

400 units in the home market @ Rs. 19/-	Rs. 7,600
467 units for export @ Rs. 15.50	<u>Rs. 7,239</u>
Total	<u>Rs. 14,839</u>

Illustration:11. (Decision about mechanization)

The present output details of a manufacturing department are as follows :

Average output per week 48,000 units from 160 employees
 Saleable value of output Rs. 6,00,000

Contribution made by output towards fixed expenses and profit Rs.
 2,40,000

The board of directors plans to introduce more mechanization into the department at capital cost of Rs. 1,60,000. The effect of this will be to reduce the number of employees to 120, and increasing the output per individual employee by 60 %. To provide the necessary incentive to achieve the increased output, the Board intends to offer a 1 % increase on the price work rate of Re. 1 per unit for every 2 % increase in average individual output achieved.

[C.A. Inter]

Solution :

Working Notes :

1) Present average output employee and total future expected output per week

Present average output per employee per week

$$\begin{aligned}
 &= \frac{\text{Total Present Output}}{\text{Total Number of Present employees}} \\
 &= \frac{48,000}{160 \text{ employees}} \\
 &= 300 \text{ units}
 \end{aligned}$$

Total future expected output per week

$$\begin{aligned}
 &= \text{Total Number of future employees} \\
 &\quad [\text{present output} + 60 \% \text{ of present output per employee}] \\
 &= 120 \text{ employees } (300 \text{ units} + 60 \% \times 300 \text{ units}) \\
 &= 57,60 \text{ units}
 \end{aligned}$$

2) Present and proposed price work rate:

Present price work rate = Re. 1.00 per unit

$$\begin{aligned}
 \text{Proposed price work rate} &= \text{Present Price work Rate} + 30 \% \times \\
 &\quad \text{Re. 1} \\
 &= \text{Re. 1.00} + 0.30 \\
 &= \text{Re. 1.30 per unit}
 \end{aligned}$$

present sale price per unit.

- 3) Present and proposal sales price per unit present sale price per unit.

$$\begin{aligned} \text{Present Sale price per unit} &= \text{Rs. 12.50} \\ (\text{Rs. 60,000} \div 48,000 \text{ units}) \end{aligned}$$

$$\begin{aligned} \text{Proposed sale price per unit} &= \text{Rs. 12.00} \\ (\text{Rs. 12.50} - 4\% \times \text{Rs. 12.50}) \end{aligned}$$

- 4) Present marginal cost (excluding wages per unit) :

$$\frac{\text{Present sales value} - \text{fixed expenses \& profit} - \text{contribution towards present wages}}{\text{Present output (units)}}$$

$$= \frac{\text{Rs. 6,00,000} - \text{Rs. 2,40,000} - \text{Rs. 48,000}}$$

$$= \text{Rs. 6.50 per unit}$$

48,000 units

Statement of extra weekly contribution (information resulting from the proposed change of mechanization meant for board's evaluation)

Expected sales units (refer to working note 1)		57,600
	Rs.	Rs.
Sales value (A) (57,600 units x Rs. 12) (refer to working note 3)		6,91,200
Marginal cost (excluding wages) (B) (57,600 units x Rs. 6.50) (refer to working note 4)	3,74,400	
Wages : (C) (57,600 units x Rs. 1.30) (refer to working note 2)	74,800	
Total marginal cost : (D) = [(B) + (C)]		4,49,280
Marginal Contribution [(A) – (D)]		2,41,920
Less : Present Contribution		2,40,000
Increase in Contribution (per week)		1,920

Evaluation: Since the mechanization has resulted in the increase of contribution to the extent of Rs. 1,920 per week, therefore the proposed change should be accepted.

Illustration: 12. (Limited factor decision)

A company producing products 'PIE' n 'SIGMA' using a single production process, has the following cost data

	PIE	SIGMA
Selling price per unit (Rs.)	20	30
Variable cost per unit (Rs.)	11	16
Machine hours required per unit production (hrs)	1	2
Market limitation (units)	1lakh	2.5lakh
Total machine hours available – 4 lakhs		
Fixed cost per annum – Rs. 26 lakhs		

Considering the limiting factors of machine hours and market limitations, you are required to

- Indicate the best combination of products to give optimum contribution,
- Show the additional machinery requirement to be augmented on rental basis at an annual rent of Rs. 1.5 lakhs per machine to provide additional capacity of 30,000 hours per machine;
- Change in number to be if the annual rental charges reduce to Rs. 1,25,000 per machine

[I.C.W.A., Inter]

Solution :

Particulars	Products		Total
	PIE	SIGMA	
Total Machine hours available			4 lakhs
Market Limitation (units)	1 lakh	2.5lakhs	
Machine hours required per unit of production	1	2	
Fixed cost per annum (Rs. In lakhs)			4.00
Selling price per unit (Rs.)	20	30	
Variable cost per unit (Rs.)	11	16	
Contribution per unit (Rs.)	9	14	
Contribution per machine hour (Rs.)	9	7	
Ranking	1	2	

(a) Statement showing best combination of Product Mix towards optimum contribution

Production for market demand (units)	1,00,000	1,50,000	2,50,000
Total Hours required	1,00,000	3,00,000	4,00,000
Total Contribution (Rs.) (Total Production x contribution per unit)	9,00,000	21,00,000	30,00,000

(b) Computation of Requirement of Additional Machines on Rental Basis

Particulars	
Annual rent per machine having capacity of 30,000 hrs.	Rs. 1,50,000
No. of additional units of SIGMA to be produced to meet the market demand (additional)	1,00,000 units
Requirement of machine hours for production (1,00,000 x 2)	2,00,000 hrs.
Number of Machines required (2,00,000 ÷ 30,000) = 6.67 (i.e. 6 + 1)	7 machines
(1) In case 6 machines are hired; Total net contribution from 6 rented machines with full capacity utilization (Rs.) 3,60,000	
(2) In case 7 machines are hired :	
(i) Net contribution from 6 machines on full utilization. = (30,000 hrs. x Rs. 7 – Rent Rs. 1,50,000) x 6 = 2,10,000 – 1,50,000 = 60,000 x 6 =	3,60,000
(ii) Net contribution from 7th Machine = 20,000 hrs. x Rs. 7 – Rs. 1,50,000 = (10,000)	3,50,000

Thus, the net contribution will stand reduced by Rs. 10,000 in case seven machines are hired. It is, therefore, better to hire only six machines.

(C) In case the annual rental charges are reduced to Rs. 1,25,000, the position will be as under;

$$\begin{aligned} \text{Net contribution from 7th Machine} &= 20,000 \text{ hrs.} \times \text{Rs. } 7 - \text{Rs. } 1,25,000 \\ &= \text{Rs. } 15,000 \end{aligned}$$

Thus, the seventh machine will also give additional contribution of Rs. 15,000.

Hence, in all seven machines may be taken on rent.

5.5 EXERCISE

5.5.1 Objective Questions

Answer in Brief

1. Comment –Pricing decisions may be based on Percentage of profit on total cost
2. Comment –Pricing decisions may be based on percentage of profit on selling price.
3. Enumerate any two limitations of Marginal Costing
4. Comment –major limitation of Marginal Costing s that it is difficult to separate fixed and variable costs.
5. Comment-Marginal Costing is not applicable to Contract Costing.
6. Comment profit volume ratio ignores price changes.
7. Define-opportunity Cost.
8. Define-Replacement Cost
9. Define-Normal Cost
10. Define –Differential Cost
11. Define Avoidable cost
12. Define-Unavoidable Cost
13. Define-differential Costing
- 14 Define Differential Cost Analysis.
- 15 Define Differential Costing

Select the correct answer in each of the following:

1. Measurable value of an alternative use of resources is

a) Sunk Cost	c) Opportunity cost
b) Imputed cost	d) Differential cost

2. The decision maker should consider, in case of limiting factor to maximize the Profit

a) Sales	b) Contribution
c) Variable cost	d) Fixed cost

3. In make or buy decision
 - a) Only marginal cost is relevant
 - b) Only fixed cost is relevant
 - c) Total cost is relevant
 - d) None of these

4. Ideal product mix is decided in terms of

a) Sales	b) Variable cost
c) Total cost	d) Marginal cost

5. A cost incurred in the past and hence irrelevant for current decisions making is

a) Fixed cost	b) Direct cost
c) Discretionary cost	d) Sunk cost

6. A cost that cannot be changed by any decision made now is

a) Sunk cost	b) Opportunity cost
c) Indirect cost	d) mixed cost

7. A shut down point is the point at which
 - a) Marginal cost and purchase price should be considered
 - b) Contribution is less than fixed cost
 - c) Contribution is equal to fixed cost
 - d) None of these

8. In a decision situation which one is the cost not likely to contain a variable cost component

a) Material	b) Labour
c) Overhead	d) Direct expenses

9. In a situation when the decision is to be taken about acceptance or rejection of special orders where there is a sufficient idle capacity which one is not relevant for decision making'

a) Absorption cost	b) Variable cost
c) Differential cost	d) Incremental cost

5.5.2 Theory Questions

1. What do you mean by limiting factor? How does the management elect the most profitable mix the presence of a limiting factor?

2. The effect of price reduction is always to reduce p/v ratio, to raise the BEP and to shorten the margin of safety. Explain and illustrate your views with appropriate illustrations.

3. How does marginal cost differ from total cost? In what circumstances, if any, may it be to the advantage of manufacturer to sell some of its products at price :
 - a) below total cost
 - b) below marginal cost.

4. What is “cost and profit”? Bring out its importance.
5. “Profit-Volume analysis” is a technique of analyzing the costs and profits at various levels of volume’. Explain how such analysis helps management.

5.5.3 Practical problems

Illustration 1:

From the following data you are required to present.

- 1) The marginal cost of product x and y and the contribution per unit.
- 2) The total contribution and profits resulting from each of the suggested sales mixtures.

Particulars	Product	Per unit Rs.
Direct Materials 	X	10.50
Direct Materials 	Y	8.50
Direct Wages 	X	3.00
Direct Wages 	Y	2.00

Variable expenses 100% of direct wages per product.

Fixed expenses (total) 800

Sales Price X 20.50 and
 Y 14.50

Suggested sales mixes:

Alternatives	No of Units	
	X	Y
A 	100	200
B 	150	150
C 	200	100

(M.Com. Oct. 97, adapted)

(Ans.: Contribution per Unit: Product X- Rs. 4, Product Y- Rs. 2)

Illustration 2 :

A manufacturer of packing cases makes three main types-Deluxe, Luxury and Economy. Overheads are incurred on the basis of labour hours. Wages are paid at Re. 1.00 per hour.

Estimates for the cases show the following :

Particulars	Delux Rs.	Luxury Rs.	Economy Rs.
Materials	10.00	8.00	3.00
Wages	6.00	3.00	2.00
Overheads	12.00	6.00	4.00
	28.00	17.00	9.00
Net Profit / Loss	2.00	3.00	3.00
Average Selling Price	26.00	20.00	12.00
Annual Sales (Units)	10,000	20,000	5,000

The manufacturer felt that he would be well advised to discontinue producing the Delux and Economy cases even though it would mean that some of production facilities would remain unused. He cannot increase the sale of Luxury cases. It has been ascertained that 60% of the overheads is fixed.

You are required to advise the manufacturer.

(M. Com., Mar. 98, adapted)

(Ans.: Contribution per Unit: Deluxe- Rs. 5.20, Luxury- Rs. 6.60, Economy- Rs. 5.40)

Illustration 3 :

Suyash Ltd. is considering launching a new monthly magazine at a selling price of 10 per copy. Sales of the magazine are expected to be 5,00,000 copies per month but it is possible that the actual sales could differ quite significantly from this estimate.

Two different methods of producing the magazines are being considered and neither would involve any additional capital expenditure. The estimated production cost for each of the two methods or manufacture, together with the additional marketing and distribution costs of selling the new magazine, are given below :

Particulars	Method A	Method B
Variable costs	5.50 per copy	5.00 per copy
Specific Fixed Costs	8,00,000 per month	12,00,000 per month
Semi-variable costs :		
for 3,50,000 copies	5,50,000 p.m.	4,75,000 p.m.
for 4,50,000 copies	6,50,000 p.m.	5,25,000 p.m.

It may be assumed that the fixed cost element of the semi-variable cost will remain constant throughout the range of activity shown. The company sells a magazine covering related topics to those that will be included in the new publication, and consequently, it is anticipated that sales of this existing magazine will be adversely affected. It is estimated that for every ten copies sold of the new publication, sales of the existing magazine are as shown below : -

Sales	2,20,000 copies per month
Selling Price	Rs. 8.50 per copy
Variable Costs	Rs. 3.50 per copy
Specific Fixed costs	Rs. 8,00,000 per month

You are required to calculate for each production method :

- The net increase in company profit which will result from the introduction of the new magazine, at each of the following levels of activity :
5,00,000 4,00,000 6,00,000 copies per month.
- The amount by which sales volume of the new magazine could decline from the anticipated 5,00,000 copies p.m., before the company makes no additional profit from the introduction of the new publication.

And also briefly identify any conclusions which may be drawn from your calculations.

(M.Com., Oct. 01, adapted)

Illustration 4 :

From the following data, which product would you recommend to be manufactured in a factory, time being the key factor :

Per unit of Product	A	B
Direct Material	24	14
Direct Labour (Re. 1 per hr)	2	13
Variable Overhead (2 per hr)	4	6
Selling Price	100	110
Standard time to produce	2 hrs	3 hrs

(M.Com. Mar. 04, adapted)

(Ans.: Contribution per Standard Hour: Product A- Rs. 35, Product B- Rs. 25.67)

Illustration 5 :

From the following information you are required to :

- a) Calculate and present the marginal product cost and contribution per unit.
- b) State which of the alternative sales mixes you would recommend to management? and Why?

Particulars	Per Unit Rs.
Selling Price :	
For X	250
For Y	200
Direct Materials :	
For X	80
For Y	60
Direct Wages :	
For X	60
For Y	40

Fixed overheads are Rs. 75,000 and variable overheads are 150% of direct wages.

Alternative Sales Mix

- 1) 2500 units of product X and 2500 units of product Y.
- 2) Nil units of product X and 4000 units of Product Y.
- 3) 4000 units of Product X and 1000 units of Product Y.

(M.Com. Mar 96, adapted)

(Ans.: Contribution per Unit: Product X- Rs. 20, Product Y- Rs. 40)

Illustration 6 :

A pen manufacturer makes an average net profit of Rs. 25.00 per pen on a selling price of Rs. 143.00 by producing and selling 60,000 pens, or 60% of the potential capacity. His cost of sales is :

	Rs.
Direct Materials	35.00
Direct Wages	12.50
Works Overheads (50% Fixed)	62.50
Sales Overheads (25% Variable)	8.00

During the current year he intends to produce the same number of pens but anticipates that his fixed charges will go up by 10% while rates of direct labour and direct material will increase by 8% and 6% respectively. But he has no option of increasing the selling price. Under this situation, he obtains an offer for a further 20% of his capacity. What minimum price will you recommend for acceptance to ensure the manufacturer an overall profit of Rs. 16,73,000.

(M.Com. Mar. 2000, adapted)

(Ans.: Selling Price per Unit of 80% capacity: Rs.135.49)

Illustration 7 :

The price structure of an electric Fan made by the Vijaya Electric Company Ltd. is as follows :

Particulars	Per Fan Rs.
Materials	600
Labour	200
Variable Overheads	<u>200</u>
	1,000
Fixed Overhead	500
Profit	<u>500</u>
Selling Price	2,000

This cost is based on manufacture of 1,00,000 fans p.a. The company expects that due to competition, they will have to reduce the selling price. However, they want to keep the total profit intact.

You are required to prepare a statement showing the position, if

- 1) Selling price is reduced by 10% and
- 2) Selling price is reduced by 20%.

(M.Com. Oct. 2000, adapted)

(Ans.: P/V Ratio: Option I-44.44%, Option II-37.5%)

Illustration 7 :

Modern Chair Manufacturing Company received an offer to sell 25,000 outdoor patio chairs to Easy Life Corporation. Modern Chair Manufacturing Company produces 4,00,000 chairs annually by operating at 80% of full capacity. Regular selling price for this type of chairs is 33. The chairs required are similar to those currently being produced by Modern Chair Manufacturing Company.

Budgeted annual production costs and other expenses are as follows :

Particulars	Per Unit	Total
Raw material	4.25	17,00,000
Direct Labour	5.75	23,00,000
Variable factory overhead	7.75	31,00,000
Fixed factory overhead	--	25,00,000
Variable Selling Costs	--	5% of sales price
Fixed Selling and Administration overhead	--	14,50,000

The company wants to earn a minimum profit of Rupee one per chair and no selling expenses will be incurred for special order transaction. Assume that normal operations will not be affected by the special order and that regular sales volume for the year is 4, 00,000 chairs as initially planned. You are required:

- a) What should be the minimum price to be quoted by Modern Chair Manufacturing Company?
- b) Prepare an income statement showing the position of the company without special order, for special order and with special order.

(M.Com. Oct. 2004, adapted)

(Ans.: Minimum Price to be quoted Rs. 18.75)

Illustration 8 :

A manufacturer has planned his level of operation at 50% of his plant capacity of 30,000 units. His expenses are estimated as follows, if 50% of the plant capacity is utilized.

i) Direct Materials	Rs. 8,280
ii) Direct Materials	Rs. 11,160
iii) Variable and Other Manufacturing Expenses	Rs. 3,960
iv) Total Fixed Expenses irrespective of Capacity utilization	Rs. 6,000

The expected selling price in the domestic market is Rs. 2 per unit. Recently the manufacturer has received a trade enquiry from an Overseas Organisation interested in purchasing 6,000 units at a price of Rs. 1.45 per unit.

As a Professional Management Accountant, what should be your suggestion regarding acceptance or rejection of the offer?

Support your suggestion with suitable quantitative information.

(M.Com. Oct. 2006, adapted)

(Ans.: Total Contribution: Present position Rs. 6,600, Proposed Offer Rs. minus 600)

Illustration 9:

X Ltd. manufactured and sold 14,000 units and 18,000 units in the first year and the second year respectively. The selling price per unit was Rs. 100 in both the years. In the first year it suffered a loss of 20,000 and in the second year earned profit of Rs. 20,000. calculate the following :

- The amount of fixed cost
- The BEP in units and in Sales Value
- Profit when 26,000 units are sold
- The number of units to be sold to earn post-tax profit of ` 30,000. Tax rate is 40%.

X Ltd. estimates that its sales will be ` Nil in the next year. The competitor has made an offer that it would buy the products of X Ltd. at present selling price less 10% with a condition that X Ltd. should purchase competitor's product equal to double of the units purchased by the competitor from X Ltd. The competitor's product

selling price is Rs. 90 and fetches contribution of Rs. 25 per unit. If the competitor's offer is accepted, calculate:

- BEP in units purchased and sold by X Ltd.
- No. of units to be purchased and sold to earn profit of Rs. 40,000

(M.Com. Mar 2007, adapted)

(Ans.: Contribution per Unit: Rs. 10, Fixed Cost Rs. 1, 60,000)

Illustration 10 :

Following relevant data of a firm is given :

	Activity Levels (tons)			
	50,000 tons	60,000 tons	70,000 tons	80,000 tons
Variable Cost (` in thousands)	5,000	6,000	7,000	8,000
Semi-Variable cost (` in thousands)	1,500	1,600	1,650	1,700
Fixed Cost (` in thousands)	2,500	2,500	3,000	3,000
Total Cost (` in thousands)	9,000	10,100	11,650	12,700

The fixed costs follow step-graph pattern as is clear from the above and the semi-variable costs change at uniform rate between the above given activity levels. Given that the firm operates 55,000 tons level at present –

- Calculate the additional / incremental costs if it manufactures additional (a) 10,000 tons (b) 15,000 tons.
- Advise whether the firm should accept 'any one' of the following additional (special) export market offers and if Yes, 'which one' should it accept :
 - for 10,000 tons at a selling price of Rs. 125/- per ton.
 - for 15,000 tons at a selling price of Rs. 150/- per ton.

(M.Com. Apr. 2009, adapted)

(Ans.: Additional Incremental Cost in thousands - 10,000 Tons Rs. 1,075, 15,000 Tons Rs. 2,100)



STANDARD COSTING

Unit structure

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Standard Costing
- 6.3 Standard Cost
- 6.4 Benefits of Standard Costing
- 6.5 Fixation of Standards
- 6.6 Analysis of Variances
- 6.7 Material Cost Variances
- 6.8 Labour Cost Variances
- 6.9 Overhead Cost Variances
- 6.10 Sales Variances
- 6.11 Limitations of Standard Costing
- 6.12 Exercises.

6.0 OBJECTIVES

After Studying this unit, you would be able to:

- Understand the terms Standard Cost and Standard Costing
- Understand the process of setting the standards for various elements of costs.
- Understand how standard costing operates.
- Explain the benefits of standard costing
- Calculate the material, labour, overhead and Sales Variances
- Understand the use of standard costing for cost reduction

6.1 INTRODUCTION

Managers are constantly comparing their product cost with the budgets. The reasons for deviations are constantly analyzed and responsibilities are promptly fixed. Thus, “What a product should have Coasted” is a question of great concern to the management for improvement of cost performance. Standard

costing is a managerial device to determine efficiency and effectiveness of cost performance. Standard costing explains the difference between actual profit and profit as per standard relating to the operating period. It also helps to explain the variances according to their causes and responsibilities.

6.2 STANDARD COSTING

Standard costing is a control technique which compares standard costs and revenues with actual result to obtain variances which are used to stimulate improved performance. Use of standard costing is not confined to industries having repetitive processes and homogeneous product only. This technique has established the advantages of its use in industries having non repetitive processes like manufacture of automobile, turbines, boilers and heavy electrical equipment.

6.3 STANDARD COST

Standard Cost is a scientifically pre-determined cost, which is arrived at assuming a particular level of efficiency in utilization of material labour and indirect services. CIMA defines standard cost as “a Standard expressed in money. It is built up from an assessment of the value of cost elements. Its main uses are providing bases for performance measurement, Control by exception reporting, valuing stock and establishing selling prices”. reveals a very useful information for cost control.

Standard cost is like a model which provides basis of comparison for actual cost.

This comparison of actual cost with standard cost control.

6.4 BENEFITS OF STANDARD COSTING

The benefits of standard costing are as follows:

1. Use of standard costing leads to optimum utilization of men, materials and resources.
2. Its use provides a yardstick for comparison of actual cost performance.
3. Only distinct deviations are reported to management. Thus, it helps application of the principle of “management by exception”
4. It is very useful to management in discharging functions, like planning control, decision – making and price fixation.

5. It creates an atmosphere of cost consciousness.
6. It motivates workers to strive for accomplishment of defined targets. It precipitates an attitude that is conducive to efficiency.
7. It highlights areas, where probe promise improvement.
8. Its introduction leads to simplification of procedures and standardization of products.
9. Its introduction enables the management to reduce time required for preparation of reports for pricing, control or quotation purposes.
10. Its use enables to find out the cost of finished goods immediately after completion.
11. If standard costing is used, stock ledgers can be kept in terms of quantities only. This eliminates much clerical effort in pricing, balancing and posting on stores ledgers cards.
12. Its use may encourage action for cost reduction.

6.5 SETTING OF STANDARDS

Determination of standards for various elements of cost is an exercise that requires skill, imagination and experience. For setting standards, routines and process of working conditions are thoroughly studied and motion studies are conducted and different tests are carried out to ensure that standards are realistic and conform to management's view of efficient operations and relevant expenditure. The job of setting the standards is done by a group, which is represented by Engineering Department, production Department, Purchase Department, personnel Department and Cost Accounts Department. Setting of standards can be divided in two categories:

- (i) Determination of quantity standards; and
- (ii) Determination of price standards.

Quantity standards are pre-determined expressing in physical terms the relationship between a unit produced and resources consumed. Price standards are pre-determined measures expressing in money terms the cost per unit of resources consumed. Quantity standards are developed by representatives of Engineering Department in liaison with representatives of purchase Department. Wage rate standards are developed by personnel Department. Accounts department works in advisory capacity supplying the information based on historical costing.

6.6 ANALYSIS OF VARIANCES

The comparison of actual performance with standard performance reveals the variance. A variance represents a deviation of the actual result from the standard result. There can be cost variance, profit variances, sales value and operational and planning variances. Whether a variance is favorable or unfavorable is ultimately determined with reference to its impact on profit. For example a variance will be adverse, if the actual cost exceeds the standard cost or vice versa. Profit variance will be favorable if actual profit exceeds standard profit or vice versa. Variance analysis is an exercise, which involves efforts to isolate the causes of variance in order to report to management those situations which can be corrected and control by timely action. The extent to which the causes are established, depends upon the amount of time effort and money, that a company is willing to spend in accumulating data as that variance occur. In variance analysis a point is reached where incremental information is not worth its incremental cost. This point indicates the limit of variance analysis and it is determined by judgment in the light of individual circumstances. Variance analysis must be devised to suit the conditions prevailing within a particular enterprise. Analysis of variances must be followed by intelligent and factual interpretation. Computation, classification and reporting of variances is a vital feature of standard costing.

6.7 MATERIAL COST VARIANCE

It represents the different between actual cost of material used and standard cost of material specified for output achieved. Material cost variance arises due to variation in prices and usage of materials. The following formula is used to find out material cost variance:

Material cost variance = Standard cost of Material used – Actual cost of material

Materials cost variances are as follows: -

a) Material Price Variance: It is that part of material cost variance which due to the different between the actual price paid and standard price specific for the material. It is determined as follows:

Material price variance = Actual quantity (Standard price – Actual price)

b) Material usage variance: It is that part of material cost variance which due to different between the actual quantity used

and standard quantity specific for output. This indicated whether or not material was properly unitized, It is determined as follows

Material usage variance = standard price (standard quantity – actual quantity)

c) Material Mix variance: It is that part of material usage variance which is due to different between the actual composition of mix and standard composition mixing the different types of material. It is determined as follows:

Material mix variance = standard price (revised standard quantity– actual quantity)

d) Material yield variance: It is that portion of material usage variance which is due to different between the actual yield optance and standard yield specific. It determined as follows:

Material yield variance = standard price (actual output – standard output)

Illustration 1

Yes Ltd manufacture a single product the standard cost of which is as follows :

Material A 60% @ Rs20/ per Kg.

Material B 40% @ Rs10/ per Kg.

Normal lost is 20% of input . Due to shortage of material A the standard mix was changed. Actual result for January 2011 were as follows :

Material A – 105 Kg. @ Rs20/ per kG

Material B – 95 Kg @ Rs9/ per Kg.

Input 200 kg

Loss 35 Kg

Output 165 Kg

Calculate A Material cost variance B Material price variance C Material usage variance D material mix variance E material yield variance .

Solution A Material Cost Variance is = Standard cost of Material used – Actual cost of material

Rs 3300 –Rs2955 = Rs345F

Actual cost of material used

A -105kg @ Rs20 = Rs2100

B – 95 kg @ Rs9 = Rs 855

Total = Rs2955

6.8 LABOUR COST VARIANCE:

Labour cost variance is different between the actual wages paid and standard wages specific wages for the production. It is calculated as follows:

$$\text{Labour cost variance} = \text{Standard labour cost} - \text{Actual labour cost}$$

$$\text{STD Hours X STD Rate} - \text{Actual Hours X Actual rate.}$$

Following are the labour cost variance.

A) Labour rate variance: It is that portion of labour cost variance which due to the different between the actual labour rate and standard labour rate specific. It determined has follows :

$$\text{Labour rate variance} = \text{Actual hours (standard rate - Actual rate)}$$

B) Labour efficiency variance: It is that part of labour cost variance which due to the different between the actual hours paid and standard hours allowed for output achieved. It determined as follows :

$$\text{Labour efficiency variance} = \text{standard rate (standard hours - actual hours)}$$

C) Labour mix variance: Production may be completed if labour is mixed according standard proportion. Standard mix may not be adhered to under sum circumstances and substitute will have to made . It is determined as follows: -

$$\text{Labour mix variance} = \text{standard rate (actual labour mix - revised standard labour mix)}$$

D) Labour yield variance: It is that part of labour efficiency variance which is due to different between actual output and standard output of workers specific . It is determined as follows:-

$$\text{Labour yield variance} = \text{average standard labour hours rate (actual production - standard production on actual hour)}$$

Illustration 2

Standard labour hours and rate for production of one unit of article A is given below:

Particulars	Per unit Hours	Rate per Hours	Total Rs
Skilled workers	5	1.50	7.50
Unskilled workers	8	.50	4.00
Semi – skilled workers	4	.75	3
		Total	14.50

Actual Data

Articles Produces 1000 units

Particulars	Hours	Rate per Hours	Total Rs
Skilled workers	4500	2	9000
Unskilled workers	10000	.45	4500
Semi – skilled workers	4200	0.75	3150
		Total	16650

Calculated

- 1 Labour cost variance
2. Labour rate variance
3. Labour efficiency variance
4. labour mix variance
5. labour yield variance

Solution:

1. Labour cost variance = Standard labour cost – Actual labour cost

Skilled = STD Hours X STD Rate – Actual Hours X Actual rate.

$$5000 \times 1.5 - 4500 \times 2 = 7500 - 9000 = \text{Rs } 1500 \text{ A}$$

Unskilled = $8000 \times 0.5 - 10000 \times 0.45 = 4000 - 4500 = \text{Rs } 500 \text{ A}$

Semi Skilled = $4000 \times 0.75 - 4200 \times 0.75 = 3000 - 3150 = \text{Rs } 150 \text{ A}$

$$1500 + 500 + 150 = \text{Rs } 2150 \text{ A}$$

2. Labour rate variance = Actual hours (standard rate – Actual rate)

Skilled = $4500 (1.50 - 2) = 2250 \text{ A}$

Unskilled = $10000(0.50 - 0.45) = 500 \text{ F}$

Semi skilled = $4200(0.75 - 0.75) = 0$

$$2250\text{A} + 500 \text{ F} = 1750 \text{ A}$$

3. Labour efficiency variance = standard rate (standard hours – actual hours)

Skilled = $1.5 (5000 - 4500) = \text{Rs } 750 \text{ F}$

Unskilled = $0.5 (8000 - 10000) = \text{Rs } 1000 \text{ A}$

Semi Skilled = $0.75(4000 - 4200) = \text{Rs } 150 \text{ A}$

Total 400 A

4. Labour mix variance = standard rate (actual labour mix – revised standard labour mix)

Skilled = $1.5 (5500 - 4500) = \text{Rs } 1500 \text{ F}$

Unskilled = $0.5 (8800 - 10000) = \text{Rs } 600 \text{ A}$

Semi skilled = $0.75 (4400 - 4200) = \text{Rs } 150 \text{ F}$

Total = $\text{Rs } 1050 \text{ F}$

5. Labour yield variance = average standard labour hour rate
(actual production – standard production on actual hours)

$$14.50 (1000-1100) = \text{Rs}1450 \text{ A}$$

Note: Standard production of actual hours = $18700 / 17000 \times 1000$
= 1100 units

$$\text{Average std rate} = \text{Rs}7.5 + 4 + 3 = \text{Rs}.14.50$$

6.9 OVERHEAD COST VARIANCE

It is different between standard overhead cost and actual overhead cost of producing goods . There are two types of overhead variance:

- A) Variable Overhead Variance
- B) Fixed Overhead Variance

A) Variable Overhead Variance : It is different between standard variable overhead cost and actual variable overhead cost. It determined as follows:

Variable overhead cost variance = Standard variable overhead cost – actual variable overhead cost.

Variable overhead cost is again dividend into two parts

1 Variable overhead expenditure variance: It is that portion of variable overhead variance which arrives due to difference between actual overhead and standard variable overhead appropriate to the level activity. It determined as follows:

Variable Overhead Expenditure variance = standard variable overhead at actual level – actual variable overhead

2. Variable overhead efficiently variance : It is the difference between actual hours work at standard variable overhead rate and standard variable overhead for production. It is determined as follows :

Variable Overhead Efficiency Variance = standard variable overhead – actual variable overhead for production.

Illustration 3

Following information is obtained from Wise Ltd

Budgeted production for the period	600 units
Budgeted variable overhead	Rs 15600/-
Standard Time for one unit	20 hours
Actual Production for the period	500 units
Actual Variable overhead	Rs 14000/-
Actual Hours Worked	9000 Hrs

Calculate:

A Variable overhead expenditure variance

B variable overhead efficiency variance

C Variable Overhead variance

Solution:

A VO Expenditure variance = standard variable overhead at actual level – actual variable overhead

$$= 11700 - 14000 = 2300 \text{ A}$$

$$\text{SVOH} = 15000 / 12000 \times 9000 = 11700$$

B VO Efficiency Variance = standard variable overhead – actual variable overhead for production.

$$= 13000 - 11700 = 1300 \text{ F}$$

C Variable overhead cost variance = Standard variable overhead cost – actual variable overhead cost.

$$= 13000 - 14000 = 1000 \text{ A}$$

6.10 FIXED OVERHEAD COST VARIANCE

It represents the difference between actual fixed overhead incurred and standard cost of fixed overhead absorbed. It determined as follows:

Fixed overhead Cost variance = Standard cost of fixed overhead – actual fixed overhead

Fixed overhead variance is follows:

A. Fixed overhead volume variance - It that part of fixed overhead variance which due different between actual fixed overhead incurred and standard allowance for fixed overhead.

Fixed overhead volume variance = standard rate X actual output - budgeted overhead

B. Fixed overhead expenditure variance - It that part of fixed overhead variance which is due different between actual fixed overhead incurred and budgeted fixed overhead.

Fixed overhead expenditure variance = budgeted fixed overhead – actual fixed overhead.

C. Fixed overhead Calendar Variance - It is that part of fixed overhead volume variance which is due to different between budgeted fixed overhead and fixed overhead for dates available during the period at standard rate.

Fixed Overhead Calendar variance = standard rate (actual quantity – Standard quantity)

D. Fixed overhead efficiency variance: It that portion of volume variance which reflected increase or reduced output arising from efficiency being above or below standard.

Fixed overhead efficiency variance = standard rate (actual production – standard production)

E. Fixed overhead capacity variance: It is that part of fixed overhead variance which arrives due to different between capacity utilized and available capacity.

Fixed overhead capacity variance = Standard rate (revised budgeted - budgeted unit)

Illustration 4

From the following data calculate overhead variance :

Particulars	Budget	Actual
Output	15000 units	16000 units
No. of working days	25	27
Fixed overhead	Rs 30000	Rs 30500
Variable overhead	Rs 45000	Rs 47000

There was an increase of 5% in capacity.

Solution:

1. Total overhead variance = Actual output in standard rate – Actual overhead

$$16000 \times 5 - (30500 + 47000) \\ \text{Rs } 2500 \text{ F}$$

2. Variable Overhead Variance = Standard rate X Actual output – Actual Overhead

$$3 \times 16000 - 47000 = 1000\text{F}$$

3. Fixed Overhead Variance = Standard rate X Actual Output – Actual Overhead

$$2 \times 16000 - 30500 = \text{Rs } 1500\text{F}$$

4. Fixed overhead volume Variance = Standard Rate X Actual Output – Budgeted Overhead

$$2 \times 16000 - 30000 = 2000 \text{ F}$$

5. Fixed overhead Expenditure Variance = Budgeted Fixed – Actual Fixed overhead

$$\text{Rs } 30000 - \text{Rs } 30500 = \text{Rs } 500\text{A}$$

6. Fixed Overhead Capacity Variance = Standard Rate (Revised Budgeted Units – Budgeted Units)

$$\text{Rs } 2 (15750 - 15000) = 2 \times 750 \\ \text{Rs } 1500 \text{ F}$$

7. Fixed overhead calendar variance = Standard Rate (Actual Quantity – Standard Quantity)

$$2 (15750/25 \times 2) = \text{Rs } 1260 \times 2 \\ \text{Rs } 2520 \text{ F}$$

8. Fixed overhead efficiency variance = Standard Rate (Actual Production – Standard Production)

$$= 2 (16000 - 17010) = \text{Rs } 2020 \text{ A}$$

Note: Standard production = 15000 units

+ Increase Due Capacity increase = 750

+_ Increased production for 2 days = 1260

Total = 17010

6.11 SALES VARIANCE

Sales variance is difference between the actual value achieved in a given period and budgeted value of sales. Sales

value variance are useful for sales managers in determining the effect of changes in different factors on sales value. The following are Types of variance.

A) Sales value variance - It is the difference between the actual sales value realized and the standard value of sales as per the Budget.

Sale value variance = Actual Quantity X Actual price - Standard quantity X Standard Price

B) Sales price variance - It is that portion of the total sales value variance which is due to the difference between actual sales price realized and budgeted sales price

Sales price variance = Actual Quantity (Actual price – standard price)

C) Sales volume variance - It is that portion of total sales value variance which is due to the difference between the standard value of the actual sales effected and standard value of sales as per the budget.

Sales volume variance = standard price (Actual quantity – Standard quantity)

D) Sales Mix variance - It is that portion of sales volume variance which is due to the difference between the standard value of actual sales effected and Actual value of Sales.

Sales mixed variance = Standard Price (Actual proportion – revised standard mix actual sales)

E) Sales quantity variance - It is that portion of sales volume variance which is due to the difference between standard value of actual sales effected and standard values of sales as per the budgeted.

Sale quantity variance = standard price (revised standard mix – standard mix)

Check Your Progress :

- 1) Explain the terms and give formulas.
 - a) Labour Rate Variance
 - b) Labour Yield Variance
 - c) Labour Cost Variance
 - d) Variable overhead efficiency variances
 - e) Fixed overhead volume variances
 - f) Fixed overhead calendar variances
 - g) Sales value variances
 - h) Sales quantity variances

Illustration 5

From the following information about sales calculate:

- A) Total sales variance B) Sales price variance C) Sales volume variance D) Sales mix variance E) Sales quantity variance

STANDARD

Product	Quantity	Selling price per unit	RS
A	5000	5	25000
B	4000	6	24000
C	3000	7	21000
Total	12000		70000

ACTUAL

Product	Quantity	Selling price per unit	RS
A	6000	6	36000
B	5000	5	25000
C	4000	8	32000
Total	15000		93000

Solution:

A. Total Sales Variance = Rs 93000- Rs 70000 = Rs23000 F

B. Sales price Variance = Actual quantity (Actual Price – Standard Price)

= A = 6000 X (6-5) = Rs 6000 F

B = 5000 X(5-6) = Rs 5000 A

C = 4000 X (8-7) = Rs4000 F

Rs 5000 F

C. Sales volume variance = Standard price (Actual Quantity – Standard Quantity)

= A = 5 (6000-5000) = 5000 F

B = 6 (5000-4000) = 6000 F

C = 7 (4000-3000) = 7000 F

Total = 18000 F

D. Sales mix Variance = Standard price (Actual mix – Standard Mix)

= Rs.88000- Rs.87500 = 500 F

Note : Actual Mix

6000 X 5 =	30000
5000 X 6 =	30000
4000 X 7 =	28000
Total =	88000

Revised Mix

6250 X 5 =	31250
5000 X 6 =	30000
3750 X 7 =	26250
Total =	87500

$$\begin{aligned}
 \text{E Sales Quantity Variance} &= \text{Standard price (actual quantity - standard quantity)} \\
 &= 70000 / 12000 (15000-12000) \\
 &= \text{Rs}17500 \text{ F}
 \end{aligned}$$

6.12 EXERCISE

1. What standard costing . Explain the advantages and limitations of costing ?
2. What is meant by standard cost ? How standard cost is determined ?
3. The standard cost of Mix is as under :
 - 8 Tonnes of material A @ 40 per tones
 - 12 Tonnes of Material B @ 60 per tonnes

Standard yield is 90% of output . Actual cost for a period is as under :

10 tonnes of Material A @ 30 per tones
20 tonnes of Material B @ 68 per tonnes.

Actual yield is 25.5 tonnes. calculate A Material cost variance B material usage variance C Material price variance D material mix variance E material yield variance .

(Ans: a) Rs.129 A b) Rs.169 A c) Rs. 60 A d) Rs.40 A e) Rs.29 A)

4. The following figures are extracted from the books of company

Particulars	Budget	Actual
Output in units	6000	6500
Hours	3000	3300
Overhead cost - Fixed	Rs1200	Rs1250
Overhead cost - Variable	Rs6000	Rs6650
No. of Days	25	27

Compute and analysis the overhead variance

Ans.) Overhead cost variance Rs100 A b) Variable OH Cost variance Rs150 A
c) Fixed OH cost Variance Rs50 F, FO Expenditure Rs50 A , FO Volume Rs
100 F , FO Efficiency Rs4 F, FO Calendar Rs96 F , FO Capacity Rs 100 F.

5. The following information is given regarding standard composition and standard rates of gang of workers

Standard Composition	Standard hourly rates
10 men	Rs 0.625
5 women	Rs 0.400
5 Boys	Rs 0.350

Accordingly to given specifications a week consists of 40 hours and standard output for week is 1000 units . In a particular week gang consisted of 13 men , 4 women and 3 boys and actual wages paid are as follows :

Men @ Rs0.6 per hour, Women @ Rs0.425 per hour and boys @ Rs0.325 per hour. Two hours were lost in the week due to abnormal idle time . Actual production was 960 units in the week . Find out A Labour cost variance B labour rate variance C labour mix variance D labour yield variance and E labour efficiency variance

Ans A Rs35 A , Rs 12 F , Rs 31 A , Rs4 F and Rs47 A

6. From the following information calculate

A – sales Variance B Sales price Variance C sales volume variance D sales mix variance E sales quantity variance

Product	STD units	STD Rates Rs	Actual Units	Actual Rates Rs
A	5000	5	6000	6
B	4000	6	5000	5
C	3000	7	4000	8

Ans A Rs5000 F B Rs500 F C Rs17500 F D Rs2300 F E Rs18000 F

7. Chosse the right answer with your reasoning:-

- Material cost variance arises due to variation in price and _____ of materials.
(a) Quality (b) Quantity (c) Volume (d) Delivery
- Idle time variance is due to difference between labour hours applied and labour hours _____.
(a) Utilised (b) Supplied (c) Unutilised (d) Underutilised
- Fixed overhead capacity variance arises due to difference between capacity utilized and _____ capacity.
(a) Spare (b) Excess (c) Fixed (d) Planned

4. Sales mix variance is due to the difference between standard value of actual sales and actual value of sales _____.
(a) Realised (b) Effected (c) Margin (d) Volume
5. Standard cost is a specifically _____ cost.
(a) Pre-determined (b) Estimated (c) Planned (d) Average

(Ans- 1- b , 2 – a , 3 – d , 4 – a , 5 – a)

Illustration 1:

Alco Ltd. follows Standard Costing System. The standard material costs for 90 units are as under:

	Units	Rate	`
M1	60	4.00	240
M2	<u>40</u>	<u>6.00</u>	<u>240</u>
	100		480
Less : Scrap	<u>10</u>	<u>3.00</u>	<u>30</u>
	<u>90</u>		<u>450</u>

During February 2004, the company manufactured 5,400 units. The actual material cost was as under:

M1	4,000 units	` 20,000
M2	2,000 units	` 11,000

Scrap realized @ ` 2.50 p.u.

Calculate the variances in as much detail as possible.

(M.Com. Oct. 03, adapted)

(Ans.: MCV- Rs. 4,000 A, MPV- 3,000 A, MMV- 800 F, MYV- 1,800 A, MUV- 1,000 A)

Illustration 4 :

The standard material cost for 100 kg of Chemical D is made up of :

Chemical A = 30 kg @ ` 4 per kg

Chemical B = 40 kg @ ` 5 per kg

Chemical C = 80 kg @ ` 6 per kg

A batch of 500 kg of Chemical D was produced from a mix of :

Chemical A = 140 kg at a cost of ` 588

Chemical B = 220 kg at a cost of ` 1056

Chemical C = 440 kg at a cost of ` 2860

How do the yield, mix and the price factors contribute to the variance in the actual cost per 100 kg of Chemical D over the standard cost?

(M.Com. Oct. 03, adapted)

(Ans.: MCV- Rs. 4,000 A, MPV- 3,000 A, MMV- 800 F, MYV- 1,800 A, MUV- 1,000 A)

Illustration 2 :

Standard Material for 100 Kg. Chemical A is give below :

Kg.			Total Rs
45	Of Material X at Rs 4 per Kg.	.....	180.00
40	Of Material Y at Rs 8 per Kg.	.....	320.00
<u>25</u>	Of Material Z at Rs 12 per Kg.	.....	<u>300.00</u>
110			800.00
<u>10</u>	Standard Loss	.....	-
100			800.00

Actual production is 2000 units of chemical A and actual material usage is as follows :

Kg.			Total Rs
1000	Of Material X at Rs 3.80 per Kg.	.....	3,800
850	Of Material Y at Rs 8.40 per Kg.	.....	7,140
450	Of Material Z at Rs 13 per Kg.	.....	<u>5,850</u>
			16,790

Calculate :

- a) Material Cost Variance b) Material Price Variance
 c) Material Mix Variance d) Material Yield Variance
 e) Material Usage Variance

(M.Com. Mar. 96, adapted)

(Ans.: MCV- Rs. 790 A, MPV- 590 A, MMV- 528 F, MYV- 728 A, MUV- 200 A)

Illustration 3 :

A manufacturing company uses the following standard mix of their compound in one batch of 100 kgs of its production line:

50 kgs of material X at the standard price of Rs 2.

30 kgs of material Y at the standard price of Rs 3.

20 kgs of material Z at the standard price of Rs 4.

The actual mix for a batch of 120 kgs was as follows :

60 kgs of material X at the price of Rs 3.

40 kgs of material Y at the price of Rs 2.5.

10 kgs of material Z at the price of Rs 3.

Calculate the different material variances.

(M. Com. April 09, adapted)

(Ans.: MCV- Rs. 40 A, MPV- 30 A, MMV- 17 F, MYV- 27 A, MUV- 10 A)

Illustration 4:

A gang of workers usually consists of 10 skilled, 5 semi-skilled and 5 unskilled labour in a factory. They are paid at standard hourly rates of ` 5.00, ` 3.20 and ` 2.80 respectively. In a normal working week of 40 hours, the gang is expected to produce 1,000

units of output. In a certain week, the gang consisted of 13 skilled, 4 semi-skilled and 3 unskilled labour. Actual wages were paid at the rates of 4.80; 3.40 and 2.60 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced.

You are required to calculate :

- i) Labour cost variance ii) Labour rate variance iii) Labour idle time variance iv) Labour efficiency variance v) Labour mix variance

(M.Com. Mar. 06, adapted)

(Ans.: LCV- Rs. 280 A, LRV- 96 F, LEV- 32 F, MITV- 160 F, LMV- 248 A)

Illustration 5 :

From the following records of the Navi Mumbai Manufacturing Company you are required to compute material and labour variance.

Input-100 Kg. of Material yields a Standard Output of 10,000 unit	
Standard Price per Kg of Material	Rs 20
Actual Quantity of Material issued and used by Production Department	10,000 Kg.
Actual Price per Kg of Material	Rs 21
Actual Output	9,00,000 Units
Number of Employees	200
Standard Wage Rate per Employee per Day	Rs 4
Standard Daily Output per Employee per Day	100 Units
Total Number of Days Worked	50 Days
Idle Time Paid for and Included in above	Half Day
Actual Wage Rate per Day	Rs 4.50

(Oct. 96, adapted)

(Ans.: MCV- Rs. 30,000 A, MPV- 10,000 A, MUV-20,000 A, LCV- Rs. 9,000 A, LRV- 5,000 A, LEV- 4,000 A)

Illustration 6 :

The following details relating to a product are made available to you:

Standard Cost per Unit :

Material 50 kg @ Rs 40 per kg

Labour 400 hours @ Rs 1 per hour

Actual Cost :

Material 4,900 kg @ Rs 42 per kg

Labour 39,600 hours @ Rs 1 per hour

Actual Production 100 units

You are required to calculate :

- | | |
|------------------------------|--------------------------------|
| i) Material Cost Variance | ii) Material Price Variance |
| iii) Material Usage Variance | iv) Labour Cost Variance |
| v) Labour Rate Variance | vi) Labour Efficiency Variance |

(M.Com. Oct. 2000, adapted)

(Ans.: MCV- Rs. 5,800 A, MPV- 9,800 A, MUV- 4,000 F, LCV- Rs. 3,500 A, LRV- 3,960 A, LEV- 400 F)

Illustration 7 :

The following standards have been set to manufacture a product :

Direct Materials :

2 units of A at Rs 4.00 per unit	8.00
3 units of B at Rs 3.00 per unit	9.00
15 units of C at Re. 1.00 per unit	<u>15.00</u>
	32.00
Direct labour 3 hrs. @ Rs 8 per hour	<u>24.00</u>
Total Standard Price Cost	56.00

The company Mangesh Ltd. manufactured and sold 6,000 units of the product during the year.

Direct material costs were as follows :

12,500 units of A at Rs 4.40 per unit
 18,000 units of B at Rs 2.80 per unit
 88,500 units of C at Rs 1.20 per unit

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid Rs 12 per hour while for the remaining the wages were paid at the standard rate. Calculate materials price and usage variances and also labour rate and efficiency variances.

(M.Com. Oct. 01, adapted)

(Ans.: MCV- Rs. 19,600 A, MPV- 19,100 A, MUV- 500 A, MYV- 1,600 F, MMV- 2,100 A, LCV- Rs. 6,000 A, LRV- 10,000 A, LEV- 4000 F)

Illustration 8 :

The following standards have been set to manufacture a product :

Direct Materials :

4 units of A at Rs 4.00 per unit	16.00
6 units of B at Rs 3.00 per unit	18.00
30 units of C at Re. 1.00 per unit	<u>30.00</u>
	64.00
Direct labour 6 hrs. @ Rs 8 per hour	<u>48.00</u>
Total Standard Price Cost	112.00

The company Mangesh Ltd. manufactured and sold 6,000 units of the product during the year.

Direct material costs were as follows :

25,000 units of A at Rs 4.40 per unit

36,000 units of B t Rs 2.80 per unit

1,77,000 units of C at Rs 1.20 per unit

The company worked 35,000 direct labour hours during the year.

For 5,000 of these hours, the company paid Rs 12 per hour while

for the remaining the wages were paid at the standard rate.

Calculate materials price ans usage variances and also labour rate and efficiency variances.

(M.Com. Mar. 2003, adapted)

(Ans.: MPV- 38,200 A, MUV- 1,000 A, LRV- 20,000 A, LEV- 8,000 F)

Illustration 9 :

Ketan Chemical Co. gives you the following standard and actual data of Chemical No. 1456.

Standard Data			Actual Data		
Kg.	Rs	Total Rs	Kg.	Rs	Total Rs
450	of Material A @ Rs 20 per kg 9,000		450	@ 19 per kg.	
			<u>360</u>	8,550	
				@ 11 per kg.	
				<u>3,960</u>	
<u>360</u>	of Material B @ Rs 10 per kg <u>3,600</u>		810		12,510
810		12,600			
	2,400 skilled hours		2,400	skilled hours	
	@ Rs 21		@ 22		
	50,400		52,800		
	1,200 unskilled hours	64,800	1,200	unskilled hours	<u>67,800</u>
	@ 12		@ 12.50		
	<u>14,400</u>		<u>15,000</u>		
<u>90</u>	Normal / Loss		<u>50</u>	Actual Loss	
720		77,400	760		80,310

You are required to calculate :

- | | |
|----------------------------|----------------------------|
| a) Material Cost Variance | b) Material Price Variance |
| c) Material Yield Variance | d) Labour Cost Variance |
| e) Labour Rate Variance | f) Labour Gang Variance |

(M.Com. Mar.02, adapted)

(Ans.: MCV- Rs. 790 F, MPV- 90 F, MYV- 700 F, LCV- Rs. 600 F, LRV- 3,000 A, LGV- NIL)

Illustration 10 :

Input Kg.	Material Per Kg.	Rs	Rs	Total Rs	Input Per Kg.	Rs	Rs	Total Rs
400	X @ 50		20,000		420	@ 45	8,900	
200	Y @ 20		4,000		240	@ 25	6,000	
100	Z @ 15		1,500		90	@ 15	1,350	
700				25,500	750			26,250
	Labour 100 Men hrs. @ Per 2 per hr.		200			120 hrs. @ Rs 2.50 per hr.		
	200 Women hrs. @ Rs 1.50 per hr.		300	500		240 hrs. @ Rs 1.60 per hr	384	684
25	Kg Normal loss				75	Kg Actual loss		
675	Kg			26,000	Kg	Kg		26,934

From the above information calculate the following variances:

- | | |
|----------------------------|--------------------------|
| a) Material Cost Variance | e) Labour Cost Variance |
| b) Material Price Variance | f) Labour Mix Variance |
| c) Material Mix Variance | g) Labour Yield Variance |
| d) Material Yield Variance | h) Labour Rate Variance |

(M.Com. Mar 2001, adapted)

(Ans.: MCV- Rs. 750 A, MPV- 900 F, MUV- 1,650 A, MYV- 1,821 A, MMV-171 F, LCV- Rs. 184 A, LRV- 84 A, LEV- 100 A, LYV- 35 A, LMV- 65 A)

Illustration 11:

The following information has been obtained from the records of a manufacturing organization using the Standard Costing System for the month of March, 2006.

Particulars	Standard	Actual
Production (units)	4,000	3,800
Working Days	20	21
Fixed Overheads (₹)	40,000	39,000
Variable Overheads (₹)	12,000	12,000

You are required to calculate the following Overhead Variances:

- i) Variable Overhead Variance
 - a) Expenditure
 - b) Volume Variance
 - c) Efficiency Variance
 - d) Calendar Variance
- ii) Fixed Overhead Variance
- iii) Also prepare Reconciliation Statement for the same.

(M.Com. Oct. 06, adapted)

(Ans.-VOHCV- 600 A, FOHCV- 1,000 A, FOHVV- 2,000 A, FOHExp.V- 1,000 F, FOHEffi.V- 4,000 A, FOHCV- 2,000 F)

Illustration 12:

The following figures are extracted from the books of a company:

Particulars	Budget	Actual
Output (in Units)	6,000	6,500
Hours	3,000	3,300
Overheads Cost :		
Fixed	1,200	1,250
Variable	6,000	6,650
Total Overheads Cost	7,200	7,900
Number of Days	25	27

You are required to calculate the following overheads variances :

- i) Overhead Cost Variance
- ii) Variable Overhead Cost
- iii) Fixed Overhead Cost Variance
- iv) Fixed Overhead Volume Variance
- v) Fixed Overhead Efficiency Variance
- vi) Fixed Overhead Capacity Variance.

(M.Com. Mar. 2000, adapted)

(Ans.-VOHCV- 600 A, FOHCV- 50 F, FOHVV- 2,000 A, FOHExp.V- 1,000 F, FOHEffi.V- 4,000 A, FOHCV- 2,000 F)

Illustration 13:

Budgeted income from sales on 500 tonnes was 5,00,000 per month of M/s ABC and Co. in April, 2004 actual sales were 550 tonnes with a sale value of 495,000.

You are required to calculate sales Variances

(M.Com. Mar. 05, adapted)

(Ans.: S Value V- 5,000 F, SPV- 55,000 F, S Volume V- 50,000 A)

Illustration 14:

The cost accountant of Lagoon Ltd. found to this surprise that the actual profit for the period ending 31st December, 2004 was the same as budget despite realizing 10% more than the budgeted selling prices. The following facts and figures are available :

Particulars	Budgeted Rs lakhs	Actual Rs lakhs
Sales	50.00	82.50
Variable Cost	30.00	57.50
Fixed costs	10.00	15.00
Profit	10.00	10.00

You are required to assist the Cost Accountant in preparing the necessary explanations as to why the profit remained the same despite an increase in sales.

(M.Com. Oct. 2005, adapted)

(Ans.: S Value V- 32,50,000 A, SPV- 7,50,000 A, S Volume V- 25,00,000 A)

Illustration 15 :

A Company's Budgeted Sales of product A are 40,000 units at standard selling price of Rs 10 per unit and product B 60,000 units at standard selling price of Rs 12 per unit.

Actual Sales of Product A are 70,000 units at 14 per unit and Product B 50,000 units at 8 per unit.

You are required to calculate :

- | | |
|--------------------------|----------------------------|
| a) Sales Value Variance | d) Sales Mix Variance |
| b) Sales Price Variance | e) Sales Quantity Variance |
| c) Sales Volume Variance | |

(M.Com. Mar. 07, adapted)

(Ans.: S Value V- 2,60,000 A, SPV- 80,000 A, S Volume V- 1,80,000 A, SQV- 2,24,000 A, SMV- 44,000 F)



BUDGETARY CONTROL

Unit Structure

- 7.0 Objectives
- 7.1 Budgets
- 7.2 Budgetary control
- 7.3 Zero base budget
- 7.4 Performance Budgeting
- 7.5 Functional Budgets
- 7.6 Capital Expenditure Budget
- 7.7 Exercises

7.0 OBJECTIVES

After studying this topic you will be able:

- 1 to understand the basic concepts of budget and budgetary control
- 2 to understand various types of budgets
- 3 to understand the preparation of various types of budgets
- 4 to understand the benefits of budgetary control
- 5 to understand the limitations of budgetary control

7.1 BUDGETS

Budget has been defined by CIMA U. K. as, ' A financial and or quantitative statement prepared prior to a defined period of time, of the policy to be pursued during that period for the purpose of achieving a given objective.'

A budget is a statement that is always prepared prior to a defined period of time. This means that budget is always prepared for future period and not for the past. For example, a budget for the year 2011-12 regarding the sales will be prepared in the year 2011-12. another important point is that the time for which it is prepared is certain. Thus a budget may be prepared for the next 3 years / 1 year / 6 months/ 1 month or even for a week, but the point is that the time frame for which it is prepared is certain. It cannot be prepared for indefinite period of time.

Budget is prepared either in quantitative details or monetary details or both. This means that budget will show the planning in terms of rupees or in quantity or both. For example, a production budget will show the production target in number of units and when the target units are multiplied by the anticipated production cost, it will be a production cost budget that is expressed in terms of money. Similarly purchase budget is prepared in quantity to show the anticipated purchase in the next year and when the quantity is multiplied by the expected price per unit, it will become purchase cost budget. Some budgets are prepared only in monetary terms, for example, cash budget, capital expenditure budget etc.

Every organization has well defined objectives, which are to be achieved in a particular span of time. It is of paramount importance that there should be systematic efforts to bring them into reality. As a part of these efforts, it is necessary to formulate a policy and it is reflected in the manpower planning budget as well as other relevant budgets. Thus the policy to be pursued in future for the purpose of achieving well-defined objectives is reflected in the budget.

7.2 BUDGETARY CONTROL

Budgetary control is actually a means of control in which the actual results are compared with the budgeted results so that appropriate action may be taken with regard to any deviations between the two. Budgetary control has the following stages.

A. Developing Budgets:

The first stage in budgetary control is developing various budgets. It will be necessary to identify the budget centers in the organization and budgets will have to develop for each one of them. Thus budgets are developed for functions like purchase, sale, production, manpower planning as well as for cash, capital expenditure, machine hours, labor hours and so on. Utmost care should be taken while developing the budgets. The factors affecting the planning should be studied carefully and budgets should be developed after a thorough study of the same.

B. Recording Actual Performance:

There should be a proper system of recording the actual performance achieved. This will facilitate the comparison between the budget and the actual. An efficient accounting and cost accounting system will help to record the actual performance effectively.

C. Comparison of Budgeted and Actual Performance:

One of the most important aspects of budgetary control is the comparison between the budgeted and the actual performance. The objective of such comparison is to find out the deviation between the two and provide the base for taking corrective action.

D. Corrective Action:

Taking appropriate corrective action on the basis of the comparison between the budgeted and actual results is the essence of budgeting. A budget is always prepared for future and hence there may be a variation between the budgeted results and actual results. There is a need for investigation of the same and take appropriate action so that the deviations will not repeat in the future. Responsibilities can be fixed on proper persons so that they can be held responsible for any such deviations.

7.3 ZERO BASE BUDGET

Zero Base Budgeting is method of budgeting whereby all activities are revaluated each time budget is formulated and every item of expenditure in the budget is fully justified. Thus the Zero Base Budgeting involves from scratch or zero.

Zero Base Budgeting actually emerged in the late 1960s as an attempt to overcome the limitations of incremental budgeting. This approach requires that all activities are justified and prioritized before decisions are taken relating to the amount of resources allocated to each activity. In incremental budgeting or traditional budgeting, previous year's figures are taken as base and based on the same the budgeted figures for the next year are worked out. Thus the previous year is taken as the base for preparation of the budget. However the main limitation of this system of budgeting is that as activity is continued in the future only because it is being continues in the past. Hence in Zero Base Budgeting, the beginning is made from scratch and each activity and function is reviewed thoroughly before sanctioning the same and all expenditures are analyzed and sanctioned only if they are justified.

Besides adopting a 'Zero Base' approach, the Zero Base Budgeting also focuses on programs or activities instead of functional departments based on line items, which is a feature of traditional budgeting. It is an extension of program budgeting. In program budgeting, programs are identified and goals are developed for the organization for the particular program. By inserting decision packages in the system and ranking the packages, the analysis is strengthened and priorities are determined.

Applications of Zero Base Budgeting:

The following stages/ steps are involved in the application of Zero Base Budgeting.

1. Each separate activity of the organization is identified and is called as a decision package. Decision package is actually nothing but a document that identifies and describes an activity in such a manner that it can be evaluated by the management and rank against other activities competing for limited resources and decide whether to sanction the same or not.
2. It should be ensured that each decision package is justified in the sense it should be ascertained whether the package is consisted with the goal of the organization or not.
3. If the package is consisted with the overall objectives of the organization, the cost of minimum efforts required to sustain the decision should be determined.
4. Alternatives for each decision package are considered in order to select better and cheaper options.
5. Based on the cost and benefit analysis a particular decision package should be selected and resources are allocated to the selected package.

ZBB was first introduced by Peter A. Pyhrr, a staff control manager at Texas Instruments Corporation, U.S.A. He developed this technique and implemented it for the first time during the year 1969-70 in Texas in the private sector and popularized its wider use. He wrote an article on ZBB in Harvard Business Review and later wrote a book on the same. The ZBB concept was first applied in the State of Georgia, U.S.A. when Mr. Jimmy Carter was the Governor of the State. Later after becoming the President of U.S.A. Mr. Jimmy Carter introduced and implemented the ZBB in the country in the year 1987. ZBB has a wide application in the Government Departments but also in the private sector in a variety of business. In India, the ZBB was applied in the State of Maharashtra in 80s and early 90s. Benefits from ZBB can be summarized as follows.

- i. ZBB facilitates review of various activities right from the scratch and a detailed cost benefit study is conducted for each activity. Thus an activity is continued only if the cost benefit study is favorable. This ensures that an activity will not be continued merely because it was conducted in the previous year.

- ii. A detailed cost benefit analysis result in efficient allocation of resources and consequently wastages and obsolescence is eliminated.
- iii. A lot of brainstorming is required for evaluating cost and benefits arising from an activity and this results into generation of new ideas and also a sense o involvement of the staff.
- iv. ZBB facilitates improvement in communication and co-ordination amongst the staff.
- v. Awareness amongst the managers about the input costs is created which helps the organization to become cost conscious.
- vi. An exhaustive documentation is necessary for the implementation of this system and it automatically leads to record building.

The following are the limitations of Zero Base Budgeting.

- i. It is very detailed procedure and naturally is time consuming and lot of paper work is involved in the same.
- ii. Cost involved in preparation and implementation of this system is very high.
- iii. Morale of staff may be very low as they might feel threatened if a particular activity is discontinued.
- iv. Ranking of activities and decision-making may become subjective at times.
- v. It may not advisable to apply this method when there are non financial considerations, such as ethical and social responsibility because this dictate rejecting a budget claim on low ranking projects.

7.4 PERFORMANCE BUDGETING

It is budgetary system where the input costs are the performance i.e. the end results. This budgeting is used extensively in the Government and Public Sector Undertakings. It is essentially a projection of the Government activities and expenditure thereon for the budget period. This budgeting starts with the broad classification of expenditure according to functions such as education, health, irrigation, Social welfare etc. Each of functions is then classified into programs into activities or projects. The main features of performance budgeting are as follows.

- i. Classification into functions, programs or activities
- ii. Specification of objectives for each program
- iii. Establishing suitable methods for measurement of work as far as possible
- iv. Fixation of work targets for each program.

Objectives of each program are ascertained clearly and then the resources are applied after specifying them clearly. The results expected from such activities are also laid down. Annual, quarterly and monthly targets are determined for the entire organization. These targets are broken down for each activity center. The next step is to set up various productivity or performance ratios and finally target for each program activity is fixed. The targets are compared with the actual results achieved. Thus the procedure for the performance budgets include allocation of resources execution of the budget and periodic reporting at regular intervals.

The budgets are finally compiled by the various agencies such as Government Department, public undertakings etc. thereafter these budgets move on to the authorities responsible for reviewing the performance budgets. Once the higher authorities decide about the funds, the amount sanctioned are communicated and the work is started. It is the duty of these agencies to start the work in time, to ensure the regular flow of expenditure, against the physical targets, prevent over runs under spending and furnish report to the higher authorities regarding the physical progress achieved.

In the final phase of performance budgetary process, progress reports are to be submitted periodically to higher authorities to indicate broadly, the physical performance to be achieved, the expenditure incurred and the variances together with explanations for the variances.

Check Your Progress:

- 1) Define the terms.
 - a) Budget
 - b) Budgetary Control
 - c) Zero Base Budget
 - d) Performance Budgeting
- 2) "Budgetary control is actually a means of Control." Discuss.

7.5 FUNCTIONAL BUDGETS

The Functional Budgets are prepared for each function of the organization. These budgets are normally prepared for a period of one year and then broken down to each month. The following budgets are included in this category.

- i. **Sales Budget:** A Sales budget shows forecast of expected sales in the future period and expressed in quantity of the product to be sold as well as the monetary value of the same. A Sales Budget may be prepared product wise, territories/ area/ country wise, customer group wise, salesmen wise as well as time like quarter wise, month wise, weekly etc.
- ii. **Production Budget:** This budget shows the production target to be achieved in the year or the future period. The production budget is prepared in quantity as well as in monetary terms. Before preparation of this budget it is necessary to study the principal budget or the key factor. The principal budget factor can be sales demand or the production capacity or availability of raw material. The policy of the management regarding the inventory is also taken into consideration. The production budget is normally prepared for a period of one year and broken down on monthly basis. Production targets are decided by adding the budgeted closing inventory in the sales forecast and subtracting the opening inventory from the total of the same. Production Cost Budget is prepared by multiplying the production targets by the budgeted production cost per unit.
- iii. **Material Purchase Budget:** This budget of materials to be purchased during the coming year. For the preparation of this budget, production budget is the starting point if it is the key factor. If the raw material availability is the key factor, it becomes the starting point. The desired closing inventory of the raw materials is added to the requirement as per the production budget and the opening inventory is subtracted from the gross requirements. This budget is prepared in quantity as well as the monetary terms and helps immensely in planning of the purchase of raw materials. Availability of storage space, financial resources, various levels of materials like maximum, minimum, re-order and economic order quantity are taken into consideration while preparing this budget. A separate material utilization budget may also be prepared as a preparation of material purchase budget.

- iv. **Cash Budget:** a cash budget is an estimate of cash receipts and cash payments prepared for each month. In this budget all expected payments, revenue as well as capital and all receipts, revenue and capital are taken into consideration. The main purpose of cash budget is to predict the receipts and payments in cash so that the firm will be able to find out the cash balance at the end of the budget period. This will help the firm to know whether there will be surplus or deficit at the end of budget period. It will help them to plan for either investing the surplus or raise necessary amount to finance deficit. Cash budget is prepared in various ways, but the most popular form of the same is by method of Receipt and Payment method.
- v. **Master Budget:** All the budgets described above are called as 'Functional Budgets' that are prepared for the planning of individual function of the organization. For example, Budgets are prepared for Purchase, Sales, Production, Manpower Planning, and so on. A master budget which is also called as 'Compressive Budget' is a consolidation of all the functional budgets. It shows the projected Profit and Loss account and Balance sheet of business organization. For preparation of this budget, all functional budget are combined together and the relevant figures are incorporated in preparation of the projected Profit and Loss Account and Balance Sheet. Thus Master Budget is prepared for the organization and not for individual functions.

7.6 CAPITAL EXPENDITURE BUDGET

7.6.1 Fixed and Flexible Budgets:

The fixed and flexible budgets are discussed in detail in the following paragraphs.

- i. **Fixed Budget:** When a budget is prepared by assuming a fixed percentage of capacity utilization, it is called as a fixed budget. For example, a firm may decide to operate at 90% of its total capacity and prepare a budget showing the projected profit or loss at that capacity. This budget is defined by The Institute of Cost and Management Accountants of [U.K.] as 'the budget which is designed to remain unchanged irrespective of the level of activity actually attained. It is based on a single level of activity'. For preparation of this budget, sales forecast will have to be prepared along with the cost estimate. Cost estimate can be prepared by segregating the costs according to their behavior i.e. fixed and variable. Cost predictions should be made element wise and the projected profit or loss can be worked out by deducing the cost from the sales

revenue. Actually in practice, fixed budgets are prepared very rarely. The main reason is that the actual output differs from the budgeted output significantly. Thus if the budget is prepared on the assumption of producing 50, 000 units and actually the number of units produced are 40, 000, the comparison of actual results with the budgeted ones will be unfair and misleading. The budget may reveal the difference between the budgeted costs and actual costs but the reason for the deviations may not be pointed out. A fixed budget may be prepared when the budgeted output and actual output are quite close and not much deviation exists between the two. In such cases, maximum control can be exercised between the budgeted performance and actual performance.

- ii. **Flexible Budgets:** a Flexible budget is a budget that is prepared for different levels of capacity utilization. It can be called as a series of fixed budgets prepared for different levels of activity. For example, a budget can be prepared for capacity utilization levels of 50%, 60%, 70%, 80%, 90% and 100%. The basic principle of flexible budget is that if budget is prepared for showing the results at say, 15, 000 units and actual production is only 12, 000 units, the comparison between the expenditures, budgeted and actual will not be fair as the budget was prepared for 15, 000 units. Therefore it is developed for a relevant range of production from 12, 000 units to 15, 000 units. Thus even if the actual production is 12, 000 units, the results will be comparable with the budgeted performance of 12, 000 units. Even if the production slips to 8,000 units, the manager has a tool that can be used to determine budgeted cost at 8,000 units of output. The flexible budget thus, provides a reliable basis for comparison because it is automatically geared to change in production activity. Thus a flexible budget covers a range of activity, it is flexible i.e. easy with variation in production levels and it facilitates performance measurement and evaluation.
- iii. While preparing flexible budget, it is necessary to study the behavior of cost and divide them in fixed, variable and semi variable. After doing this, the costs can be estimated for a given level of activity.
- iv. It is also necessary to plan the range of activity. A firm may decide to develop flexible budget for activity level starting to plan the range of activity level from 50% to 100% with an interval of 10% in between. It is necessary to estimate the costs and associate them with chosen level of activity.
- v. Finally the profit or loss at different levels of activity will be computed by comparing the costs with the revenues.

7.6.2 Preparation of Budget:

A budgetary control is extremely useful for planning and controlling as described above. However, for getting these benefits, sufficient preparation should be made. For complete success, a solid foundation should be laid down and in view of this the following aspects are of crucial importance.

- i. **Budget Committee:** for successful implementation of budgetary control system, there is a need of a budget committee. In small or medium size organizations, there may not be carried out by the Chief Account himself. Due to the size of organization, there may not be too many problems in implementation of the budgetary control system. However, in large size organization, there is a need of a budget committee consisting of the chief executive, budget officer and heads of main departments in the organization. The functions of the budget committee are to get the budgets prepared and then scrutinize the same, to lay down broad policies regarding the preparation of budgets, to approve the budgets, suggest for revision, to monitor the implementation and to recommended the action to be taken in a given situation.
- ii. **Budget Centers:** Establishment of budget centers is another important pre-requisite of a sound budgetary control system. A budget center is a group of activities or a section of the organization for which budget can be developed. For example, manpower planning budget, research and development cost budget, production and production cost budget, labor hour and so on. Budget centers should be defined clearly so that preparation becomes easy.
- iii. **Budget Period:** A budget is always prepared prior to a defined period of time. This means that the period for which a budget is prepared is decided in advance. Thus a budget may be prepared for three years, one year, six months, one month or even for a week. The point is that the period for the functional budgets like sales, purchase, production etc. are prepared for one year and then broken down on monthly basis. Budgets like capital expenditure are generally prepared for a period from 1 year to 3 years. Thus depending upon the type of budget, the period of the same is decided and it is important that it is decided well in advance.
- iv. **Preparation of an Organization chart:** There should be an organization chart that shows clearly defined authorities and responsibilities of various executives. The organization chart will define clearly the functions to be performed by each executive relating to the budget preparation and his relationship with other executives. The organization chart may

have to be ensure that each budget center is controlled by an appropriate member of the staff.

- v. **Budget Manual:** A budget manual is defined by ICMA as ' a document which sets out the responsibilities of the person engaged in, the routine of and the forms and records required for budgetary control'. The budget manual thus is a schedule, document or booklet, which contains different forms to be used, procedures to be followed, budgeting organization details, and set of instructions to be followed in the budgeting system. It also lists out detail of the responsibilities of different persons and the managers involved in the process. A typical budget manual contains the following.
1. Objectives and of authorities and managerial policies of the business concern.
 2. Internal lines of authorities and responsibilities.
 3. Functions of the role of budget committee officer.
 4. Budget period
 5. Principal budget factor
 6. Detailed program of budget preparation
 7. Accounting codes and numbering
 8. Follow up procedures.
- vi. **Principal Budget Factor:** A principal budget factor is that factor the extent of whose influence must first be assessed in order to prepare the functional budgets. Normally sales is the key factor or principal budget factor but other factors like production, purchase, skilled labor may also be the key factors. The key factor puts restrictions on the other functions and hence it must be considered carefully in advance. So continuous assessment of the business situation becomes necessary. In all conditions the key factor is the starting point in the process of preparation of budgets. A typical list of some of the key factor is given below:

Sales: Consumer demand, shortage of sales staff, inadequate advertising

Material: Availability of supply, restrictions on import

Labor: Shortage of labor

Plant: Availability of capacity, bottlenecks in key processes

Management: Lack of capital, pricing policy, shortage of efficient executive, lack of faulty design of the product etc.

- vii. Accounting Records: It is essential that the accounting system should be able to record and analyze the transaction involved. A chart of accounts or accounts code should be maintained which may correspond with the budget centers for establishment of budgets and finally, control through budgets.

Check Your Progress:

- 1) Define the terms.
 - a) Functional Budget.
 - b) Production Budget.
 - c) Cash Budget.
 - d) Master Budget.
 - e) Budget Committee
 - f) Budget Creators.
 - g) Budget Manual
- 2) Distinguish between Fixed Budget and Flexible Budget.

Illustration 1

1. Z Ltd., has prepared the following sales Budget for first five months of 2011.

Month	Sales Budget (units)
January	10,800
February	15,600
March	12,200
April	10,400
May	9,800

Inventory finished goods at the end of every month is to be equal to 25 % of sales estimate for the next month. On 1st January 2011, there were 2,700 units of product on hand. There is no work in progress at the end of any month.

Every unit product requires two types of materials in the following quantities;

Material A: 4 Kg.

Material B: 5 Kg.

Materials equal to one half of the requirements of the next month's production are to be in hand at the end of every month. This requirement was met on 1st January 2011.

Prepare the following budgets for the quarter ending on 31st March 2011

- I) Production Budget- Quantity Wise.
- II) Materials Purchase Budget- Quantity wise.

Solution:

Z Ltd.

Production Budget [In units] January – March 2011

Particulars	January	February	March
I] Sales	10,800	15,600	12,200
II] Estimated Closing Stock	3,900	3,050	2,600
III] Gross Requirements[I+II]	14,700	18,650	14,800
IV] Opening Stock	2,700	3,900	3,050
V] Net Requirements [III-IV]	12,000	14,750	11,750

Materials Requirement Budget [Quantitative]

Material A- January –March 2011

Particulars	January	February	March
Production [As per Production Budget-units]	12,000	14,750	11,750
Requirement for Production: 4 kg per unit	48,000	59,000	47,000
Add: Desired Closing Stock	29,500	23,500	20,500
Gross requirements	77,500	82,500	67,500
Less: Opening Stock	24,000	29,500	23,500
Net Requirements	53,500	53,000	44,000

Materials Requirement Budget [Quantitative]

Material B- January –March 2011

Particulars	January	February	March
Production [As per Production Budget-units]	12,000	14,750	11,750
Requirement for Production: 5 kg per unit	60,000	73,750	58,750
Add: Desired Closing Stock	36,875	29,375	25,625
Gross requirements	96,875	1,03,125	84,375
Less: Opening Stock	30,000	36,875	29,375
Net Requirements	66,875	66,250	55,000

Working Notes:

- 1) Production for April. Sales 10,400 [units] + Closing Stock 2,450 [units]
= 12,850 [units] – Opening Stock 2,600 [units] = 10,250 [units].
- 2) Material required for production in April: A :10,250 X 4 = 41,000 kg.
B :10,250 X 5 = 51,250 kg.

Illustration 2

A Ltd. manufactures a single product P with a single grade of labor. The sales budget and finished goods stock budget for the 1st Quarter ending on 30th June 2011 are as follows:

Sales: 1400 units
 Opening finished units: 100 units
 Closing finished units: 140 units

The goods are imported only when the production work is complete and it is budgeted that 10% of finished work will be scrapped.

The standard direct labor content of the product P is 3 hours. The budgeted productivity ratio for direct is 80% only.

The company employs 36 direct operatives who are expected to average 144 working hour each in the 1st quarter.

You are required to prepare,

- I] Production Budget
- II] Direct Labor Budget
- III] Comment on the problem that your direct labor budget reveals and suggest how this problem might be overcome.

Solution:

**A Ltd.
 Production Budget**

April – June 2011

Particulars	No. of units
I] Sales Forecast	1,400
II] Estimated Closing Stock	140
III] Gross Requirement [I + II]	1,540
IV] Opening Stock	100
V] Net Production Requirement [III – IV] Good Production	1,440
VI] Wastage [10% of total production – assumed]	160
VII] Total Production Requirement[V + VI]	1,600

Direct Labor Budget

Particulars	No. of hours
Total Standard Hours Required: 1,600 units X 3	4,800
Productivity Ratio: 80%	
Actual Hours Required: 4,800/ .80	6,000
Budgeted Hours Available 36 men X 144 hours	5,184
Shortfall	816

Comments: From the Direct Labor Budget it can be seen that the direct labor hours available are not sufficient and hence there is shortage of 816 Hours. Therefore it will be necessary to work overtime, as well as improvement in the efficiency.

Illustration 3

Summarized below are the Income and Expenditure forecast for the month March to August 2011.

Month	Credit Sales Rs.	Credit Purchases Rs.	Wages Rs.	Mfg. Expenses Rs.	Office Expenses Rs.	Selling Expenses Rs.
March	60,000	36,000	9,000	4,000	2,000	4,000
April	62,000	38,000	8,000	3,000	1,500	5,000
May	64,000	33,000	10,000	4,500	2,500	4,500
June	58,000	35,000	8,500	3,500	2,000	3,500
July	56,000	39,000	9,000	4,000	1,000	4,500
August	60,000	34,000	8,000	3,000	1,500	4,500

You are given following further information

- i. Plant Costing Rs. 16,000 due for delivery in June. 10% on delivery and balance after three months
- ii. Advance Tax Rs. 8,000 is payable in March and June
- iii. Period of credit allowed, Suppliers 2 months and Customers 1 month
- iv. Lag in payment of manufacturing expenses half month
- v. Lag in payment of all others expenses one month
- vi. Cash balance on 1st May 2008 is Rs. 8,000
- vii. Prepare Cash Budget for three months starting from 1st May 2010

Solution:

**Cash Budget
May-August 2010**

Particulars	May	June	July
I] Opening Cash Balance	8,000	15,750	12,750
II] Expected Cash Receipts:			
A] Collections from Debtors [Credit 1 month]	62,000	64,000	58,000
III] Total Expected Receipts	62,000	64,000	58,000
IV] Total Cash Available [I+III]	70,000	79,750	70,750
V] Expected Payment			
A] Purchases [2 months credit]	36,000	38,000	33,000
B] Manufacturing Expenses [Half month credit]*	3,750	4,000	3,750
C] Wages [Half month credit]	8,000	10,000	8,500
D] Office Expenses [one month credit]	1,500	2,500	2,000
E] Selling Expenses [one month credit]	5,000	4,500	3,500
F] Purchase of Machine			1,600
G] Advance Tax		8,000	
VI] Total Payment [A+B+C+D+E+F+G]	54,250	67,000	52,350
VII] Closing Balance	15,750	12,750	18,400

There is delay of half a month for payment of Manufacturing Expenses and wages and hence current month's 50% and previous month's 50% are paid in the current month.

Illustration 4

A manufacturing company is currently working at 50% capacity and produce 10,000 units at a cost of Rs. 180 per unit as per the following details.

Materials: Rs.100

Labor: Rs.30

Factory Overheads: Rs.30 [40% fixed]

Administrative Overheads: Rs.20 [50% fixed]

Total Cost Per Unit: Rs.180

The selling price per unit at present is Rs.200. At 60% working, material cost per unit increases by 2% and selling price per unit falls by 2%. At 80% working, material cost per unit increases by 5% and selling price per unit falls by 5%.

Prepare a Flexible Budget to show the profits/ losses at 50%, 60% and 80% capacity utilization.

Solution:

Flexible Budget

Particulars	Capacity Utilization 50%	Capacity Utilization 60%	Capacity Utilization 80%
A] Number of Units	10,000	12,000	16,000
B] Selling Price Per Unit	Rs.200	Rs.196	Rs.190
C] Variable Cost Per Unit <ul style="list-style-type: none"> • Direct Material • Direct Labor • Factory Overheads[60%] • Administrative Overheads[50%] 	Rs.100 Rs.30 Rs.18 Rs.10	Rs.102 Rs.30 Rs.18 Rs.10	Rs.105 Rs.30 Rs.18 Rs.10
D] Total Variable Cost Per Unit	Rs.158	Rs.160	Rs.163
E] Total Variable Cost [A X D]	Rs.15,80,000	Rs.19,20,000	Rs.26,08,000
F] Fixed Costs [Rs.12 + Rs.10 = Rs.22 per unit at existing level 10,000 units.]	Rs.2,20,000	Rs.2,20,000	Rs.2,20,000
G] Total Cost[E + F]	Rs.18,00,000	Rs.21,40,000	Rs.28,28,000
H] Sales Revenue [A X V]	Rs.20,00,000	Rs.23,52,000	Rs.30,40,000
I] Profits/ Losses [H – G]	Rs.2,00,000	Rs.2,12,000	Rs.2,12,000

7.7 EXERCISES

1. Select the correct answer from the choices given in each of following:-

- 1) A budget is A] an aid to management B] a postmortem analysis C] a substitute of management.

- 2) The budgeted standard hours of factory is 12,000. the capacity utilization ratios for April 2009 stood at 90% while the efficiency ratios for the month came to 120%. The actual production in standard hour for April 2009 was A] 10,800 B]12,960 C] 14,400 D] 12,800
 - 3) A budget is a projected plan of action in A] physical units B] monetary terms C] physical units and monetary units.
 - 4) Flexible budget are useful for A] Planning purposes only B] Planning performance evaluation and feedback control C] Control of performance only
 - 5) The scarce factor of production is known as , A] Key factor B] Linking factor C] Critical factor D] Production factor.
2. State whether the following statements are TRUE or FALSE.
- 1) Fixed budgets are concerned with acquisition of fixed assets.
 - 2) Functional Budgets are subsidiary to master budget.
 - 3) Budgeting is useful for planning and controlling.
 - 4) Capital expenditures budget is prepared generally for short term.
 - 5) Budgetary control is a technique of costing.

Illustration 1

Prepare a Cash Budget from the following information for ABC Ltd.

Particulars	1 st Quarter [Rs.]	2 nd Quarter [Rs.]	3 rd Quarter [Rs.]	4 th Quarter [Rs.]
Opening Cash	10,000			
Collection from customers	1,25,000	1,50,000	1,60,000	2,21,000
Payments:				
Purchase of Materials	20,000	35,000	35,000	54,200
Other Expenses	25,000	20,000	20,000	17,000
Salaries and Wages	90,000	95,000	95,000	1,09,200
Income Tax	5,000			
Machinery Purchase				20,000

The company desires to maintain a cash balance of Rs.15,000 at the end of each quarter. Cash can be borrowed or repaid in multiples of Rs.500 at an interest rate of 10% p. a. Management does not want to borrow cash more than what is necessary and wants to repay as early as possible. In any event, loans cannot be extended beyond a quarter. Interest is computed and paid when principal is repaid. Assume that borrowing takes place at the beginning and repayments are made at the end of the quarter.

Illustration 2

A company manufactures two products, X and Y. A forecast units to be sold in first 4 months of the year is given below.

Particulars	Product X [units]	Product Y [units]
January	1,000	2,800
February	1,200	2,800
March	1,600	2,400
April	2,000	2,000
May	2,400	1,600

Other information is given below:

Particulars	Product X – Rs. Per Unit	Product Y – Rs. Per Unit
Direct Material	12.50	19.00
Direct Labor	4.50	7.00
Factory Overheads per unit	3.00	4.00

There will be no opening and closing work in progress [WIP] at the end of any month and finished product [in units] equal to half the budgeted sale of the next month should be in stock at the end of each month[including previous year]

You are required to prepare,

- A] Production Budget for January to April and
- B] Summarized production cost budget

Illustration 3

The monthly budget for manufacturing overheads of a manufacturing company is given below.

Particulars	Capacity 80%	Capacity 100%
Budgeted Production	600 units	800 units
Wages	Rs.1,200	Rs.2,000
Consumable Stores	900	1500
Maintenance	1100	1500
Power and Fuel	1600	2000
Depreciation	4000	4000
Insurance	1000	1000
Total	9800	12000

You are required to,

- i. Indicate which of the item are fixed, variable and semi variable
- ii. Prepare a budget for 80% capacity
- iii. Show that total cost, both fixed and variable per unit and output at 60%, 80%, and 100% capacity levels.



COST AUDIT

Unit Structure

- 8.0 Objectives
- 8.1 Introduction
- 8.2 Definition of Auditing
- 8.3 Compulsory Audit
- 8.4 The Auditor
- 8.5 Cost Audit
- 8.6 Efficiency Audit
- 8.7 Cost V/s Financial Audit
- 8.8 Scope & Functions of cost Audit
- 8.9 Organizations for and circumstances favoring cost Audits
- 8.10 Benefits of Cost Audits
- 8.11 Cost Audit Program and Procedure
- 8.12 Statutory Cost Audit
- 8.13 Provisions of Cost Audit in companies Act and Cost Audit (Reporting) Rules
- 8.14 Cost Investigation
- 8.15 Exercises

8.0 OBJECTIVES

After studying this unit the Students will:

- Know the Concept of Audit
- Know Statutory Audit
- Know Cost Audit
- Know the Scope and Functions of Cost Audit
- Know the benefits of cost Audit
- Know the difference between Financial Audit and cost Audit
- Understand the concept of efficiency Audit

8.1 INTRODUCTION

No business or institution can effectively carry on its activities without the help of proper records and accounts, since

transactions take place at different points of time with numerous persons and entities. The effect of all transactions has to be recorded and suitably analyzed to see the result as regards the business as a whole. Periodical statements of account are drawn up to measure the success or failure of the activities in achieving the objectives of the organization. This would be impossible without a systematic record of transactions. Financial statements are often the basis for decision making by the management and for corrective action so as to even closing down the organization or apart of it. All this would be possible only if the statements are reliable; decisions based on wrong accounting statements may prove very harmful or even fatal to the business. For Example, if the business has really earned a profit but because of wrong accounting, the annual accounts show a loss. Thus, from the point of view of the management itself, authenticity of financial statements is essential. It more for those who have invested their money in the business but cannot take part in its management, for example, shareholders in a company, such persons, certainly need an assurance that the annual statements of accounts sent to them are fully reliable. Its is auditing which ensures that the accounting statements are authentic. In today's economic environment, information and accountability have assumed a larger role than ever before. As a result, the independent audit of an entity's financial statements is a vital service to investors, creditors, and other participants in economic exchange.

8.2 DEFINITION OF AUDITING

According to General Guidelines on Internal Auditing issued by the ICAI, "Auditing is defines as a systematic and independent examination of data, statements, records, operations, and performances (financial or otherwise) of an enterprise for a stated purpose. In any auditing situation, the auditor perceives and recognizes the propositions before him for examination, collects evidence, evaluates the same and on this basis formulates his judgment which is communicated through his audit report."

Spicer and Pegler define Audit as " An examination of the books accounts and vouchers of a business as will enable the auditors to satisfy that the balance sheet is properly drawn up so as to give a true and fair view of the state of affairs of the business and whether the Profit and Loss Account gives a true and fair view of the Profit and Loss for the period , according to the best of his information and the explanations given to him and as shown by the books, and if not in what respect he is not satisfied"

Thus, audit is a critical examination of the books of accounts and the financial statements drawn from them. An audit examination can be made by a person who is duly competent for this purpose. An audit examination is to be made on the basis of evidential documents. The object of audit examinations is to enable the auditor to express his opinion as regards the truth and fairness of the financial statements.

An auditor may review the financial statements of an enterprise to ascertain whether they reflect a true and fair view of its state of affairs and of its working results. In another situation, he may analyze the operations of an enterprise to appraise their cost – effectiveness and in still another, he may seek evidence to review the managerial performance in an enterprises. In yet another type of audit the auditor may examine whether the transactions of an enterprise have been executed within the framework of certain standards of financial propriety. However the variations in the propositions do not change the basic philosophy of auditing, though the process of collection and evaluation of evidence and that of formulating a judgment thereon may have to be suitably modified.

According to AAS-1 on “ Basic Principles Governing an Auditing “ An Audit is independent examination of financial information of any entity, whether profit oriented or not, and irrespective of its size or legal form, when such an examination is conducted with a view to expressing an opinion thereon.” The person conducting this process should perform his work with knowledge of the use of the accounting statements and should take particular care to ensure that nothing contained in the statements will ordinarily mislead anybody. This he can do honestly by satisfying himself that.

1. The accounts have been drawn up with reference to entries in the books of accounts;
2. The entries in the books of account are adequately supported by underlying papers and documents and by other evidence.
3. None of the entries in the books of account has been omitted in the process of compilation and nothing which is not in the books of account has found place in the statements.
4. The information conveyed by the statements is clear and unambiguous;
5. The Financial statement amounts are properly classified described and disclosed in conformity with accounting standards; and

6. The statement of accounts taken as a whole, present a true and fair picture of the operational results and of the assets and liabilities.

The aforesaid definition is very authoritative. It makes clear that the basic objective of auditing, i.e. expression of opinion on financial statements does not change with reference to nature, size or form of an entity. The definition given in AAS-1 is restrictive since it covers financial information aspect only. However, the scope of auditing is not restricted to financial information only but, today; it extends to variety of non-financial areas as well. That is how various expressions like marketing audit, personnel audit, efficiency audit, Cost audit, etc, came into existence.

8.3 COMPULSORY AUDIT

Compulsory audit in the case of companies was introduced by the Companies Act, 1956 with specific provisions as to maintenance of books of accounts, and audit. Accordingly only, independent persons duly qualified and trained in the profession can act as statutory auditor in the case of a company. The scope of duties, rights, and liabilities of the auditor and requirements as to annual accounts and the audit report has also been enlarged.

In 1949, Parliament enacted the Chartered Accountants Act which was vested the management and control of accounting profession in the members of the profession. Accordingly, the Institute of Chartered Accountant of India (ICAI) was set up under the Act in Delhi. The affairs of the ICAI are managed and controlled by Council comprising elected representatives of Chartered Accountants and nominees of Central Government. The Council lays down standards of education, training, professional conduct and discipline. The ICAI has issued a number of statements on Auditing, Statements standards (AS) for guidance of the members of the profession.

The companies Act 1956, also prescribes a cost audit the case of specified companies to be conducted by a cost and works Accountant within the meaning of the Cost and Works Accountants Act, 1959. The Income – Tax Act, 1961, has also made the audit of accounts of certain assesses compulsory. .

8.4 THE AUDITOR

The person conducting audit is known as the auditor. He makes a report to the person appointing him after due examination of the accounting records and the accounting statement in the form of an opinion on the financial statements. The opinion that he is

called upon to express is whether the financial statements reflect a true and fair view. Auditing, especially of companies and for public purposes has become the preserve of persons having recognized professional training and qualification. In India, under the authority of the Companies Act, 1956 only Chartered Accountants are professionally qualified for the audit of the accounts of companies. Chartered Accountants are in a position to undertake auditing of almost any accounting aspect, unlike cost accountants, whose sphere has been restricted to audit of the cost accounting records and statements.

8.5 COST AUDIT

Cost Audit is defined as the verification of correctness of cost records and check on the adherence to the cost accounting plan. It is the audit of cost records. It is an audit process for verification of the cost of manufacture or production of any article on the basis of accounts relating to utilization of material, labour and other items of cost maintained by the company with the accepted principles of cost accounting. Thus, Cost Audit is an audit of efficiency. It is mainly a preventive measure, a guide for management policy and decision, in addition to being a barometer of performance of a company.

8.5.1 Objectives of Cost Audit:

The Objectives of cost audit are:

1. Verification of cost accounts with a view to ascertain that those have been properly maintained and compiled according to the cost accounting system.
2. Ensure that the prescribed procedure of cost accounting is duly adhered to,
3. Detection of errors and frauds.
4. Determination of inventory valuation
5. Facilitating the fixation of prices of goods or services.
6. Periodical reconciliation between cost accounts and financial accounts.
7. Ensuring optimum utilization of human, physical and financial resources of the company.
8. Detection and correction of abnormal losses.
9. Inculcation of cost consciousness.
10. Advising management as regards the areas where performance calls for improvement.

The Central Government may, if it considers it necessary, direct that the audit of cost accounts kept by a company under section 209(1) (d) shall be conducted by a cost accountant within the meaning of the Cost and Works Accountants, Acts, 1959, in such manner as may be prescribed. Such direction may in relation to a company engaged in production, processing, manufacturing or mining activities, require specified particulars relating to material, labour or other items of cost. The Central Government has from time to time framed rules regarding the particulars as to the books of account relating to cost, to be kept by a company.

8.5.2 Qualifications of Cost Auditor: Section 233 B (1)

The person to be appointed as Cost Auditor of a company is required:

- (a) To be Cost Accountant within the meaning of the Cost and Works Accountants Act.1959 and
- (b) To hold a certificate of practice issued by the Institute of Cost and Works Accountants of India.

The Cost Auditor may be an individual Cost Accountant or a firm of cost accountants with a least two partners. A firm of cost accountants is required to be constituted with the previous approval of the central government.

8.5.3 Disqualifications of Cost Auditor:

According to Section 233 B (5) , the following persons cannot be appointed or reappointed to conduct audit of the Cost Accounts of a company :

- (a) A person who has been appointed to conduct the audit of a company under section 224 (Financial Audit)
- (b) A body Corporate
- (c) An officer or employee of a company
- (d) A person who is a partner or who is in the employment of an officer or employee of the Company
- (e) A person who is indebted to the company for an amount exceeding Rs1000 or who has given any guarantee, or provided any security in connection with the indebtedness of any kind of any third person to the company for an amount exceeding Rs1000.
- (f) A person who is disqualified for any of the above reasons for appointment as auditor of any subsidiary or holding company of such company.

8.5.4 Appointment of Cost Auditor:

According to Section 233 B (2), the cost auditor is to be appointed by the Board of Directors with the previous approval of the central government. The appointment of the Cost Auditor is valid only for the year for which he has been appointed. The Board of Directors is free to appoint a different person as a Cost Auditor in the subsequent years.

8.5.5 Ceiling on Number of Cost Audits:

The Ceiling as regards the number of Cost Audit shall with the passing of the Companies (Amendment) Act, 1988 be the same as of audits under section 224 (1-B) . However, before the appointment of any cost auditor is made by the Board, a written certificate shall be obtained from the Auditor to the effect that the proposed appointment , if made, will be in accordance with the ceiling prescribed in the case of an auditor under section 224 (1 – B). However, before the appointment of any cost auditor is made by the Board, a written certificate shall be obtained from the Auditor to the effect that the proposed appointment, if made will be in accordance with the ceiling prescribed in the case of an auditor under section 224(1- B)

8.5.6 Cost Audit Report:

The Central Government has issued Cost Audit Report Rules 1968 which specify the form of the report to be made by the cost auditor. The report must be submitted to the Central Government (Company Law Board) in the prescribed form and in accordance with the procedure laid down in the schedule annexed to the Rules. The report should also be submitted to the company with 120 days of the closing of the year to which the cost audit relates. To ensure that the auditor is enabled to complete his work in time, there is a provision that requires the company and every officer of the company to make available to the auditor within 90 days from the end of the financial year, all cost accounting records, statements and other necessary books and papers , that may be required for the purpose of cost audit.

8.6 AN EFFICIENCY AUDIT

Efficiency audit ensures “application of the basic economic principal viz, resources flow into the most remunerative channels. The main purpose of efficiency audit is to ensure that (a) every rupee invested in capital or in other fields gives the optimum returns and (b) the planning of investment between the different functions and aspects is designed to give optimum results”.

Thus, cost audit can appropriately be called an “efficiency audit”. The very purpose of introduction of cost accounting records, was to enable carrying out efficiency audit. The following are further evidences to prove the cost audit can be called an efficiency audit.

1. The cost audit report under para 4 of the annexure reflects the installed and actual capacity utilized. It also analyses the reasons for shortfall in actual capacity utilization as compared to installed capacity. The immediate problem facing our economy is underutilization of capacities in all sectors. A study of cost audit reports can bring to light the broad factors responsible for underutilization. In fact, such an analysis was made by the government and presented to parliament in 1981 which provided valuable information regarding reasons for underutilization of installed capacity:
2. Under para 6 of the annexure to cost audit report an analytical study of the consumption of raw materials per unit of production both in quantity and in value is made. The cost auditor is also expected to compare the consumption with standards, if any, as well as with the corresponding figures for the previous two years. The cost auditor has to offer his comments on the variation in the consumption. A careful study of these comments can identify areas where wastage of raw material occurs and can bring to focus the most efficient units in material consumption.
3. The cost auditor is expected to comment on the consumption of energy power and fuel in total as well as per unit of output. Power and fuel are the vital inputs for industry. With the imperative need for conserving energy for better utilization, this information is bound to be great use to anyone who analyses the cost audit report. The para relating to power also contains detailed workings regarding the cost of generated power and a comparative study can bring about better utilization by drawing lessons from efficient units.
4. A manufacturing establishment should keep its plant and machinery in a good state so that the productivity of the machines is not allowed to deteriorate. For this purpose, a study of repairs and maintenance expenses would be helpful. The cost audit report contains information regarding consumption of stores and spares per unit of output which serves as a good indicator of the state of repairs and maintenance in the company.
5. A sound financial management is reflected in the maintenance of minimum inventory of stores and spares. The cost audit

report contains information regarding the extents and proportion of non-moving items of materials as stores and spares as compared to the total inventory. Many companies were able to unearth their dead inventories through this comment on non – moving items;

6. The cost accounting record rules also envisage maintenance of log books showing detailed analysis of downtime i.e. time of idleness of machines. An analysis of the log books linked up with reasons for underutilization of capacity will provide a sound base for assessing the factors responsible for lower production and lower levels of activity.
7. Particulars of export sales and profitability from exports sales after taking into account expenses on exports are also available in the cost audit report. One major outgo from the central revenue is on account of cash incentives and duty drawbacks on exports. To what extent the industry is justified in taking these export benefits could be known by studying para 13 of the cost audit report giving the profitability or otherwise of exports for the company;
8. A Cost auditor is expected to offer comments on various matters like rectification of imbalances in production facilities, fuller utilization of installed capacities, cost of production, increased productivity, limiting factors causing production bottlenecks and improved inventory policies.
9. A cost auditor is also expected to offer his comments on the budgetary control systems and internal audit systems, if any, prevailing in the organization. A good control system is an instrument for achieving managerial objectives;
10. The flow of information from different units of the industry into the government departments provides the best means for carrying out an inter-firm comparative study of cost structure and other related aspects. Though inter- firm comparison is a difficult exercise because of situations not being comparable, at least the comparable ones can be isolated, and useful conclusions can be drawn, the system of cost audit has facilitated this exercise. The industrial scene is dominated by the public sector. The need for improving efficiency and cost reduction in public sector undertakings has been emphasized by the government from time to time. There is no other better instrument than an independent cost specialist monitoring the behavior of cost from time to time.

8.7 COST AUDIT V/S FINANCIAL AUDIT

A Financial audit under the Companies Act, 1956 can be described as an examination of books and vouchers of a business or undertaking to enable the auditor to satisfy himself whether the accounts thereof are properly drawn up so as to exhibit a true and fair view of the state of affairs of the company. The end product of a financial audit is a report expressing an opinion as to whether.

1. The balance sheet and profit and loss account give a true and fair view of the financial position and profit /loss respectively.
2. The necessary records as prescribed by law have been maintained or not, and
3. The balance sheet and profit and loss account are in agreement with the books of accounts.

In addition, the financial auditor should also express himself on matter contained in the Manufacturing and Other Companies (Auditor's Report) Order, 1988 as well as those contained in Section 227 (1A) of the Companies Act,1956. The Financial Auditor, a practicing chartered Accountant, is appointed by the shareholders and hence he reports to them. This is applicable to all companies irrespective of size and nature of operations.

Statutory cost audit is a "System of audit introduced by the Government of India for the review, examination and appraisal of the cost accounting records and attendant information required to be maintained by specified industries."

From the above definition, it would be evident that this audit is applicable only to companies engaged in manufacture of specified products. Cost Audit results in a report by the cost auditor which inter alia contains an independent opinion as to whether:

1. The cost records as prescribed by law have been maintained or not:
2. The cost statements give a true and fair view of the cost of production, processing and marketing of the product under audit.

In addition the auditor should also provide information regarding various matters as specified in the format of annexure to the cost audit report.

Cost Audit, thus, is product – oriented as compared to financial audit which is organization – oriented. Of course, cost audit would be with reference to each company, but limited to the

particular industrial activity of which the audit is ordered to be carried out. The prerequisite for cost audit is that the company should be engaged in the manufacture of a product for which cost accounting record rules have been prescribed.

Cost audit is not necessarily a regular annual exercise as it is to be carried out only in case the government orders a company to get the cost audit done. It is, however, open to a company to get a cost audit carried out voluntarily in which case the report need not be submitted to the government. Recently, the government has decided to order cost audit annually.

Thus, broadly, financial audit is concerned with auditing all the income and expenditure to certify the working results and financial position of the organization as a whole whereas cost audit is concerned with auditing of allocation and apportionment of expenses under natural heads to determine the cost of functions, products and services, with reference to a particular product or service.

Check Your Progress:

- 1) Define the terms.
 - a) Auditing
 - b) Auditor
 - c) Cost Audit
 - d) Cost Audit Report
 - e) Efficiency Audit
- 2) Give the provisions for compulsory Audit.

8.8 SCOPE AND FUNCTIONS OF COST AUDIT

The Government of India has taken steps to study the cost structure of certain basic industries such as coal, sugar, drugs, tyres, cement etc. and to administer the prices charged by these industries. Such control is aimed at assuring a fair price to the consumer and a fair return to the manufacturer. It also enables the government to adjust its tax and tariff policies in respect of these industries in the larger interests of society. Statutory provisions as regards cost audit were introduced by the Companies (Amendment) Act 1965, Section 209 (i) (d) deals with provision relating to cost records and section 233 B deals with audit of cost accounts in the cases of specified industries.

8.9 ORGANIZATION FOR AND CIRCUMSTANCES FAVORING COST AUDIT

There are a number of manufacturing undertakings with poor capacity utilization and a very poor return on capital employed.

Crores of rupees are being lost in these undertakings for which the responsibility needs to be fixed. The Central Government is working on a document on the accountability structure, wherein the role of responsibility accounting will be underlined. Incidentally, the role of cost accounting and cost audit should also get emphasis in this process. The Department of Public Enterprises whose function it is to monitor the performance of public sector undertakings had been emphasizing the significance of the maintenance of cost accounting records as well as the introduction of standard costing in every public sector undertaking to ensure effective utilization of scarce resources.

8.10 BENEFITS OF COST AUDIT

Audits as an Aid to Government:

Normally, the price of any commodity is determined by demand and supply. The seller cannot charge any price he wants nor can the consumer get the commodity at any price he would like to pay. Yet the price will settle at that level where the demand and supply are at equilibrium. In a controlled economy like ours, where there are shortages in many items, capacities are not fully available to meet the increasing demand, in order to protect the interest of the consumers who have limited purchasing power and also to render justice to the producers, the government intervenes and regulates the price of some commodities. A number of essential commodities like sugar, drugs, kerosene, petroleum, etc, are still under the administered price of certain items under surveillance. Thanks to these measures both the consumer and the producer are hoping for a fair deal.

In fact, price fixation is not only confined to the industrial sector but also extends to the agricultural sector as well. It is in this situation that cost is a relevant factor for price fixation.

Though, originally, cost audit was not intended to be used for price fixation by the government there has been a constant apprehension that this audit is aimed at regulating the prices of commodities. In fact, the government initiates independent studies of cost of production of any commodity as and when the need for price fixation is considered. Though the government takes up the study at the industry level and not at unit level, the basic cost data has to emerge only from the units for which the infrastructure is already laid through the Cost Accounting Record Rules.

As already referred to, one copy of the report of the cost auditor of every company as and when carried out is passed on by the Department of Company Affairs to the Bureau of Industrial Costs and Prices (BICP), which is the investigating and

recommending agency before prices are fixed for industrial products. The BICP adopts its own procedures for cost study before recommending a price. These procedures are not necessarily based on the contents of the cost audit report. However, the cost audit report can be and is being used as a good source of material by the BICP while making the cost studies. In particular, the investigator can cross – check information regarding the extent of capacity utilization, manufacturing process, extent of raw material wastage, extent of power consumption and the extent of inputs, i.e. other elements of cost like depreciation overheads, store consumption, etc. This will enable the investigator to further probe in detail into certain submissions of the industry or to have the information without extra effort since these cost studies are time bound. Based on the findings in the cost audit report, he may equitably distribute his time to the areas to be covered by him in the cost examination.

From the point of view of the industry also, the cost audit report can come in handy to put across any point of view which may be the area of deliberations while recommending the price, BICP offers ample opportunity to the industry to prove with facts and figures the cost actually incurred by the industry for which an authenticated document bound to be useful. For example, the extent of raw material wastage or scrap, the extent of power consumption, the extent of capacity utilization are some of the matters, in which authentic data would be available to quote. In fact, those industries and those sectors like co operative which are not covered under the cost audit feel themselves handicapped to take up issues since they lack the relevant information. This is particularly so where there is apportionment of common expenses between two or more activities, In the cost audit report there is a specific proforma which provides for apportionment of total expenses of the company between the product under cost audit as well as other activities.

What is important to note is that since cost audit report is not prepared keeping specifically price- fixation in view as an objective, the data contained in the report is bound to be unbiased not skewed to any particular purpose.

To improve the profitability of the public sector, the only acceptable solution is cost reeducation/control through cost accounting and audit.

In the matter of corporate taxation, it is widely known that unscrupulous managements manipulate the taxable profit by fudging the figures of inventory. If there is a foolproof mechanism for inventory valuation, the manipulation can be detected. A system of cost accounting and cost audit can only ensure a proper

valuation including that of work in progress. The authentication for inventory values by cost accountants was recommended by the High Powered Committee on Company Law as early as in 1977 because of this potential, thus ensuring the due revenue to the Government.

In the area of indirection taxation since excise duty and customs duty are linked to materials and since material accounting is the main area of activity of cost accountants, they can provide authentic data to facilitate proper assessment by the authorities. These authorities have now started depending upon cost accounting statements in their functioning.

Generation of black money through unauthorized use of installed industrial capacity is being adopted certain unscrupulous managements. These unauthorized usages can be detected only by putting the inputs and outputs against each other as well as scrutiny of the Log Books and other books and other records. This falls within the area of cost accounting and cost audit and hence can make a direct contribution to government revenues.

The Government is doing out subsidies and reliefs without any mechanism for checking whether such subsidies/reliefs go only to deserving hands. In actual practice, one finds that even profitable companies are enjoying these incentives. Information regarding product-wise profitability on exports is available in the cost audit report which can be made use of to ensure that the subsidy goes only to units which actually suffers a loss in exports.

It goes to the credit of cost accountancy that in India the government has recognized the utility of cost accounting in this regard. The Income Tax Act has provided that every income tax return from a company shall be accompanied by a copy of the Cost Audit Report in case the Company is subject to cost audit. Similarly the Finance Bill, 1995 has now provided through an amendment of Section 14(a) of the Central Excise and Salt Act that in the process of assessment of Central Excise, to facilitate the assessment, the assessing officer can order an audit to be carried out by a practicing cost accountant and his report can be made use of for the assessment purpose. This measure enables cost accounting to make a direct contribution to the revenues of the Government.

This audit has assumed greater significance with the recognition of consumer's rights with the coming into force of the Consumer Protection Act. It is declared that the consumer is entitled to know about the quantity, quality and price in all of which there should be a fair deal to the consumer. Whereas quantity and quality can be taken care of by prescribing proper weights and measures combined with realizable testing arrangements through

recognized laboratories, reasonableness of price can be tested only through proper cost determination. A consumer cannot have easy access to cost information. The only public source of information is the Cost Audit Report.

Utility to the consumers:

A copy of the cost audit report is sent to the concerned administrative ministers. It is possible for such a ministry to find out whether a company is profiteering by increasing its prices disproportionate to the increase in cost of production. Such pricing practices are already regulated by the MRTP Act as a monopolistic trade practice. Such instances of profiteering and anti-consumer measures need to be curbed immediately. The handicap with the Government is the lack of information in this regard. Since authentic information is available in the cost audit report regarding product cost, price and profits for two years, effective steps can be taken both by the Administrative Ministry as well as by the MRTP commission.

As an Aid to Shareholders:

There has been a rapid growth in the corporate sector with more and more companies tapping the capital market. The shareholders have to be provided with reliable information about the performance of their company at least annually. Presently the information contained in the annual reports is scanty and distorted. The cost auditor and his report are kept away from the shareholders. Though the industry is agreeable to provide aggregated performance figures of the group, no steps are taken to provide segmental information to shareholders. Cost Audit Reports contain a wealth of information regarding each product and its profitability. It also reveals areas of waste and inefficiency with regard to each input, viz men, material and machines. The Companies Amendment Bill, 1993, has now proposed that the cost auditor will be appointed by the shareholders and his report at least in condensed form will be available to them. Care has to be taken to ensure that confidential information is not published in the competitive atmosphere, but at the same time sufficient information to the shareholders to enable them to make an overall performance appraisal of their elected representatives, viz, the Directors, has to be provided. The report should cover each activity of the company duly linked with the overall working results of the company. In case of manufacturing activity, it can provide the capacity utilization for each product and reasons, for underutilization of capacity. Information regarding energy conservation could also be reflected. The report can also contain data regarding profits, generated from domestic and export sales. A statement regarding the trend of costs compared to the previous year could also be given. All these

areas are suggested keeping in view the confidentiality of information in a competitive atmosphere. It may also be kept in view that all the above information cannot be found from the financial report and they can be straightway worked out and consolidated from the detailed cost audit report submitted to the government.

8.11 COST AUDIT PROGRAMME

Planning for cost Audit involves working out a programme for carrying out the audit. The programme should cover audit of various elements of cost and sales which are normally prescribed in the cost accounting record rules. They are:

1. Raw Materials, bought out components and process materials.
2. Consumable stores, Small tools, etc
3. Salaries and Wages
4. Other direct expenses
5. Depreciation
6. Factory Overheads
7. Administration overheads
8. Selling and distribution overheads.
9. Quantitative data regarding production etc.
10. Sales details (quantity and value)
11. Physical inventory of finished goods and work in progress.

8.12 PROVISIONS REGARDING COST ACCOUNTS AND AUDIT

The 1965 amendments to the Companies Act Introduced two provisions with reference to cost accounting and cost audit. The amendment to introduce maintenance of cost accounting records compulsorily on a regular basis was achieved by inserting sub-clause (d) in Section 209(1) of the Companies Act , 1956 . This section basically deals with the maintenance of books of account by a company. After the introduction of sub – clause (d), Section209(1) reads as follows:

“Every company shall keep as its registered office proper books of account with respect to:

- (a) all sums of money received and expended by the company and the matters in respect of which receipt and expenditure take place;
- (b) all sales and purchases of goods by the company ;
- (c) the assets and liabilities of the company; and

(d) in the case of a company pertaining to any class of companies engaged in production, processing, manufacturing or mining activities, such particulars relating to utilization of material or labour or to other items of cost as may be prescribed if such class of companies is required by the central government to include such particulars in the books of account.”

It may be noted that, by the introduction of the above sub – clause, the central government has acquired the power to prescribe certain cost particulars to be included in the accounting records by companies engaged in specified industries as may be notified from time to time. Thus, the actual prescription of the cost data is not contained in section 209(1) (d) of the Companies Act but in the cost accounting record rules prescribed by the government from time to time.

The power to prescribe the cost accounting record rules is also derived by the central government by virtue of the general power contained in Section 642(1) of the Companies Act, 1956 which provides that the central government may, by notification in the official gazette, make rules to cover all or any of the matters which are to be or may be prescribed by the Central Government and generally to carry out the purposes of the Act. Thus, the cost accounting record rules are prescribed in accordance with Section 642(1) read with Section 209(1) (d) of the Companies Act, 1956

1. The central government derives the power to order any company falling under Section 209 (1) (d) to get the cost accounts audited by a Cost Accountant within the meaning of the Cost and Works Accountant Act 1959.

2. The cost auditor shall be appointed by the board of directors, of the company with the previous approval of the Central Government.

3 The powers and duties of the cost auditor in relation to this audit are the same as of financial auditor but the cost auditor shall submit his report to the central government with a copy to the company at the same time. The report shall be submitted in the prescribed form and within the prescribed time. According to a notification issued later, three copies of the report need to be submitted to the government.

4. All the disqualifications which are applicable to a financial auditor are also applicable to cost auditor. In addition, a financial auditor cannot also be appointed as a cost auditor of the same company. If a person is disqualified on the above grounds subsequent to his appointment, he shall cease to conduct the cost audit of that company. Incidentally, a cost auditor cannot be

appointed as internal auditor, which in other words means that an internal cannot be a cost auditor also.

5. It shall be the duty of the company to give all facilities and assistance to the person appointed for conducting the cost audit.

6 The company shall within 30 days from the date of receipt of a copy of the cost audit report furnish to the Central Government full information and explanation on every reservation or qualification contained in the said report.

7. The Central Government may, after considering the report, call for any further information or explanation and thereupon the company shall furnish the same within such time as may be specified.

8. After receiving any such further information and explanation, the Central Government may take action on the report in accordance with any law in force for the time being.

9 The Central Government may direct the company concerned to circulate to its members along with the notice for the annual general meeting, the whole or such portion of the cost audit report as it may specify.

10. Penalty for contravention of any of the provisions of this section can extend up to Rs 5,000 for the company, and for every officer of the company who is in default, imprisonment upto 3 years or a fine which may extend to Rs 5,000 or with both.

FORM OF COST AUDIT

I/we..... having been appointed as Cost Auditor(s) , under Section 223 B of the Companies Act 1956, of..... (mention name of the company) having its registered office at(mention registered office address of the company) (herein after referred to as the company), have examined the books of accounts prescribed under clause (d) of subsection (i) of section 209 of the said Act, and other relevant report for the year ended.....(mentioned the financial year) relating to (mention name of product) maintained by the company and report, subject to my/our comments under the heading “ Auditor’s Observations and Conclusions’ contained in the Annexure to this report , that –

(a) I /we have/have not obtained all the information and explanations, which to the best of my/our knowledge and belief were necessary for the purpose of this audit;

(b) Proper cost accounting records as required under clause (d) of sub-section(i) of section 209 of the Companies Act, 1956 have/have not been kept by the company;

(c) Proper returns adequate for the purpose of my/ our Cost Audit/have/have not been received from branches not visited by my/us;

(d) the said books and records give/do not give the information required by the Companies Act, 1956 (1 of 1956) in the manner so required;

(e) in my/our opinion, the company's cost accounting records have /have not been properly kept so as to give a true and fair view of the cost of production, processing, manufacturing or mining activities, as the case may be, and marketing of the product under reference ; and

(f) the cost statements in respect of product under reference as specified in the Annexures / Proforma of Schedules I and II of the Cost Accounting Records (.....) Rules duly audited by me/us are/are not kept in the company.

The matters contained in the Annexure and proforma to this report form part of this report, which is also subject to my/our observations made there in.

Dated this..... date of19..... At

(Mention name of place of signing this report)
COST AUDITORS (S)

Note:

(1) Delete in applicable words.

(2) Specify the title of cost Accounting Records Rules made under Clause (d) of subsection (1) of Section 209 of the Companies Act, 1956 which are applicable to the product of the company.

8.13 THE COST AUDIT REPORT RULES

In exercise of the powers conferred by subsection (4) of section 233 B, read with subsection (1) of section 227 and clause (b) of subsection (1) of section 642, of the companies Act, 1956 (1 of 1956), and in supersession of the Cost Audit (Report) Rules, 1968, except as respect things done or omitted to be done, before such supersession , the central Government hereby makes the following rules, namely :

1. Short title and Commencement:

- (1) These rules may be called the Cost Audit (Report) Rules, 1996.
- (2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions: In these rules, unless the context otherwise requires:

- (a) “ Act” means the Companies Act,1956 (1 to 1956);
- (b) “Cost Auditor” means the auditor appointed under subsection (l) of section 233 B of the Act;
- (c) “ Form” means the Form of Cost Audit Report specified in the schedule; and includes Annexure to the Cost Audit Report and proforma Specialized in the Schedule;
- (d) “ Product Under reference” Means the product to which the rules made under clause (d) of subsection (1) of section 209 of the Companies Act, 1956 (1 to 1956) apply;
- (e) “Schedule” means schedule annexed to these rule;
- (f) All other words and expressions used in the rules but not defined, and defined in the Act and rules made under Section 209 of the Act shall have the same meanings respectively assigned to them in the Act or rules, as the case may be.

3. Application :

These rules shall apply to every company in respect of which an audit of the cost accounting records has been ordered by the Central Government under Subsection (1) of section 233 B of the Act.

4. Form of Report :

- (1) Every Cost Auditor who conducts an audit of the cost accounting records of the company shall submit a report in triplicate to the Central Government in the Form (including Annexures and proforma) In accordance with the procedures specified in the Schedule annexed to these rules and at the same time forwarded a copy of the report to the company.
- (2) Every Cost Auditor, who submits a report under sub rule (1) , shall also give clarifications, if any, required by the Central Government on the Cost Audit Report submitted by him, within thirty days of receipt of the communication address to him calling for such clarifications.

5. Time Limit for Submission of Report :

The Cost Auditor shall send his report referred in sub rule (1) of rule 4 to the Central Government and to the concerned company within 180 days from the end of the company's financial year to which the cost Audit Report Relates.

6. Cost Auditor to be furnished with the cost Accounting records etc(1)

Without prejudice to the powers and duties the cost Auditor Shall have under subsection, (4) of section 233 B of the Act, the company and every officer thereof, including the persons referred to in subsection (6) of section 209 of the Act, shall make available to the cost auditor within 90 days from the end of the financial year of the company such Cost Auditor so as to enable him to complete the cost audit and sent his report within the time limit specified in rule 5.

If the cost accounting records , cost statements, other books and papers are not made available by the company within the time limit specified in sub rule (1) the Cost Auditor shall intimate the fact of not having made available to him such records, statements , books and papers to the Central Government within ten days after expiry of limit of 90 days specified in sub rule (1)

7. Penalties:

(1) If default is made by any Cost Auditor in complying with the provisions and rule 4 or rule 5, he shall be punishable with fine which may extend to five hundred rupees.

(2) If a company contravenes the provisions of rule 6 the company and every officer of the company including the persons referred to in subsection (6) of section 209 of the Act, who is in default, shall subject to the provisions of section 233 B of the Act , be punishable with fine which may extend to five hundred rupees and where the contravention is a continuing one, with a further fine which may extend to fifty rupees for every day after the first day during which period such contravention continues.

8. Saving :

Saving of action taken or that may be taken for contravention of the Cost Audit (Report) Rules 1968 – It is hereby clarified that the supersession the Cost Audit (Report) Rules, 1968 as amended from time to time, shall not in any way affect:

(i) Any right, obligation or liability acquired , accrued or incurred there Under :

(ii) Any penalty, forfeiture or punishment incurred in respect of any contravention committed there under:

(iii) Any investigation, legal proceeding or remedy in respect of any such right, privilege, obligations, liability, penalty, forfeiture or punishment as aforesaid, and; any such investigation, legal proceeding or remedy may be instituted, continued or enforced and any such penalty, forfeiture or punishment may be imposed as if those rules has not been superseded.

Check Your Progress:

- 1) Give names.
 - a) Department of Company Affairs.

8.14 COST INVESTIGATION

A cost accountant is often faced with a problem of determining out of control situations. It is enough to warrant management's attention and further investigation is ordered. The investigative attention and further investigation is ordered. The investigative efforts are directed towards a particular out of control situation when incremental benefits promise increase in the incremental costs. There exists reason to determine tolerance limits or range. If any variance falls within the range it can be considered acceptable or normal. If the variance falls beyond tolerance limits an investigation should be made provided the benefits of investigation justify the cost.

The basic problem is that when a cost variance is reported to a manager, he should investigate to find out when actual and standard differ. Decision is taken either for investigation or disregarding the variance. Investigating every adverse variance is a wastage of time and other resources. Investigation costs money and at times benefits obtainable from control action on those occasions, when control action turns out to be possible, may not justify these costs.

There are some of the cost investigation model as follows:

i) Materiality Significance Model:

It means deciding the limit of cost variance. If the size of variance happens to be within the limit then it can be considered immaterial. It is considered materially significant and worthy of investigation only a standard cost but also of a standard deviation for the expected dispersal of actual costs around the standard. A standard is an average costs and some dispersal of actual around the average must be expected when the costs are under control.

ii) Control Chart Model:

Control charts can be used to show variances. Investigation can be signaled by making control limits and the chart. When a variance exceeds the control limit and when the trends of variances show a progressively worsening movement in actual results though the variance in any single period has not overstepped the control limit.

iii) Cost benefit analysis of variance investigation model:

In this model decision on whether variance is worth investigating is taken based on expected cost of investigation and control and expected benefits from control action. An investigation can be undertaken if the expected benefits from the investigation exceed the cost of searching and correcting the source of cost variance.

iv) Statistical Significance Model:

This model relies on the measurement not only standard cost but also of standard deviation for the expected dispersal of actual cost around the standard. The standard is an average cost and some dispersal of actual cost around the average must be expected when the costs are under control.

8.15 EXERCISES

1. Choose the right answer from the Following:

- a) Compulsory audit in the case of companies was introduced by the
 (i) Government (ii) Reserve Bank (iii) Companies Act.
- b) Is the verification of correctness of cost records and check on the adherence to the cost accounting plan?
 (i) Cost Audit (ii) Financial Audit (iii) Management Audit.
- c) The cost Auditor is to be appointed by the with previous approval of the Central Government.
 (i) Shareholders (ii) Board of Directors (iii) Reserve Bank
- d) The cost Audit Report must be submitted to
 (i) Shareholders (ii) Board of Directors (iii) Central Government

(Ans – a – iii, b – i, c- ii, d- iii)

- 2) Answer in one sentence only
 - a) What is cost Audit?
 - b) What is an efficiency Audit?
 - c) What are the objectives of cost Audit?
 - d) What is compulsory audit?
 - e) Who can act as a cost auditor?
3. What is cost Audit? What are the objectives of cost audit?
4. Distinguish between cost audit and financial audit.
5. What is an Audit Report? Explain the objectives and contents of cost audit report?



SYLLABUS**M. Com. Part - I****Paper 2- Advanced Cost Accounting (100 Marks)****1 Process Costing**

Essential characteristics of Process Costing Comparison of process costing and job costing, Inter process profits, Work in progress and equivalent production, Practical problems.

2 Operating Costing

Meaning of operating costing, Determination of per unit cost, Collection of costing data Practical problems based on costing of hospital, hotel, and goods and passenger transport

3 Integrated accounts

Meaning, Advantages and disadvantages. Distinctive features, practical problems

Non integrated system of accounts

Cost control accounts to be prepared, Journal entries, practical problems

4 Marginal costing and absorption costing

Meaning of absorption costing, distinction between absorption costing marginal costing, Theory and problems on Breakeven Analysis. Cost Volume Profit Analysis, Breakeven Charts, Contribution margin and Various decision making problems.

5 Managerial Decisions

Managerial Decisions through Cost accounting such as Pricing Accepting special Offer, Profit planning. Make or Buy decision, Determining key-factor, Determining Sales-mix, determining optimum Activity Level, performance Evaluation, Alternatives methods of Production, Cost reduction and cost Control.

6 Standard Costing

Standard Costing as an Instrument of Cost Control and Cost Reduction. Fixation of Standards. Theory and problems based on Analysis of Variances of Sales, Materials, Labour and Overheads.

7 Budgetary Control

Budget and Budgetary control, zero based budget, Performance budgets, Functional Budgets Leading to the Preparation of Master Budgets, Capital Expenditure Budget. Fixed and flexible Budgets and preparation of different types of budgets.

II

8 Cost Audit

Cost and efficiency Audit, Cost Audit vis-à-vis Financial audit, special Characteristics, Scope And Functions of Cost Audits, Organizations For and Circumstances favouring cost audits, Benefits of Cost audits, Cost audit programme and Procedure, External or Statutory Cost Audit, provision of Cost audit in companies Act and cost Audit (reporting) Rules, Cost investigation.

PATTERN OF QUESTION PAPER

Maximum Marks	100	Duration	3 Hours
No of questions to be asked			9
No of question to be answered			6
Question No. 01 Compulsory Practical question			20 Marks
Question No.02 Compulsory Objective			16 Marks
Question No. 03 to Question No. 09			16 Marks each

Notes :-

- 1) From Question No. 03 to Question No. 09 not more than one question may be theory including short problems/questions.
- 2) Student to answer any four out of Question No. 03 to Question No. 09
- 3) Objective questions to be based on all topics and include Inter alia question like:-

A) Multiple choice B) Answer in one sentence

Costing Recommended Books

Lecture on costing by Swaminathan published by S. Chand & Co.

Practical costing by Khanna Pandey and Ahuja published by S. Chand & Co.

Cost Accounting by C s Rayudu published by Tata McGraw Hills

Cost Accounting by Jawaharlal published by Tata McGraw Hills

Theory and problems of Cost and Management accounting by M Y Khan and P K Jain published by Tata McGraw Hills

Cost Accounting by Ravi M Kishore published by Taxmann Ltd.

Cost Accounting by N K Prasad

Cost Accounting – Theory and Practice by B K Bha

III

Cost Accounting – Theory and Practice by M N Arora published by
Practical Costing by P C Tulsian published by Vikas Published
house

Cost Accounting – Text and problems by M C Shuk a, T S Grewal
M P Gupta published by S. Chand

Cost accounting – Problems and solutions by V K Saxena C D
Vashist published by S. Chand

Cost Accounting by S P Jain and K L Narang published by Kalyani

Cost Accounting – Principles and practice by M N Arora published
by Vikas

Principles of Management Accounting by Anthon, Robert published
by Richard Irwin Inc.

Cost Accounting – A. Managerial emphasis by Horngreen, Charles,
Foster and Datar published by Prentice Hall of India.

Management Accounting by M Y Khan and P K Jain published by
Tata McGraw Hills

Advanced Management accounting by R S Kapllan and AA
Atkinson prentice India international

Advanced problems and solutions in Cost Accounting by S N
Maheshwari published by Sultan Chand.



QUESTION PAPER - APRIL 2011

TIME - 3 HOURS

TOTAL MARKS 100

- N.B.** 1) Q. No. I and II are **compulsory**. Attempt any **four** questions from the **remaining**.
- 2) Question No. I carries 20 marks and all remaining questions carry 16 marks each.
- 3) **All** Sub-questions carry equal marks unless specified to the contrary.
- 4) Workings to form part of the solutions and necessary assumptions to be made and stated clearly.

Q.1 M/s Alok Industries has given the following details, find the most profitable product mix and prepare a statement of profitability of that product mix

Particulars	Product "X"	Product "Y"	Product "Z"
Units budgeted to be produced and sold	1,800	3,000	1,200
Selling price per unit (Rs.)	60	55	50
Requirements per unit :			
Direct Materials	5 kg	3 kg.	4 kg
Direct Labour	4 hrs.	3 hrs.	2 hrs.
Variable Overheads	Rs. 7	Rs. 13	Rs. 8
Fixed Overheads	Rs. 10	Rs. 10	Rs. 10
Cost of Direct Material per kg.	Rs. 4	Rs. 4	Rs. 4
Direct Labour Hour Rate	Rs. 2	Rs. 2	Rs. 2
Maximum possible Units of Sales.	4,000	5,000	1,500

All the three products are produced from the same direct material using the same type of machines and labour. Direct labour, which is the key factor, is limited to 18,600 hours.

- Q.2 A)** Choose the correct option and rewrite in full.
- a) In case of operation of a motor vehicle, the following cost would be classified as fixed cost : -
- i) Insurance
 - ii) Change of engine oil after every 5,000 kilometers.
 - iii) Tyre Replacement
 - iv) Petrol

- b)** Under Process Costing, the concept of process cost is based on :
- i) Marginal cost
 - ii) Standard cost
 - iii) Average cost
 - iv) Differential cost
- c)** P/V ratio is indicated in a Break even chart by :
- i) Intersection of Fixed cost and Total cost lines.
 - ii) Intersection of Total Cost and Sales line
 - iii) Angle of Incidence between Total Cost and Sales line
 - iv) Angle between Total Cost and Fixed Cost lines.
- d)** Fixed Overhead Cost Variance is the difference between:
- i) Actual fixed cost and budgeted fixed cost.
 - ii) Actual fixed cost and standard fixed cost
 - iii) Actual Fixed cost and Applied fixed cost
 - iv) Budgeted fixed cost and Applied fixed cost.
- e)** Cost Audit Report is to be submitted by the cost auditor :
- i) to the managing director
 - ii) to the Chief Financial Officer
 - iii) to the shareholders
 - iv) to the Central Government with a copy to the company
- f)** A budget that gives indication of purchases to be made as derived from production figures is known as :
- i) Fixed budget
 - ii) Flexible budget
 - iii) Production budget
 - iv) Purchase budget
- g)** When the variance is due to the difference between actual overhead and applied overhead, it is called as :
- i) Efficiency variance
 - ii) Total overhead variance
 - iii) Spending variance
 - iv) Volume variance

h) Under integrated system of accounting issue of indirect raw material for production is debited to :

- i) Purchases Account
- ii) Work-in-Progress Control Account
- iii) Stores Ledger Control Account
- iv) Works overhead control account.

Q.2 B) Answer the following in brief (in **one** sentences) :

- 1) State any two variable costs of a Hotel.
- 2) Name any two industries where process costing is applicable.
- 3) Name the account which makes the cost ledger self balancing.
- 4) If contribution per unit is known, how will you calculate Margin of Safety (in units)?
- 5) When is the Sales Volume Variance said to be adverse?
- 6) Mention any one budget classified on the basis of coverage.
- 7) Give the formula for "Equivalent Units" under Process Costing.
- 8) Write the formula for calculating Labour Cost Variance.

Q.3 On 30th September, 2009 following was the Balance Sheet of MD Pvt. Ltd.

Liabilities	Rs.	Assets	Rs.
Equity shares (Rs. 10) fully paid	20,000	Equipment (cost) 20,000	
Reserves and Surplus	10,000	Less : Depreciation 5,000	15,000
Creditors	40,000	Stock	20,000
Proposed dividend	15,000	Debtors	15,000
		Bank	35,000
	85,000		85,000

The company is developing a system of forward planning and on 1st October, 2009 it submits the following information :

	Credit sales (Rs.)	Cash Sales (Rs.)	Credit purchases (Rs.)
September 2009 (actual)	15,000	14,000	40,000
October 2009 (budgeted)	18,000	5,000	23,000
November 2009 (budgeted)	20,000	6,000	27,000
December 2009 (budgeted)	25,000	8,000	26,000

On 1st October, 2009 the equipment will be replaced at a cost of Rs. 30,000, Rs. 14,000 will be allowed in exchange for the old equipment and a net payment of Rs 16,000 will be made. Depreciation is to be provided t the rate of 10% per annum.

The proposed dividend will be paid in December 2009.

Wages Rs. 3,000 per month.

Administration Rs. 1,500 per month.

Rent Rs. 3,600 (for the year to 30th September, 2010) to be paid in October, 2009.

You are required to prepare a cash budget for the months of October, November and December, 2009.

Q.4 Pramod Automobiles has been distribution goods to its prominent customer situated at a place 40 kms, away from its own place using a single truck. The truck has been purchased at a cost of Rs. 7,50,000 (excluding tyres), and has a capacity of carrying 10 tonnes of load of goods. It makes the journey twice a day carrying its full load on the outward journey whereas it returns empty. The truck operates five days in a week.

The following is the relevant data for a month equated to a 4-weekly period.

	Rs.
Insurance	9,000 per annum
License, Road-tax	4,000 per annum
Garage rent	1,500 per week
Repairs and maintenance	500 per week
Tyres and tubes	20,000 (Life : 25,000 kms.)
Other Overheads allocated	60,000 per annum
Drivers remuneration	800 per week
Oil	300 per week
Petrol	25 per litre (consumed @ 8 kms. per litre)

The effective life of the vehicle is worth running 80,000 kms. at the end of which the vehicle will have scrap value of Rs. 25,000.

You are required to submit a statement showing the total cost for a month and decide the fare to be charged per tonne km. that allows 20% profit on fares.

- Q.5** The following is the data available of AB Ltd. in respect of Process III for the month of January, 2011.

	Rs.
1. Direct materials	776
2. Direct labour	386
3. Production overheads	768
4. Transfer from Process II : 4,200 units	1,560
5. Transfer to Process IV: 3,650 units	
6. Stock on 1-1-2011 : 600 units (Degree of Completion:	
Materials added in the process	60%
Labour	50%
Overheads	40%) 390
7. Stock on 31-1-2011 : 800 units (Degree of completion:	
Materials added in the process	80%
Labour	70%
Overheads	60%)
8. 350 Units scrapped are fully complete in all respects i.e. materials, labour and overheads.	
9. Normal loss was 10% of the production and units scrapped have a scrap value of Re. 0.10 per unit.	
Prepare Process account along with Statements of Equivalent production, Cost allocated per equivalent unit and Evaluation for the month of January, 2011 assuming F.I.F.O. basis.	

- Q.6** The following were the balances appearing in the Cost books of Cost Conscious Ltd. at the start of a month :

	Rs. (in lakhs)
Stores Ledger Control Account	80
Work On-Progress Control Account	20
Finished Goods Control Account	430
Building Construction Account	10
General Ledger Adjustment Account	540

During the month, the following transactions took place :

Materials Purchased	40
Materials issued to production	50
Materials issued to general maintenance	6
Materials issued to building construction	4
Wages - Direct wages paid	150
- Indirect wages paid	40
- Paid for building construction	10
Works Overheads - Actual amount incurred (excluding items shown above)	160
- Absorbed in building construction	20
- Under absorbed	8
Royalty paid	5
Selling, distribution and administration overheads	25
Sales	450

At the end of the month, the stock of raw materials and work-in-progress was Rs. 55 lakhs and Rs. 25 lakhs respectively. The loss arising in the raw material accounts is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales.

Prepare the relevant control accounts to record the above transactions in the cost ledger the company for the month.

Q.7 The standard cost of a certain chemical mixture is as follows :

Material	Cost per tonne (Rs.)	
I (40%)	20	A standard loss of 10% is expected in production
II (60%)	30	

For a period, the actual consumption data was as follows:

Material	Cost per tonne (Rs.)	
I (180 tonnes)	18	The actual weight produced was 364 tonnes
II (220 tonnes)	34	

Calculate all the Material Variances.

Q.8 a) From the following particulars, you are required to calculate :

- i) P/V ratio
- ii) B.E.P. for sales
- iii) Margin of safety
- iv) Profit when sales are Rs. 2,00,000/-
- v) Sales required to earn net profit of Rs. 40,000/-

Year	Sales (Rs.)	Profit (Rs.)	Units
I	2,40,000	18,000	24,000
II	2,80,000	26,000	28,000

b) ABC Ltd. have prepared the following budget for the production of one lakh units of the commodity manufactured by it for a period :

Particulars	Rs. (per unit)
Raw material	2.52
Direct labour	0.75
Direct expenses	0.10
Works overheads (60% Fixed)	2.50
Administration overheads (80% Fixed)	0.40
Selling overheads (50% Fixed)	0.20

The actual production during the period was later reviewed and re-estimated at 60,000 units. Prepare the budgeted cost (both totally and per unit) at this revised level on the basis of the aforesaid data showing a profit of 22.5% of the sale-price which you would arrive at therein.

Q.9 a) Write short notes on (any two) :

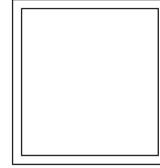
- i) Statutory Cost Audit :
- ii) Cross-checks in Overheads variances :
- iii) Purchase Budget :
- iv) Cost Audit (Reporting) Rules.

- b) A company submits the following data of its product manufactured for the first quarter of 2009 and 2010 :

Particulars	Amounts / Values
Sales : January, 2009	30,000 units
: February, 2009	25,000 units
: March, 2009	35,000 units
Selling price (2009)	Rs. 20
Targets for first quarter 2010 :	
Increase in Sales quantity	10%
Increase in Sales price	10%
Stock : 1-1-2010 (% of January, 2010 Sales)	50%
Stock : 31-3-2010	25,000 units
Stock : 31-3-2010 and 28-2-2010 (as percentage of subsequent month's Sales)	50%

Prepare the Sales and Production budget for the first quarter 2010.





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