The following example illustrates this method.

Product	*kg.*	*Proportion to total*	*Cost allocated (Rs.)*	*Cost per kg (Rs.)*
A	30,000	1/2	1,80,000	6
B	20,000	1/3	1,20,000	6
C	10,000	1/6	60,000	6
	60,000		3,60,000	6

Relative Market or Sales Value Method

The relative sales value method is often used to apportion joint product costs at the split-off point. The result is a percentage of cost to sales value for the output of the joint process. The sales value of each of the joint products is then multiplied by this percentage to arrive at the apportioned cost for that joint product.

The data given in the above example is being used herewith to explain the sales value method.

Product	*Quantity produced*	*Unit sales price*	*Sales value of production*		*Cost apportioned*	
		Rs.	Amount	%	Total	per unit
A	30,000	4	1,20,000	20	72,000	2.4
B	20,000	9	1,80,000	30	1,08,000	5.4
C	10,000	30	3,00,000	50	1,80,000	18.0
	60,000		6,00,0000	100	3,60,000	

Cost can be allocated in the following two ways:

1. Ratio of cost to sales value $= \frac{\text{Rs. } 3,60,000}{\text{Rs. } 6,00,000} = 60\%$

   Product *A* 60% of Rs. 1,20,000 = Rs. 72,000
   Product *B* 60% of Rs. 1,80,000 = Rs. 1,08,000
   Product *C* 60% of Rs. 3,00,000 = Rs. 1,80,000

2. Ratio of sales value of product to total sales value applied to total cost:

   Product *A* 20% of Rs. 3,60,000 = Rs. 72,000
   Product *B* 30% of Rs. 3,60,000 = Rs. 1,08,000
   Product *C* 50% of Rs. 3,60,000 = Rs. 1,80,000

Profits Under the Sales Value Method Move as the Sales Price

Product	*Cost (Rs.)*	*Selling price (Rs.)*	*Profit*	
			Amount (Rs.)	*%*
A	72,000	1,20,000	48,000	40%
B	1,08,000	1,80,000	72,000	40%
C	1,80,000	3,00,000	1,20,000	40%

Average Unit Cost Method

This method apportions total manufacturing costs to the various products by using an average unit cost obtained by dividing the total number of units produced into the total manufacturing cost. If all units produced are measured in terms of the same unit and do not differ greatly, this method can be used without much disadvantage. But when the units manufactured are not measured in similar terms, this method cannot be applied.

The average cost is computed by using the following formula:

$$\frac{\text{Total manufacturing cost}}{\text{Total number of units produced}}$$

Weighted Average Cost Method

Under this method, weight factors are often assigned to each unit based upon size of the unit, difficulty of manufacture, time used in making the units, difference in type of labour employed, amount of material used, etc. Finished production of every kind is multiplied by weight factors to apportion total costs to individual units. This method is also known as the survey method.

ACCOUNTING FOR BY-PRODUCTS

By-products can be classified into two categories according to their marketable condition at the split-off point: (i) those sold in their original form without need for any further processing; (ii) those which require further processing in order to be saleable. Because of wide variations in the nature of by-products, different accounting treatments are found in practice, such as the following:

1. *Sales of by-product as other income* If the value of the by-product is comparatively small, many manufacturers treat the by-product like scrap material, and sell it. The sale proceeds of by-product are treated as other income.
2. *Sales of by-products as a reduction in the cost of joint products* This method can be followed by reducing the cost of the main product by the total estimated income from the by-product less the selling expense incurred in effecting the sale of the by-product.
   By-products which are not sold, are kept in stock at nil value.
3. *Treating by-products having no cost at the time of separation but charging them with all costs after separation* In such a case, costs incurred after separation should be deducted from the saleable value of the by-product and the balance should be credited to the profit and loss account or the relevant process account.
4. *Recording costs of by-products* This method is applied when the by-products are of relatively high value and also require additional processing after separation from the main product. This requires apportionment of joint costs of the product upto the split-off point. The cost of further processing the by-product is debited to the by-product account. This by-product account is credited with the sale proceeds of the by-products, and any profit or loss is transferred to the costing profit and loss account.
5. *Replacement cost method* The replacement cost method is used in those industries where by-products resulting from the manufacturing process are used within the company. The cost assigned to the by-product is the purchase or replacement cost existing in the market.
6. *Market value (reversal cost) method* This method reduces the manufacturing cost of the main product, not by the actual revenue received, but by an estimated market value of the by-product prevailing at the time the by-product is recovered or sold.

Example 11.35

A factory is engaged in the production of a chemical X and in the course of its manufacture a by-product Y is produced, which after a separate process has a commercial value. For the month of March 2007 the following are summarised cost data:

	Joint Expenses	Separate Expenses	
	X	X	Y
	Rs.	Rs.	Rs.
Materials	19,200	7,360	780
Labour	11,700	7,680	2,642
Overheads	3,450	1,500	544

The output of the month was 142 kg of *X* and 49 kg of *Y*. The selling price of *Y* averaged Rs. 280 per kg. Assuming the profit on *Y* is estimated at 50% of selling price, calculate the cost of *X* per tonne.

(B.Com.(Hons), Delhi, 2007)

Solution:

Statement Showing Y's Share in Joint Expenses

			Rs.
Selling price (49 × 280)			13,720
Less:	Profit (50%)		6,860
	Total Cost		6,860
Less:	Subsequent cost after Separation (780 + 2642 + 544)		3,966
	Share of Joint Expense of *Y*		2,894
Total Joint Expenses (19,200 + 11,700 + 3,450)			34,350
Less:	Share of Joint Expenses of *Y*		2,894
	Share of Joint Expenses of *X*		31,456
		Total Cost of *X*	
			Rs.
	Share of Joint Expense of *X*		31,456
Add:	Further cost after separation		
	Material	7,360	
	Labour	7,680	
	Overhead	1,500	16,540
	Total Cost of *X*		47,996

Cost per kg of $X = \frac{47,996}{142}$ = Rs. 338 per kg.

Example 11.36

In the course of manufacture of the main product *P*, by-products *A* and *B* also emerge. The joint expenses of manufacture amount to Rs. 1,19,550. All the products are processed further after separation and sold as per details given below:

	Main Product	By-product	
	P	*A*	*B*
	(Rs.)	(Rs.)	(Rs.)
Sales	90,000	60,000	40,000
Cost beyond split-off stage	6,000	5,000	4,000
Profit as percentage of sales	25%	20%	15%

Selling and administration overheads are absorbed as percentage of cost of sales. Prepare a statement showing the apportionment of joint cost to the main product and by-products. Also prepare main product *P* account. *(B. Com. (Hons), Delhi, 2001)*

Solution:

Statement Showing the Apportionment of Joint Costs

	Main Product	*By product*		*Total*
	P	*A*	*B*	
	Rs.	Rs.	Rs.	Rs.
Sales	90,000	60,000	40,000	1,90,000
Less: Profit (that is 25%, 20% and 15% respectively from *P*, *A* and *B*)	22,500	12,000	6,000	40,500
Cost of sales	67,500	48,000	34,000	1,49,500
Less: Selling expenses (675 : 480 : 340) Rs. 1,49,500 – Rs. 1,19,550 – 14,000 = Rs. 14,950	6,750	4,800	3,400	14,950
Cost of Production	60,750	43,200	30,600	1,34,550
Less: Cost after separation	6,000	5,000	4,000	15,000
Value at split-off point	54,750	38,200	26,600	1,19,550

P (Main Product) Account

To Joint expenses of Manufacture	1,19,550	By transfer of share in Joint expenses	
To Separate Expenses	6,000	By Product *A*	38,200
		By Product *B*	26,600
		By Cost of Product of *P*	60,750
	1,25,550		1,25,550
To Cost of Product *P*	60,750	By Sales	90,000
To Selling and Admn.Exp.	6,750		
To Profit	22,500		
	90,000		90,000

Example 11.37

A factory is engaged in the production of a chemical BOMEX and in the course of its manufacture, a by-product BRUCIL is produced, which after further processing has a commercial value. For the month of April, 2005, the following are the summarised cost data:

	Joint Expenses	*Separate Expenses*	
		BOMEX	BRUCIL
	Rs.	Rs.	Rs.
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling price per unit		98	34
Estimated profit per unit on sale of BRUCIL			4
		Units	Units
No. of units produced		2,000	2,000

The factory uses reverse cost method of accounting for by-products whereby the sales value of by-products after deduction of the estimated profit, post separation costs and selling and distribution expenses relating to the by-products is credited to the joint process cost account.

You are required to prepare statement showing:

(i) the Joint Cost allocable to BOMEX.

(ii) the product-wise and overall profitability of the factory for April, 2005. *(CA Inter)*

Solution:

(i) **Statement of Joint Cost Allocable to BOMEX**

Total joint expenses	*Rs.*	*Rs.*
Materials	1,00,000	
Labour	50,000	
Overheads	30,000	
		1,80,000
Less: Joint Cost allocable to the production of 2,000 units of BRUCIL at the split-off point (See Working Note)		32,000
Cost of production of 2,000 units of BOMEX		1,48,000

(ii) **Productwise and Overall Profitability Statement for the Month of April 2001**

Particulars	*Products*		*Total*
	BOMEX	BRUCIL	Rs.
Sales (Units)	2,000	2,000	
Selling price per unit (Rs.)	98	34	
Total sales (Rs.)	1,96,000	68,000	
Less: Cost of production at the split off point	1,48,000	32,000	
Post Separation Cost	36,000	28,000	
	1,84,000	60,000	
Profit (Rs.)	12,000	8,000	20,000

Working Note:

Computation of the Joint Expenses Chargeable to the By-product BRUCIL

Units produced		2000
Selling price unit (Rs.)		34
Total Sales: (2000 × Rs. 34)		(Rs.) 68,000
Less: Profit (2000 × Rs. 4)		(Rs.) 8,000
Cost of Sales		60,000
Less: Selling and distribution expenses		Nil
Less: Expenses after separation (Rs. 4,000 + Rs. 18,000 + Rs. 6,000)		28,000
Cost of Production at the split-off point		32,000

Example 11.38

Raw materials AXE costing Rs. 150 per kg. and BXE costing Rs. 90 per kg. are mixed in equal properties for making product *A*. The loss of material in processing works out to 25% of the product. The production expenses are allocated at 40% of direct material cost. The end product is priced with a margin of 20% over the total cost.

Material BXE is not easily available and substitute raw material CXE has been found for BXE costing Rs. 75 per kg. It is required to keep the proportion of this substitute material in the mixture as low as possible and at the same time maintain the selling price of the end product at existing level and ensure the same quantum of profit as at present.

You are required to compute the ratio of the mix of the raw materials AXE and CXE.

(CA, PE, Exam II, Group II, May 2007)

Solution:

Working Notes:

(i) Computation of material mix ratio:

Let 1 kg. of product *A* requires 1.25 kg. of input of materials AXE and BXE

Raw materials are mixed in equal proportions.

Then raw material AXE = $\frac{1.25}{2}$ = .625 kg.

Then raw material BXE = $\frac{1.25}{2}$ = .625 kg.

(ii) Computation of selling price/kg. of product *A*

	Rs.
Raw material AXE .625 kg. × 150 = Rs. 93.75	
Raw material BXE .625 kg. × 90 = Rs. 56.25	150.00
Production expenses (40% of material cost)	60.00
Total cost	210.00
Add: profit 20% of total cost	42.00
Selling price	252.00

(iii) Computation of proportions of materials AXE and CXE in *A*

Let material CXE required in product *A* be *m* kg.

Then for purchasing 1 kg of product *A*, material AXE requirement = (1.25 – *m*) kg.

To maintain same level of profit and selling price as per Working Note (ii), it is required that the total cost of material in 1 kg. of product *A* should not exceed Rs. 150,

that is, *m* kg. × Rs. 75 + (1.25 – *m*) kg. × 150 = Rs. 150

or 75 *m* + 187.5 – 150 *m* = 150

or 75 *m* = 37.5

or *m* = 0.5 kg.

Raw material AXE requirement in product *A* = 1.25 – 5 = 0.75 kg.

So, proportion of materials AXE and CXE

= 0.75 : 50

that is 3 : 2.

Example 11.39

In a chemical plant four different products viz. *AB*, *BC*, *CD* and *DD* emerge from the input of crude oil. Product *AB* can be sold immediately, but the remaining three products require further processing before they can be marketed.

In a month, 40000 litres of crude oil were procured at a cost of Rs. 30 per litre and processed at a cost of Rs. 3 lakhs. The details of output obtained, further processing cost, selling price per unit etc. are given below.

Product	*Output kg*	*Further processing cost (Rs.)*	*Selling price at the point of sale*
AB	8000 kg		Rs. 45/kg
BC	10000 kg	80,000	Rs. 60/kg
CD	12000 kg	120,000	Rs. 70/kg
DD	5000 litres	60,000	Rs. 80/litre

Prepare:

(i) Statement showing apportionment of joint cost on suitable basis and product-wise profitability statement.

(ii) If the company finds a market for *CD* at Rs. 63/kg without further processing, will it be advisable to accept it? *(ICWA, Inter, Stage 1, Dec. 2006)*

Solution:

Joint cost of manufacture:

(i) Cost of 40,000 litre of crude oil @ Rs. 30 litre	=	Rs. 12,00,000
Processing cost	=	Rs. 3,00,000
	Total	Rs. 15,00,000

Apportionment of joint cost is done at net sales value at split off point as follows:

(In thousand of rupees)

Product	*Output/ Sales*	*Selling price per unit*	*Sales*	*Further Processing cost*	*Net Sales value*	*Apportionment of joint cost*	*Total cost*	*Net Profit*
(1)	(2)	(3)	(4)	(5)	(6) (4 – 5)	(7)	(8) (5 + 7)	(9) (4 – 8)
AB	8000 kg	Rs. 45	360	-	360	278	278	82
BC	10000 kg	60	600	80	520	402	482	118
CD	12000 kg	70	840	120	720	557	677	163
DD	5000 litres	80	400	60	340	263	323	77
			2200	260	1940	1500	1760	440

(ii) If the Company is able to get market for *CD* at Rs. 63/kg. It is worth selling at the split off point, instead of processing further and selling as it is clear from the following details:

Sales value after further processing	Rs. 8,40,000.00
Sales value at split off point at Rs. 63/kg. 1,20,000 kg. × Rs. 63	Rs. 7,56,000.00
Incremental sales value	Rs. 84,000.00
Further processing cost required, if sold @ Rs. 70/kg.	Rs. 1,20,000.00

Further processing cost is more than the incremental revenue by Rs. 36,000. Hence in this case it is better to sell at split off point without further processing.

Example 11.40

In a chemical manufacturing company, three products *A*, *B* and *C* emerge at a single split off stage in department *P*. Product *A* is further processed in department *Q*, product *B* in department *R* and product *R* and product *C* in department *S*. There is no loss in further processing of any of the three products. The cost data for a month are as under:

Cost of raw materials introduced in department *P*	Rs. 12,68,800
Direct Wages Department	Rs.
P	3,84,000
Q	96,000
R	64,000
S	36,000

Factory overheads of Rs. 4,64,000 are to be apportioned to the departments on direct wage basis.

During the month under reference, the company sold all three products after processing them further as under:

Products	*A*	*B*	*C*
Output sold kg.	44,000	40,000	20,000
Selling Price per kg. Rs.	32	24	16

There are no Opening or Closing Stocks. If these products were sold at the split off stage, that is, without further processing, the selling prices would have been Rs. 20, Rs. 22 and Rs. 10 each per kg respectively for *A*, *B* and *C*.

Required:

(i) Prepare a statement showing the apportionment of joint costs to joint products.
(ii) Present a statement showing product-wise and total profit for the month under reference as per the company's current processing policy.
(iii) What processing decision should have been taken to improve the profitability of the company.
(iv) Calculate the product-wise and total profit arising from your recommendation in (iii) above.

(CA, PE, Exam. II, Group II, May 2002)

Solution:

(i) Statement Showing the Apportionment of Joint Costs to Joint Products

	Products			
	A	*B*	*C*	*Total*
Output sold kg: (I)	44,000	40,000	20,000	
Selling price per kg. at split off (Rs.): (II)	20	22	10	
Sales value at split off (Rs.): (I) × (II)	8,80,000	8,80,000	2,00,000	19,60,000
Joint costs (costs incurred in department *P* (Rs.) (apportionment on the basis of sales value at the point of split off) that is, (22 : 22 : 5)	8,80,000	8,80,000	2,00,000	19,60,000

(ii) **Statement Showing Product-wise and Total Profit for the Month under Reference**

(as per the company's current processing policy)

	Products			
	A	*B*	*C*	*Total*
Output kg: (a)	44,000	40,000	20,000	
Selling price per kg. after further processing (Rs.): (b)	32	24	16	
Sales value after further processing (Rs.): (c) = {(a) × (b)}	14,08,000	9,60,000	3,20,000	26,88,000
Joint costs (Rs.): (d) (Refer to b (i) Working Notes and 2 (i)	8,80,000	8,80,000	2,00,000	19,60,000
Further processing costs (Rs.): (e) (Refer to Working Note 2 (ii)	1,72,800	1,15,200	64,800	3,52,800]
Total costs (Rs.): (f) = [(d) + (e)}	10,52,800	9,95,200	2,64,800	23,12,800
Profit / (Loss) (Rs.): [(c) – (f)}	3,55,200	(35,200)	55,200	3,75,200
Alternatively:				
Incremental sales revenue (Rs.)	5,28,000 (44,000 units × Rs. 12	80,000 (40,000 units × 2)		1,20,000 (20,000 units × Rs. 6)
Less: Further processing costs (Rs.): [Refer to Working Note 2 (ii)]	1,72,800	1,15,200		64,800
Incremental net profit / (loss)	3,55,200	(35,200)		55,200

(iii) Processing Decision to Improve the Profitability of the Company.

44,000 units of product *A* and 20,000 units of product *C* should be further processed because the incremental sales revenue generated after further processing is more than the further processing costs incurred. 40,000 units of product *B* should be sold at the point of-split off because the incremental revenue generated after further processing is less than the further processing costs.

(iv) The Productwise and Total Profit Arising from the Recommendation in (iii) above is as follows:

Product	*A*	*B*	*C*	*Total*
Profit (Rs.)	3,55,200	–	55,200	4,10,400

Working Notes:

1. Statement of Department-wise Costs

	P	*Q*	*R*	*S*
	Rs.	*Rs.*	*Rs.*	*Rs.*
Raw materials	12,68,800			
Wages	3,84,000	96,000	64,000	36,000
Overheads (Apportioned on the basis of departmental direct wages that is, 96 : 24 : 16 : 9)	3,07,200	76,800	51,200	28,800
Total Cost	19,60,000	1,72,800	1,15,200	64,800

2. Joint Costs and Further Processing Costs

(i) Costs incurred in the departments *P* are joint costs of products *A*, *B* and *C* and are equal to Rs. 19,60,000.

(ii) Costs incurred in the departments *Q*, *R* and *S* are further processing costs of products *A*, *B* and *C* respectively. Further processing costs of products *A*, *B* and C thus are Rs. 1,72,800; Rs. 1,15,200 and Rs. 64,800 respectively.

Example 11.41

JKL Limited produces two products – *J* and *K* together with a by-product *L* from a single main process (Process I). Product *J* is sold at the point of separation for Rs. 55 per kg. Whereas product *K* is sold for Rs. 77 per kg. After further processing into product *K* 2 By product *L* is sold without further processing for Rs. 19.25 per kg.

Process I is closely monitored by a team of chemists, who planned the output per 1,000 kg of input materials to be as follows:

Product *J*	500 kg
Product *K*	350 kg.
Product *L*	100 kg.
Toxic waste	50 kg.

The toxic waste is disposed at a cost of Rs. 16.50 per kg and arises at the end of processing.

Process II which is used for further processing of product *K* into product *K*2, has the following cost structure:

Fixed costs	Rs. 2,64,000 per week
Variable cost	Rs. 16.50 per kg. processed

The following actual date relate to the first week of the month:

Process I

Opening work-in-progress	Nil
Material input	40,000 kg costing Rs. 6,60,000
Direct Labour	Rs. 4,40,000
Variable overheads	Rs. 1,76,000
Fixed overheads	Rs. 2,64,000

Outputs:

Product *J*	19,200 kg.
Product *K*	14,400 kg.
Product *L*	4,000 kg.
Toxic waste	2,400 kg.
Closing work-in-progress	Nil

Process II

Opening work-in-progress	Nil
Input of product *K*	14,400 kg.
Output of product *K* 2	13,200 kg.
Closing work-in-progress (50% converted and conversion costs were incurred in accordance with the planned cost structure)	1,200 kg.

Required

(i) Prepare Process I account for the first week of the month using the final sales value method to attribute the pre-separation costs to join products.
(ii) Prepare the toxic waste account and Process II account for the first week of the month.
(iii) Comment on the method used by the *JKL* Limited to attribute the pre-separation costs to joint products.
(iv) Advise the management of *JKL* Limited whether or not, on purely financial grounds it should continue to process product *K* into product *K* 2.
  (a) If product *K* could be sold at the point of separation for Rs. 47.30 per kg; and
  (b) If the 60% of the weekly fixed costs of Process II were avoided by not processing product *K* further. *(CA, PE, Exam. II, Group II, May 2004)*

Solution:

Process I Account

Particulars	*Qty in kg.*	*Rate / kg. Rs.*	*Amount Rs.*	*Particulars*	*Qty in kg.*	*Rate / kg. Rs.*	*Amount Rs.*
To Material input	40,000	16.50	6,60,000	By Product *L* sales	4,000	19.25	77,000
To Direct Labour			4,40,000	By Normal Loss	2,000	(–) 16.50	(–) 33,000
To Variable Overheads			1,76,000	By Abnormal Loss*	400	44	17,600
To Fixed Overheads			2,64,000	By Joint Product J (Refer to Working Note 2)	19,200		7,21,171
				By Joint product *K* (Refer to Working Note 2)	14,400		7,57,229
	40,000		15,40,000		40,000		15,40,000
Valuation of abnormal loss per kg. (Using physical measure method)				$= \frac{\text{Rs. } 15,40,000 - \text{Rs. } 77,000 + \text{Rs. } 33,000}{40,000 \text{ kg.} \times 0.85}$ = Rs. 14,96,000 / 34,000 kg. = Rs. 44 per kg.			

(ii)

Toxic Waste Acount

Particulars	*Qty in kg.*	*Rate / kg. Rs.*	*Amount Rs.*	*Particulars*	*Qty. in kg.*	*Rate / kg. Rs.*	*Amount Rs.*
To Process I A/c	2,000	16.50	(–) 33,000	By Balance		16.50	(–) 33,000

Process II Account

Particulars	*Qty in kg.*	*Rate / kg. Rs.*	*Amount Rs.*	*Particulars*	*Qty in kg.*	*Rate / kg. Rs.*	*Amount Rs.*
To Process I A/c (Product *K*)	14,400	52.585	7,57,236	By Product *K* 2 Account	13,200		11,73,924
To Variable overheads		16.50	2,37,600	By Closing WIP (Refer to Working Note 3)	1,200		84,912
To Fixed overheads			2,64,000				
			12,58,836				12,58,836

Working Notes:

1. **Calculation of joint cost of the output:**
   = Rs. 15,40,000 – Rs. 77,000 – Rs. (–) 33,000 – Rs. 17,600
   = Rs. 14,78,400
2. **Allocation of joint cost over joint products J and K (By using final sales value method)**

Products	*Quantity (kg)*	*Sales Value Rs.*	*Joint Cost Rs.*
J	19,200	10,56,000 (19,200 kg × Rs. 55)	7,21,171
K	14,400	11,08,800 (14,400 kgs × Rs. 77)	7,57,229
Total		21,64,800	14,78,400

3. **Valuation of 1,200 kg of Closing WIP:**

		Rs.
Material I	100% complete (1200 kg × Rs. 52.5858)	63,103
Fixed and variable overheads	$\left(\frac{\text{Rs. } 5,01,600}{13,800 \text{ units}}\right) \times 600$ units	21,809
Total valuation of 1,200 kgs of closing WIP		84,912

(iii) Comment on the method used by the JKL Ltd:
(To attribute the pre-separation costs to joint products)

For attributing the joint costs over joint products *J* and *K*, JKL Ltd., used the basis of final sales value. This is one of the popular method used in the industry.
Other methods can also be used for the purpose. Some of these are as follows:

- Physical Measure Method (if both the products are equally complex).
- Constant Gross Margin Percentage method.
- Net Realisation Value Method.

(iv) Advise to the management of JKL Ltd.:

	(Rs.)
Incremental sales revenue per kg. from further processing	29.70
Less: Incremental variable cost per kg. of further processing	16.50
Incremental contribution per kg from further processing	13.20
At an output of 14,400 kgs the incremental contribution is:	1,90,080
Less: Avoidable fixed cost (60% × Rs. 2,64,000)	1,58,400
Net benefit (Rs.)	31,680

$$\text{Break-even point} = \frac{\text{Avoidable fixed costs}}{\text{Incremental contribution kg.}} = \frac{\text{Rs. } 1,58,400}{\text{Rs. } 13.20}$$
$$= 12,000 \text{ kg.}$$

Hence further processing should be undertaken if output is expected to exceed 12,000 kgs. per week.

Example 11.42

ABC Ltd. operates a simple chemical process to convert a single material into three separate items, referred to here as *X*, *Y* and *Z*. All three end products are separated simultaneously at a single split-off point.

Products *X* and *Y* are ready for sale immediately upon split off without further processing or any other additional costs. Product *Z*, however, is processed further before being sold. There is no available market price for *Z* at the split-off point.

The selling prices quoted here are expected to remain the same in the coming year. During 2002–03, the selling prices of the items and the total amounts sold were:

X – 186 tons sold for Rs. 1,500 per tonne
Y – 527 tons sold for Rs. 1,125 per tonne
Z – 736 tons sold for Rs. 750 per tonne

The total joint manufacturing costs for the year were Rs. 6,25,000. An additional Rs. 3,10,000 was spent to finish product *Z*.

There were no opening inventories of *X*, *Y* or *Z* at the end of the year, the following inventories of complete units were on hand:

X 180 tonne
Y 60 tonne
Z 25 tonne

There was no opening or closing work-in-progress.

Required:

(i) Compute the cost of inventories *X*, *Y* and *Z* for Balance Sheet purposes and cost of goods sold for income statement purpose as of March 31, 2003, using:
  (a) Net realizable value (NRV) method of joint cost allocation
  (b) Constant gross-margin percentage NRV method of joint-cost allocation.

(ii) Compare the gross-margin percentages for *X*, *Y* and *Z* using two methods given in requirement (i)

(CA, PE, Exam. II, Group II, May 2003)

Solution:

(i) (a) **Statement of Joint Cost Allocation of Inventories of X, Y and Z for Balance Sheet Purposes (By using net realisable value method)**

	Products			
	X	*Y*	*Z*	*Total*
	Rs.	*Rs.*	*Rs.*	*Rs.*
Final sales value of total production (Refer to Working Note 1)	5,49,000 (366 tone × Rs. 1,500)	6,60,375 (587 tone × Rs. 1,125)	5,70,750 (761 tone × Rs. 750)	17,80,125
Less: Additional Cost	–	–	3,10,000	3,10,000
Net realisable value (at split-off point)	5,49,000	6,60,375	2,60,750	14,70,125
Join cost allocated (Refer to Working Note 2)	2,33,398	2,80,748	1,10,854	6,25,000

Cost of Goods Sold for Income Statement Purpose as of March 31, 2003
(By using net realisable value method)

	Products			
	X Rs.	*Y* Rs.	*Z* Rs.	*Total* Rs.
Allocated joint cost	2,33,378	2,80,748	1,10,854	6,25,000
Additional	–	–	3,10,000	3,10,000
Cost of goods available for sale (CGAS)	2,33,398	2,80,748	4,20,854	9,35,000
Less: Cost of ending inventory	1,14,785	28,692	13,846	(1,57,323)
X: 49.18% Y: 10.22% Z: 3.29% × (CGAS)				
(Refer to working note)				
Cost of goods sold	1,18,613	2,52,056	4,07008	7,77,677

Income Statement
(Showing gross margin and gross margin percentage)
(By using net realisable value method)

	Products			
	X Rs.	*Y* Rs.	*Z* Rs.	*Total* Rs.
Sales revenue (Rs.)	2,79,000 (186 tonne × Rs. 1,500)	5,92,875 (527 tonne × Rs. 1,125)	5,52,000 (736 tonne × Rs. 750)	14,23,875
Less: Cost of goods sold (Rs.)	1,18,613	2,52,056	4,07,008	7,77,677
Gross margin (Rs.)	1,60,387	3,40,819	1,44,992	6,46,198
Gross margin (%)	57.49%	57.49%	26.26%	

(b) Statement of Joint Cost Allocation of Inventories of X, Y and Z for Balance Sheet Purposes
(By using constant gross margin percentage net-realisable value method)

	Product			
	X Rs.	*Y* Rs.	*Z* Rs.	*Total* Rs.
Final sales value of total production	5,49,000	6,60,375	5,70,750	17,80,125
Less: Gross margin	2,60,641	3,13,517	2,70,967	8,45,125
(Refer to Working Note 3)	2,88,359	3,46,958	2,99,783	9,35,000
Less: Addition Cost	–	–	3,10,000	3,10,000
Joint Cost allocated	2,88,359	3,46,858	(10,217)	6,25,000

Note

The negative joint cost allocation to product *Z* illustrates one 'unusual' feature of the costant gross margin NRV method.

Cost of Goods Sold for Income Statement Purpose
(By using constant gross margin percentage net-realisable value method)

	Products			
	X	*Y*	*Z*	*Total*
	Rs.	*Rs.*	*Rs.*	*Rs.*
Allocated joint cost	2,88,359	3,46,858	(10,217)	6,25,000
Joint Cost			3,10,000	3,10,000
Cost of goods available for sale (CGAS)	2,88,359	3,46,858	2,99,783	9,35,000
Less: Cost of ending inventory	1,41,815	35,449	9,863	1,87,127
X: 49.18% *Y*: 10.22% × (CGAS) *Z*: 3.29%				
Cost of good sold	1,46,544	3,11,409	2,89,920	7,47,873

Income Statement
(Showing gross margin and gross margin percentage
by using constant gross margin percentage NRV method)

	Product			
	X	*Y*	*Z*	*Total*
	Rs.	*Rs.*	*Rs.*	*Rs.*
Sales revenue (Rs.)	2,79,000	5,92,875	5,52,000	14,23,875
Less: Cost of good sold (Rs.)	1,46,544	3,11,409	2,89,920	7,47,873
Gross margin (Rs.)	1,32,456	2,81,466	2,62,080	6,76,002
Gross margin (%)	47.475%	47.475%	47.478%	47.478%

(ii) **Comparative Statement of Gross Percentage for X, Y and Z**
(Using net realizable value and Constant gross margin percentage NRV methods)

	Product gross margin percentage		
	X	*Y*	*Z*
	Rs.	*Rs.*	*Rs.*
Net realisable	57.49	57.49	26.26
Constant gross margin percentage NRV	47.48	47.48	47.48

Working Notes

1. **Total Production of Three Products for the Year 2002–03**

Items/Products	*Quantity sold in tonnes*	*Quantity of ending inventory in tonnes*	*Total production*	*Ending inventory percentage*
(1)	*(2)*	*(3)*	*(4) = [(2) + (3)]*	*(5) = (3)/(4)*
X	186	180	366	49.18
Y	527	60	587	10.22
Z	736	25	761	3.29

2. **Joint Cost Apportioned to each Product**

$$\frac{\text{Total joint cost}}{\text{Total net realisable value}} \times \text{Net realizable value of each product}$$

$$= \text{Total cost of product } X = \frac{\text{Rs. } 6,25,000}{\text{Rs. } 14,70,125} \times \text{Rs. } 5,49,000$$

Similarly, the joint cost of inventories of products Y and Z comes to Rs. 2,80,748 and Rs. 1,10,854 respectively.

3. **Gross Margin Percentage**

		Rs.
Final sales value production		17,80,125
Less: Joint cost and additional costs (Rs. 6,25,000 + Rs. 3,10,000)		9,35,000
Gross margin		8,45,125
Gross margin percentage (Rs. 8,45,125/Rs. 17,80,125) × 100	47.4756%	

Example 11.43

Pokemon Chocolates manufactures and distributes chocolate products. It purchases cocoa beans and processes them into two intermediate products:

- Chocolate powder liquor base
- Milk-chocolate liquor base

These two intermediate products become separately identifiable at a single split off point. Every 500 pounds of cocoa beans yields 20 gallons of chocolate–power liquor base and 30 gallons of milk-chocolate liquor base.

The chocolate powder liquor base is further processed into chocolate powder. Every 20 gallons of chocolate-power liquor base yields 200 points of chocolate powder. The milk-chocolate liquor base is further processed into milk-chocolate. Every 30 gallons of milk-chocolate liquor base yields 340 pounds of milk chocolate

Production and sales data for October, 2004 are:

- Cocoa beans processed — 7,500 pounds
- Costs of processing Cocoa beans at split off point (including purchase of beans) — Rs. 7,12,500

	Production	*Sales*	*Selling price*
Chocolate powder	3,000 pounds	3,000 pounds	Rs. 190 per sound
Milk chocolate	5,100	5,100	Rs. 237.50 per pound

The October 2004, separable costs of processing chocolate-powder liquor into chocolate powder are Rs. 3,02,812.50. The October 2004 separable costs of processing milk-chocolate liquor base into milk-chocolate are Rs. 6,23,437.50.

Pokemon full processes both of its intermediate products into chocolate powder or milk-chocolate. There is an active market for these intermediate products. In October, 2004, Pokemon could have sold the chocolate powder liquor base for Rs. 997.50 a gallon and the milk-chocolate liquor base for Rs. 1,235 a gallon.

Required:

(i) Calculate how the joint cost of Rs. 7,12,500 would be allocated between the chocolate power and milk-chocolate liquor bases under the following methods:
   (a) Sales value at split off point
   (b) Physical measure (gallons)
   (c) Estimated net realizable value, (NRV) and
   (d) Constant gross-margin percentage NRV.

(ii) What is the gross-margin percentage of the chocolate power and milk-chocolate liquor bases under each of the methods in requirements (i)?

(iii) Could Pokemon have increased its operating income by a change in its decision to fully process both of its intermediate products? Show your computations. *(CA, PE, Exam. II, Group II, Nov. 2004)*

Solution:

(i)

Comparison of Alternative Join-cost Allocation Methods
Sales Value at Split-off Point Method

	Chocolate powder liquor base	*Milk chocolate liquor base*	*Total*
Sales value of products at split off	Rs. 2,99,250	Rs. 5,55,750	Rs. 8,55,000
Weights	0.35	0.65	1.00
Joint cost allocated	Rs. 7,12,500 × 0.35 = Rs. 2,49,375	Rs. 7,12,500 × 0.65 = Rs. 4,63,125	

- 300 × 997.50 = Rs. 2,99,250
- 450 × 1235 = Rs. 5,55,750

Physical Measure Method

	Chocolate powder liquor base	*Milk chocolate liquor base*	*Total*
Output	300 gallons	450 gallons	750 gallons
Weight	300/750 = 0.40	450/750 = 0.60	1.00
Joint cost allocated	Rs. 7,12,500 × 0.40 = Rs. 2,85,000	Rs. 7,12,500 × 0.60 = Rs. 4.27,5.00	Rs. 7,12,500

Net Realisable Value Method

	Chocolate powder liquor base	*Milk chocolate liquor base*	*Total*
Final sales value of production	3,000 lbs × Rs. 190 = Rs. 5,70,000	5.100 lbs × Rs. 237.50 = Rs. 12,11,250	Rs. 17,81,250
Less: separable costs	Rs. 3,02,812.50	Rs. 6,23,437.50	Rs. 9,26,250
Net realisable value at split off point	Rs. 2,67,187.50	Rs. 5,87,812.50	Rs. 8,55,000
Weight	2,67,187.50/8,55.000 = 0.3125	5,87,812.5/8,55,000 = 0.6875	
Joint cost allocated	Rs. 7,12,500 × 0.3125 = Rs. 2,22,656.25	Rs. 7,12,500 × 0.6875 = Rs. 4,89,843.75	Rs. 7,12,500

Constant + Gross Margin % NRV Method

	Chocolate powder Liquor base	*Milk chocolate liquor base*	*Total*
Final sales value of production	Rs. 5,70,000 *(Chocolate Powder)*	Rs. 12,11,250 *(Milk Chocolate)*	Rs. 17,81,250
Less: Gross margin 8%	Rs. 45,600	Rs. 96,900	Rs. 1,42,500
Cost of goods available for sale	Rs. 5,24,400	Rs. 11,14,350	Rs. 16,38,750
Less Separable costs	Rs. 3,02,812.50	Rs. 6,23,437.50	Rs. 9,26,250
Joint cost allocated	Rs. 2,21,587.50	Rs. 4,90,912.50	Rs. 7,12,500

Calculation of Gross Margin %

Final sales value of total production	= Rs. 17,81,250
Less joint and separable cost	= Rs. 712500 + Rs. 926250
	= Rs. 16,38,750
Gross Margin	= Rs. 1,42,500
Gross margin %	= Rs. 1,42,500 / Rs. 17,81,250 = 8%

(ii) **Chocolate Powder Liquor Base (calculations in Rs)**

	Sales value at Split off	*Physical Measure*	*Estimated net Realizable Value*	*Constant gross Margin NRV*
Final sale value of Chocolate powder	5,70,000	5,70,000	5,70,000	5,70,000
Less: Separable costs	3,02,812.50	3,02,812.50	3,02,812.50	3,02,812.50
Less: Joint costs	2,49,375	2,85,000	2,22,656.25	2,21,587.50
Gross Margin	17,812.50	(17,812.50)	44,531.25	45,600
Gross Margin %	3.125%	(3.125%)	7.8125%	8%

Milk Chocolate Liquor Base (calculations in Rs.)

	Sales value at Split off	*Physical Measure*	*Estimated net Realisable*	*Constant Gross margin NRV*
Final sale value of milk chocolate	12,11,250	12,11,250	12,11,250	12,11,250
Less: separable costs	6,23,437.50	6,23,437.50	6,23,437.50	6,23,437.50
Less: Joint costs	4,63,125	4,27,500	4,89,843.75	4,90,912
Gross Margin	1,24,687.50	1,60,312.50	97,968.75	96,900.50
Gross Margin %	10.29%	13.23%	8.08%	8%

(iv) **Further Processing of Chocolate Powder Liquor base into Chocolate Powder (calculations in Rs.)**

Incremental revenue (5,70,000 – (997.50 × 300)	2,70,750
Incremental costs	3,02,812.50
Incremental operating income	(32,062.50)
Further processing of Milk chocolate liquor base into milk chocolate (calculations in Rs.)	
Incremental revenue ((12,11,250 – 5,55,750)	6,55,500
Incremental cost	6,23,437.50
Incremental operating income	32,062.50

The above computations show that Pokemon Chocolates could increase operating income by Rs. 32,062.50 if chocolate liquor base is sold at split off point and milk chocolate liquor base is processed further.

Example 11.44

Inorganic Chemicals purchases salt and processes it into more-refined products such as caustic soda, chlorine, and PVC (Polyvinyl chloride). During the month of April, 2000. Inorganic Chemicals purchased salt for Rs. 10,00,000. Conversion cost of Rs. 15,00,000 were incurred upto the split-off point, at which time two saleable products were produced. Caustic soda and chlorine can be further processed into PVC. The April production and sales information are as follows:

	Production	*Sales*	*Sales Price per Tonne*
Caustic Soda	1,200 tonne	1,200 tonne	Rs. 1,250
Chlorine	800 tonne		
PVC	500 tonne	500 tonne	Rs. 5,000

All 800 tons of chlorine were futher processed, at an incremental cost of Rs. 5,00,000 to yield 500 tone of PVC. There were no byproducts or scrap from this further processing of chlorine. There were no beginning or ending inventories of caustic soda, chlorine or PVC in April.

There is an active market for chlorine. Inorganic Chemicals could have sold all its April production of chlorine at Rs. 1,875 a ton.

Required:

(i) Calculate, how the joint costs of Rs. 25,00,000 would be allocated between Caustic Soda and Chlorine under each of the following methods:
   (1) sales value at split off
   (2) physical measure (tonne); and
   (3) estimated net realisable value

(ii) What is the gross margin percentage of Caustic Soda and PVC under the three methods cited in requirement (i)?

(iii) Lifetime Swimming Pool Products offer to purchase 800 tonne of Chlorine in May, 2000 at Rs. 1,875 a tonne. This sale would mean that no PVC would be produced in May. How would accepting the offer affect May Operating Income? *(C.A.Inter May 2000)*

Solution:

(i)

(1) Statement of Joint Costs Allocation between Caustic Soda and Chlorine by using Sales Value Method at Split Off

Products	*Caustic Soda*	*Chlorine*	*Total*
Sales value at split off (Rs.)	15,00,000 (1,200 tonne × Rs. 1,250)	15,00,000 (800 tonne × Rs. 1,250)	30,00,000
Weightage	0.5	0.5	
Joint costs allocated (Rs.)	12,50,000 (Rs. 25,00,000 × 0.5)	12,50,000 (Rs. 25,00,000 × 0.5)	25,00,000

(2) Statement of Joint Costs Allocation between Caustic Soda and Chlorine by using Physical Measure (tonne) Method

Products	*Caustic Soda*	*Chlorine*	*Total*
Physical measure (tonne)	1,200	800	2,000
Weightage	0.6	0.4	
Joint costs allocated (Rs.)	15,00,000 (Rs. 25,00,000 × 0.6)	10,00,000 (Rs. 25,00,000 × 0.4)	25,00,000

(3) Statement of Joint Costs Allocation between Caustic Soda and Chlorine by Using Estimated Net Realisable Value Method

Products	*Caustic Soda*	*Chlorine*	*Total*
Expected sales value of production (Rs.)	15,00,000 (1,200 tonne × Rs. 1,250)	25,00,000 (500 tonne × Rs. 5,000)	40,00,000
Less: Further processing cost (Rs.)	—	5,00,000	5,00,000
Estimated net realisable value at split off point (Rs.)	15,00,000	20,00,000	35,00,000
Weightage	3/7	4/7	
Joint cost allocated (Rs.)	10,71,429 $\left(\frac{3}{7} \times \text{Rs. } 25,00,000\right)$	14,28,571 $\left(\frac{4}{7} \times \text{Rs. } 25,00,000\right)$	25,00,000

(ii) **Statement of Gross Margin Percentage of Caustic Soda and PVC under Sales Value, Physical Measure and Estimated Net Realisable Value Methods**

	Sales value (at split off)	*Physical measure*	*Estimated net realisable value*
Caustic soda:			
Sales (Rs.)	15,00,000	15,00,000	15,00,000
Less: Joint costs allocated (Rs.)	12,50,000	15,00,000	10,71,429
Gross margin (Rs.)	2,50,000	0	4,28,571
Gross margin (in %)	16.67	0	28.57
	$\left(\frac{\text{Rs. } 2,50,000}{\text{Rs. } 15,00,000} \times 100\right)$		$\left(\frac{\text{Rs. } 4,28,571}{\text{Rs. } 15,00,000} \times 100\right)$
PVC:			
Sales (Rs.) (500 tons × Rs. 5,000)	25,00,000	25,00,000	25,00,000
Less: Joint cost allocated (Rs.)	12,50,000	10,00,000	14,28,571
Further processing cost (Rs.)	5,00,000	5,00,000	5,00,000
Gross margin (Rs.)	7,50,000	10,00,000	5,71,429
Gross margin (in %)	30	40	22.86
	$\left(\frac{\text{Rs. } 7,50,000}{\text{Rs. } 25,00,000} \times 100\right)$	$\left(\frac{\text{Rs. } 10,00,000}{\text{Rs. } 25,00,000} \times 100\right)$	$\left(\frac{\text{Rs. } 5,71,429}{\text{Rs. } 25,00,000} \times 100\right)$

(iii) Incremental revenue from further processing of Chlorine into *PVC*

500 tons × Rs. 5,000 – 800 tonne × Rs. 1,875: (*A*)	Rs. 10,00,000
Incremental costs of further processing of chlorine into PVC: (*B*)	Rs. 5,00,000
Incremental operating income from further processing: {(*A*) – (*B*)}	Rs. 5,00,000

Decision: The operating income of Inorganic Chemicals which converts Chlorine into PVC after further processing will be reduced by Rs. 5,00,000 in May, if it accepts the offer of Lifetime Swimming Pool Products, of selling to them 800 tons of Chlorine at Rs. 1875 per tonne.

THEORY QUESTIONS

1. Discuss the distinguishing features of a process cost system?
2. Compare the cost accumulation and summarising procedures of a job order cost system and a process cost system.
3. What is equivalent production? What is its effect on computed unit cost?
4. Discuss the possible effects on a department's unit costs when materials are added to work-in-progress.
5. How is opening work-in-progress handled in average costing?
6. What are some of the disadvantages of the FIFO costing method?
7. What is the meaning of the term "split-off"? What is its significance in product costing?
8. What are joint costs? What problems are created by joint costs?
9. Explain the difference between a main product and a by-product.
10. How can the income from the sale of by-products be shown on the income statement?
11. Does the showing of income from by-products on the income statement influence the unit cost of the main product?

12. What is the difference between physical quantity method and sales value method?
13. Define and explain the term "joint products and by-products". Enumerate the method which may be employed in costing "joint product". *(B. Com. (Hons), Delhi, 2005)*
14. Define joint products and by-products. Explain the various bases available for apportionment of joint costs to joint products. *(CA Inter)*
15. Explain with an example the concept of 'equivalent production' for valuation of work-in-progress. *(B. Com. (Hons), Delhi)*
16. (i) What are the three most common methods of allocating joint product cost? Write a brief explanatory note on each. *(B. Com. (Hons), Delhi)*
    (ii) Explain the procedure of accounting for by-products.
17. Distinguish between normal and abnormal wastage of materials with specific reference to their accounting treatment and control. *(B.Com.(Hons) Delhi, 2004)*
18. What are equivalent units of production? Mention two principal methods of calculating equivalent units. *(ICWA, Inter, Stage 1, June 2006, June 2007)*
19. Explain briefly the procedure for the valuation of work-in-progress. *(CA, PE, Exam. II, Group II, Nov. 2002)*
20. Mention the different methods of by-product cost accounting. *(ICWA, Inter, Stage 1, Dec. 2006)*
21. Distinguish between joint products and by-products. *(ICWA, Inter, Stage I, Dec. 2006)*

SELF EVALUATION QUESTIONS

Choose the correct answer for the following multiple choice question:

(i) When should process costing method be used in assigning costs of products.
   (a) If the product is manufactured on the basis of each order received.
   (b) When production is only partially completed during the accounting period.
   (c) If the product is composed of mass-produced homogeneous units.
   (d) In situations in which standard costing techniques should not be used.

(ii) Which of the following characteristics applies to process costing but not to job-order costing?
   (a) Identifiable batches of production
   (b) Equivalent units of production
   (c) Averaging process
   (d) Use of standard costs

(iii) Which is the best cost accumulation procedure to use when there is a continuous mass production of like units.
   (a) Actual
   (b) Standard
   (c) Job order
   (d) Process

(iv) Which of the following is a characteristic of a process costing method?
   (a) Work-in-progress inventory restated in terms of completed units
   (b) Costs are accumulated by order
   (c) It is used by a company manufacturing on customers' orders
   (d) Standard costs are not applicable

(v) Normal wastage and abnormal wastage should be classified as:

	Normal	*Abnormal*
(a)	Period cost	Period cost
(b)	Product cost	Period cost
(c)	Period cost	Product cost
(d)	Product cost	Product cost

(vi) Normal wastage is properly classified as:

(a) An extraordinary item
(b) Period cost
(c) Product cost
(d) Deferred charge

(vii) If the amount of wastage in a manufacturing process is abnormal, it should be classified as:

(a) Deferred charge
(b) Joint cost
(c) Period cost
(d) Product cost

(viii) The type of wastage that should not affect the recorded costs of closing inventories is:

(a) Abnormal wastage
(b) Normal wastage
(c) Seasonal wastage
(d) Standard wastage

(ix) Each of the following is a method by which to allocate joint costs except

(a) Relative sales value
(b) Relative profitability
(c) Relative weight, volume
(d) Average unit cost

(x) When two products are produced during a common process, what is the factor that determines whether the products are joint products or one principal product and a by-product?

(a) Potential marketability for each product
(b) Amount of work expended in the production of each product
(c) Relative total sales value
(d) Management policy

(xi) Joint costs are most frequently allocated based upon relative

(a) Profitability
(b) Conversion costs
(c) Sales value
(d) Prime costs

(xii) In order to compute equivalent units of production using FIFO method of process costing, work for the period must be broken down to units.

(a) Completed during the period and units in ending inventory.
(b) Completed from the beginning inventory, started and completed during the month and units in closing inventory.
(c) Started during the period and units transferred out during the period.
(d) Processed during the period and units completed during the period.

(xiii) From the industries listed below, choose the one most likely to use process costing in accounting for production costs:

(a) Road builders
(b) Electrical contractor
(c) Newspaper publisher
(d) Automobile repair shop

(xiv) What are transferred-in costs as used in a process cost accounting system?

(a) labour that is transferred from another department within the same plant instead of hiring temporary workers from the outside.

(b) cost of the production of a previous internal process that is subsequently used in a succeeding internal process
(c) supervisory salaries that are transferred from an overhead-cost centre to a production-cost centre
(d) ending work-in-process inventory of a previous process that will be used in a succeeding process

(xv) Purchased materials added in the second department of a three department process that do not increase the number of units produced in the second department would

(a) not change the amount transferred to the next department
(b) decrease total work-in-process inventory.
(c) increase the factory overhead portion of the ending work-in-process inventory.
(d) increase total unit cost.

(xvi) The units transferred in from the first department to the second department should be included in the computation of the equivalent-units divisor for the second department for which of the following methods of process costing?

	First-In, First-Out	*Weighted Average*
(a)	yes	yes
(b)	yes	no
(c)	no	yes
(d)	no	no

(xvii) Purchased materials added in the second department of a three-department process that increase the number of units produced in the second department would always

(a) change the direct labour cost percentage in the ending work-in-process inventory.
(b) cause no adjustment to the unit cost transferred in from the first department.
(c) increase total unit costs.
(d) decrease total ending work-in-process inventory.

(xviii) The percentage of completion of the beginning work-in-process inventory should be included in the computation of the equivalent units of production for which of the following methods of process costing?

	First-in, First-out	*Weighted Average*
(a)	yes	no
(b)	yes	yes
(c)	no	yes
(d)	no	no

(xix) In the computation of manufacturing cost per equivalent unit, the weighted-average method of process costing considers

(a) current costs only.
(b) current costs plus cost of ending work-in-process inventory.
(c) current costs less cost of beginning work-in-process inventory.
(d) current costs plus cost of beginning work-in-process inventory.

(xx) In a given process-costing system, the equivalent-units divisor is computed for the weighted-average method. With respect to conversion costs, the percentage of completion for the current period only is included in the calculation of the

	Beginning Work-in-process Inventory	*Ending Work-in-Process Inventory*
(a)	no	no
(b)	no	yes
(c)	yes	no
(d)	yes	yes

(xxi) The first-in, first-out method of process costing differs from the weighted-average method in that the first-in, first-out method

(a) considers the stage of completion of beginning work-in-process inventory in computing equivalent units of production, whereas the weighted-average method does *not*.

(b) does not consider the stage of completion of beginning work-in-process inventory in computing equivalent units of production, whereas the weighted-average method does.

(c) is applicable only to those companies using the first-in, first-out inventory pricing method, whereas the weighted-average method may be used with any inventory pricing method.

(d) allocates costs based on whole units, whereas the weighted-average method uses equivalent units.

PROBLEMS

Process costing having no process loss and no opening and closing work-in-progress

1. Prepare process cost accounts from the following data:

Rs.

Items	*Total*	*Process*		
		I	*II*	*III*
Direct material	4,40,000	3,60,000	60,000	20,000
Direct wages	80,000	20,000	40,000	20,000
Direct expenses	1,00,000	60,000	—	40,000

Production overhead incurred is Rs. 1,60,000 and is recovered on 200% of direct wages. Production during the period was 20,000 units. There was no opening or closing work-in-progress.

Ans:

	Cost per unit (Rs.)	*Amt. (Rs.)*
Process I A/c	24.00	4,80,000
Process II A/c	33.00	6,60,000
Process III A/c	39.00	7,80,000

2. From the following Figures, prepare process accounts indicating the cost of process and the total cost. The production was 480 articles per week.

	Process I	*Process II*	*Process III*
Materials	Rs. 3,000	Rs. 1,000	Rs. 400
Labour	1,600	4,000	1,200
Factory Overheads	520	1,440	500

Office overheads amounting to Rs. 1,700 should be apportioned on the basis of wages. Ignore stock in hand and work-in-progress at the beginning and end of the work. *(B.Com. Delhi)*

Ans: Process I—Transfer to Process II Rs. 5,520.
Process II —Transfer to Process III Rs. 12,960.
Process III—Transfer to finished stock Rs. 15,360

Process costing having process losses or gains (Normal loss, Abnormal loss, Abnormal gain)

3. The following data are available pertaining to a product after passing through two processes *A* and *B*: Output transferred to process *C* from process *B*, 9120 units for Rs. 49,263

Expenses incurred in Process C:

Sundry materials	Rs.	1,480
Direct labour	Rs.	6,500
Direct expenses	Rs.	1,605

The wastage of process *C* is sold at Re 1.00 per unit. The overhead charges were 168% of direct labour. The final product was sold at Rs. 10.00 per unit fetching a profit of 20% on sales.
Find the percentage of wastage in process *C* and prepare Process C Account.

(B.Com. (Hons), Delhi 1999)

Ans: Percentage of wastage 5%. Transfer to finished goods stock A/c Units 8,664, Rs. 69,312.

4. In a certain process, material is mixed and cooked in batches of 1,000 lbs each. Cooking results in 10 percent loss of weight of the mixture. Since the cooking requires considerable skill and constant watching, there is generally a further loss for spoilage which is not discovered until processing has been completed. Also, past experience shows that normally two batches out of every ten started in the process are spoiled in this way.
In a given month, the production records show:

(i) Production started in the process — 50 batches of 1,000 lbs each.
(ii) Production completed and transferred to finished goods is 34,200 lbs.
(iii) There is no inventory of work-in-process at the beginning or end of the month.

Costs recorded during the month amounted to Rs. 45,000. Prepare the Process Account for the month and determine the cost per pound of finished product. *(B.Com. (Hons), Delhi 2000)*

Ans: Finished stock A/c, Rs. 43,971

5. The input to a purifying process was 16,000 kg of basic material purchases @ Rs. 1.20 per kg. Process wages amounted to Rs. 720 and overhead was applied @ 240% of the labour cost. Indirect materials of negligible weight were introduced into the process at a cost of Rs. 336. The actual output from the process weighed 15,000 kg. The normal yield of the process is 92%. Any difference in weight between the input of basic material and output of purified material (product) is sold @ Re. 0.50 per kg.

The process is operated under a licence which provides for the payment of royalty @ Re. 0.15 per kg. of the purified material produced.

Prepare:

(i) Purifying Process Account
(ii) Normal Wastage Account
(iii) Abnormal Wastage/Yield Account
(iv) Royalty Payable Account

(CA Inter, May 1996)

Ans: Purifying Process A/c - Transfer to stock A/c 15,000 Kg, Amt. Rs. 24,000.
Royalty Payable A/c, Balance 15,000 kg Amt. Rs. 2250

6. The finished product of a manufacturing company passes through three Processes, viz., I, II and III. The normal wastage in each process is 5%, 7% and 10% for the Processes I, II and III respectively (calculated with reference to the number of units fed into each process). The scrap generated out of wastage has a sale value of 70 paise per unit, 80 paise per unit and Re. 1 per unit in the Process I, II and III respectively. The output of each process is transferred to the next Process and the finished output emerges from the process III and transferred to stock. There was no stock of work-in-progress in any process in a particular month. The details of cost data for the month are given below:

Particulars	*Processes*		
	I	*II*	*III*
Materials used (Rs.)	1,20,000	40,000	40,000
Direct Labour Cost (Rs.)	80,000	60,000	60,000
Production Expenses (Rs.)	40,000	40,000	28,000
Output in Units (actuals)	38,000	34,600	32,000

Process I was fed with 40,000 units of raw input at cost of Rs. 3,20,000.
Prepare the Process Accounts.

(ICWA Inter, June 1996, ICWA., Inter, Stage 1, Dec. 2003)

Ans: Process I A/c, Transfer to Process II, Units 38,000, Rs. 5,58,600.
Process II A/c, Transfer to Process III, Units 34,600, Rs. 6,81,888.
Process III – Transfer to finished stock A/c, Units 32,000, Rs. 8,28,700.

7. A product passes through three processes—*P*, *Q*, and *R*. The details of expenses incurred on three processes during the year 1996 were as under:

Particulars	*P*	*Q*	*R*
Units issued	10,000		
Cost per unit	100		
Sundry Materials	Rs. 10,000	15,000	5,000
Labour	Rs. 30,000	80,000	65,000
Direct Expenses	Rs. 6,000	18,150	27,200
Sale Price of output per unit	Rs. 120	165	250

Management expenses during the year amounted to Rs. 80,000 and selling expenses were Rs. 50,000. Both these are not allocable to the processes.
Actual output of the three processes was as under:
Process *P*—9,300 units; Process *Q*—5,400 units; Process *R*—2,100 units.
Two-thirds of the output of process *P* and one half of the output of process *Q* was passed on to the next process and the balance was sold. The entire output of process *R* was sold.
The normal wastage of the three processes calculated on the input of every process was:
Process *P*—5 per cent; Process *Q*—15 per cent; Process *R*—20 per cent.
The wastage of Process *P* was sold at Rs. 2 per unit, that of Process *Q* at Rs. 5 per unit and that of Process *R* at Rs. 10 per unit.
Prepare the three Process Accounts and a Statement of Income for 1994 showing fully the accounting treatment of Process Wastage. *(B. Com. (Hons), Delhi 1996)*

Ans: Income statement, Net loss Rs. 32,450.

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

	Process-A	*Process-B*	*Process-C*
Sundry materials	Rs. 1,600	Rs. 1,500	Rs. 1,500
Direct labour	4,500	8.000	6,500
Direct expenses	1,000	1,000	1,503

The wastage of Process-*A* was 5% and in Process-*B* 4%. The wastage of Process-*A* was sold at Re. 0.25 per unit and that of *B* at Re. 0.50 per unit and that of *C* at Re. 1.00 per unit. The overhead charges were 160% of direct labour. The final product was sold at Rs. 10 per unit fetching a profit of 20% on sales, find out the percentage of wastage in Process-*C*. *(ICWA, Inter)*

Ans: Normal wastage in Process *C*, 696 units, Process *C*, Transfer to finished stock A/c, 8424 units, Rs. 67,392.

9. An article passes through three successive operations from the raw material to the finished product stage. The following data are available from the production records of a particular month:

Operation no.	*No. of pieces input*	*No. of pieces rejected*	*No. of pieces output*
1	60,000	20,000	40,000
2	66,000	6,000	60,000
3	48,000	8,000	40,000

(a) Determine the input required to be introduced in the first operation in number of pieces in order to obtain finished output of 100 pieces after the last operation.

(b) Calculate the cost of raw material required to produce one piece of finished product, given the following:

- Weight of the finished piece is 0.10 kg and
- The price of raw material is Rs. 20 per kg. *(CA, Inter)*

Ans: (a) 19.80 Kg (b) Rs. 3.96

10. Department I of Coromandel Chemicals conducts a process which requires mixing of materials and cooking of the mixture in batches of 1,000 lbs each. Cooking results in 10 per cent loss of weight of the mixture. Also, past experience shows that two batches out of every ten started in the process are spoiled.
The production records for May, 2008 show the following:

(i) Production started in the Process: 50 batches of 1,000 lbs each.
(ii) Production completed and transferred to finished goods: 34,200 lbs.
(iii) There is no inventory of work-in-process at the beginning or at the end of the month.
Costs recorded during the month totalled Rs. 45,000. Prepare the account of the process conducted by Department I. *(B. Com. (Hons), Delhi)*

Ans: Abnormal loss 800 lbs, Rs. 1,029. Finished goods 34,200 lbs, Rs 43,971

11. Product Z is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the month ending December 31, 2008.

Rs.

Items	*Total*	*Process*		
		I	*II*	*III*
Direct material	7,542	2,600	1,980	2,962
Direct wages	9,000	2,000	3,000	4,000
Production overhead	9,000			

1,000 units at Rs. 3 each were introduced to Process *I*. There was no stock, material or work-in-progress at the beginning or end of the period. The output of each process passes direct to the next process and finally to finished stores. Production overhead is recovered at 100% of direct wages. The following additional data are obtained:

Process	*Output during the month*	*Percentage of normal loss to input*	*Value of scrap per unit*
Process I	950	5%	Rs. 2
Process II	840	10%	4
Process III	750	15%	5

Prepare the process cost accounts and abnormal gain or loss accounts. *(B. Com. (Hons), Delhi)*

Ans: Process I 950 units Rs. 9,500 II 840 units Rs. 16,800 III 750 units Rs. 28,500
Abnormal loss Process II–15 units Rs. 300
Abnormal gain Process III–36 units, Rs. 1,368

12. The finished product of a factory has to pass through three Processes *A*, *B* and *C*. The normal wastage of each process is 2% in *A*, 5% in *B* and 10% in *C*. The percentage of waste is computed on the number of units entering each process.

The scrap value of wastage of Process *A*, *B* and *C* are Rs. 10, Rs. 40, Rs. 20 per 100 units respectively.

The output of each process is transferred to the next process and the finished products are transferred from Process *C* into stock. The following further information is obtained:

	Processes		
	A	*B*	*C*
	Rs.	Rs.	Rs.
Materials consumed	12,000	4,000	4,000
Direct labour	8,000	6,000	6,000
Manufacturing expenses	2,000	4,000	2,000

2,000 units were put into Process *A* at a cost of Rs. 16,000. The output of each process has been *A*–19,600 units, *B*–18,400 units and *C*–16,700 units.

There was no stock of work-in-progress in any process.

Prepare the process accounts. *(B. Com. (Hons), Delhi)*

Ans: Process *A*, units 19,600 Rs. 37,960 Process *B*, units 18,400 Rs. 50,959, Abnormal loss (Process *B*) 220 units, Rs. 609 Process *C*, finished goods units 16,700 Rs. 63,120 Abnormal gain Process *C* 140 units Rs. 529

13. Product ZENU is made by three sequential Processes I, II, III. In process III, a by-product arises and after further processing in process *XY*, at a cost of Rs. 2 per unit, by-product *XYZ* is produced. Selling and distribution expenses of Re. 1 per unit are incurred in marketing *XYZ* at a selling price of Rs. 9 per unit.

	Process I	*Process II*	*Process III*
Standards provided for:			
Normal loss in process of input, of	10%	5%	10%
Loss in process, having a scrap value per unit, of	Re. 1	Rs. 3	Rs. 5

For the month of April 2005 the following data are given:

	Process I	*Process II*	*Process III*	*Process XY*
Output (in units)	8,800	8,400	7,000 of ZENU	420 of *XYZ*
Costs:				Total
Direct Materials:				
Introduced (10,000 units)	Rs. 20,000			20,000
Direct Materials added	6,000	Rs. 12,640	Rs. 23,200	41,840
Direct Wages	5,000	6,000	10,000	21,000
Direct Expenses	4,000	6,200	4,080	14,280

Budgeted production overhead for the month was Rs. 84,000.

Absorption is based on a percentage of direct wages.

There are no stocks at the beginning or end of the month. You are required, using the information given, to prepare accounts for:

(a) each of Process I, II and III; and (b) Process *XY*. *(ICWA, Inter)*

Ans:

Process I – Transfer to Process II, 8800 units, Rs. 52,800

Process II – Transfer to Process III, 8400 units, Rs. 1,00,800

Process III – Net sales value, 420 units, Rs. 2,520.

XY Process A/c, Finished goods stock A/c, units 420, Rs. 3780.

14. A product, which uses 100 tons as input per month passes through two Processes. The details of cost in Process 1 for April 2003 are:

Process 1	*Cost per tonne*
Direct material cost	Rs. 26,100
Direct labour cost	7,800
Overhead	13,500

The total loss in Process 1 is 2% of input, and the scrap is 8% of input with a value of Rs. 12,000 per ton. The material to Process 2 is transferred at cost. The Process direct labour cost at Process 2 is Rs. 9,000 per ton of input. The overhead is 60% of direct labour cost. The scrap at Process-2 is 20% of input with a value of Rs. 12,000 per ton. Draw up a cost sheet to present the manufacturing cost of the product showing clearly the cost of scrap and waste at each stage of manufacturing. *(CS, Inter)*

Ans:

	Process 1	*Process 2*
Loss	2 tonne	—
Scrap	8 tonne, Rs. 96,000	18 tonne, Rs. 2,16,000

15. The product of a manufacturing concern passes through two Processes *A* and *B* and then to finished stock. It is ascertained that in each process 5% of the total weight is lost and 10% is scrap, which from processes *A* and *B* realises Rs. 80 per kg and Rs. 200 per kg respectively.
The following are the figures relating to both the processes:

	Process A	*Process B*
Materials kg	1,000	70
Cost of materials (Rs. per kg)	125	200
Wages (Rs.)	28,000	10,000
Manufacturing expenses (Rs.)	8,000	5,250
Output (kg)	830	780

Prepare the process cost account showing cost per kg of each process. There was no stock or work-in-process in any process. *(B. Com. (Hons), Delhi)*

Ans:	Process A	Process B
Abnormal loss	20 kg, Rs. 3,600	—
Abnormal gain	—	15 kg, Rs. 3,150
Transfer to process *B*	830 kg, Rs 1,49,400	—
Transfer to finished stock	—	780 Kgs, Rs. 1,63,800

16. XYZ Ltd. manufactures and sells three chemicals produced by consecutive processes known as *X*,*Y* and *Z*. In each process, 2% of the total weight put in is lost and 10% is scrap, which from processes *X* and *Y* realised Rs. 100 a units and from *Z* Rs. 200 a units. The products of the three processes are dealt with as follows:

	X	*Y*	*Z*
Sent to warehouse for sale	25%	—	100%
Passed on to next process	75%	100%	—

The following particulars relate to the month of March:

Materials used (units)	100	140	1,348
Cost per units of materials (Rs.)	120	200	80
Manufacturing expenses (Rs.)	30,800	25,760	1,810

Prepare an account of each Process, showing the cost per unit of each process. *(B. Com. (Hons), Delhi)*

Ans:

	X	*Y*	*Z*
Cost of production (Rs.)	Rs. 41,800	83,050	1,62,114.40

17. A Product passes through three processes. Figure relating to production for the 6 months of 2005 are as follows:

	Process I	*Process II*	*Process III*
Raw materials used	1,000 kg.		
Cost per kg.	Rs. 200		
Manufacturing wages and expenses	Rs. 72,500	Rs. 40,800	Rs. 10,710
Weight lost	5%	10%	20%
Scrap-sold at Rs. 50 per kg	50 kg	30 kg	51 units
Sales price per kg	Rs.350	Rs. 500	Rs. 800

Management expenses were Rs. 17,500, selling expenses Rs. 10,000 and interest on borrowed capital Rs. 4,000.

Two thirds of Process I and one-half of Process II are passed on to the next process and the balances are sold.

You are required to prepare process cost accounts in a form suitable for presentation to the directors at their next board meeting when the production policy of the company will be discussed. *(B. Com. (Hons), Delhi)*

Ans: Net profit Rs. 5,940.

Process Costing Having opening and closing Work-in-Progress with or without Normal Loss, Abnormal Loss and Abnormal Gain

18. (Normal Loss at Beginning of or during a Process)

AB Ltd. is engaged in the process engineering industry. During the month of April 2002, 2,000 units were introduced in Process *X*. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to Process *Y*, 460 units were incomplete units and 140 units during the process had to be scrapped. The incomplete units had reached the following stage of completion:

Material	75%	Completed
Labour	50%	"
Overhead	50%	"

Following is further information in Process *X*:

	Rs.
Cost of the 2,000 units	58,000
Additional direct material	14,400
Direct labour	33,400
Direct overhead	16,700
Units scrapped realised Rs. 10 each	

Prepare a statement of equivalent production, statement of cost, statement of evaluation and the Process X account. *(ICWA Inter)*

Ans: Apportionment of cost, Abnormal loss Rs. 2,800, Finished production Rs. 98,000, Work-in-progress Rs.20,700, Cost per unit Rs. 70.

19. (Normal Loss at the End of a Process)

The finished products 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 cost data relating to the first process, prepare a statement of equivalent production, statement of cost, and process account. Spoilage of 1,000 units occur at the end of the first process.

Process costs	Rs.
Materials	60,000
Labour	33,600
Overhead	22,400
Units put into Process I	12,000
Transferred to Process II	10,000
Closing inventory (20% complete)	1,000

Ans: Cost per unit Rs. 10 Completed units transferred Rs. 1,10,000 Work-in-progress Rs. 6,000

20. (FIFO)

The accountant of a chemical company provides you the following data:

	Units	*Amount (Rs.)*
Work-in-process, beginning of period	2,000	
Direct materials		4,200
Direct labour and manufacturing overhead		1,950
Addition to work-in-process in April	4,000	
Direct materials		9,000
Direct labour and manufacturing overhead		7,500
Total		22,650
Work-in-process, end of period	1,500	

Further, work-in-process at the beginning of the period is complete to the extent: materials 100% and labour and manufacturing overhead 75%. Work-in-process at the end of the period is complete to the extent: materials 100% and direct labour and manufacturing overhead only 50%.

You are required to:

(i) Calculate the number of units of product transferred to finished-goods stock during the period. Assume no units are lost in process.

(ii) Calculate the number of equivalent whole units of work completed during the period.

(iii) Calculate the unit cost for materials during the month of April using First-in, First-out method of inventory issue. *(B. Com. (Hons), Delhi)*

Ans: (i) 4,500 (ii) 3750 (iii) Rs. 2.25

21. (Average Costing)

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

Opening Stock	20,000	units
Material	Rs. 10,000	
Labour	Rs. 4,000	
Overhead	Rs. 5,000	
Units Introduced	Rs. 80,000	units
Material	Rs. 40,000	
Wages	Rs. 31,000	
Overhead	Rs. 30,000	

During the period 60,000 units were completed and transferred to Process II.

Closing stock 40,000 units, degree of completion.

Material	100%
Wages and overhead	25%

Ans: Equivalent production 70,000 units, Cost per unit of equivalent production Rs. 1.50, Units completed and transferred Rs. 90,000 Closing work-in-progress Rs. 30,000

22. (Average Costing)

The beginning inventory in Process No. 2 at the beginning of a period was valued at Rs. 2,950 made up of Rs. 1,400 towards materials, Rs. 1,000 towards labour and Rs. 550 towards overheads for 100 units. The value added during the period was Rs. 53,600 towards an introduction of 4,100 units from the previous process besides Rs. 40,800 towards labour and Rs. 19,400 towards overheads. Out of 3,600 units completed, 3,300 units were transferred to the next process leaving the balance in stock. 400 units were held back in process with half completion towards labour and overheads while 200 units were loss in processing considered normal and hence should be borne by the entire inventory. Prepare a cost of production statement using average cost basis. *(ICWA Inter)*

Ans: Cost of units transferred Rs. 99,000; Cost of units held in stock Rs. 9,000; Cost of WIP Rs. 8,75; Cost per unit Material Rs. 13.75, Labour Rs. 11.00; Overheads Rs. 5.25.

23. Roy and Johnson (P) Ltd. gives the following particulars relating to Process *A* in its plant for the month of December 1997:

		Cost	Rs.
Work-in-progress (opening balance) on 1.12.1997—500 units:			
		Material	4,800
		Labour	3,200
		Overheads	6,400
			14,400
Units introduced during the month		19,500	
Processing costs incurred during the month:			
Materials	Rs. 1,86,200		
Labour	72,000		
Overheads	1,06,400		Rs. 3,64,600
Output: Units transferred to Process *B*	18,200		
Units scrapped (completely processed)	1,400		
Work-in-process (closing balance)	400		
[Degree of completion: Materials 100%			
Labour and overhead 50%]			

Normal loss in processing is 5% of total input and normal scrapped units fetch Re. 1 each.
Prepare the following statements for Process *A* for December 1997:
(a) Statement of Equivalent Production;
(b) Statement of Cost;
(c) Statement of Evaluation;
(d) Process *A* Account. *(ICWA Inter, June 1998)*

Ans: Output completed and transferred Rs. 3,64,000; Abnormal loss Rs. 8,000; Closing work in progress Rs. 6,000; Cost per unit, material Rs. 10; Labour Rs. 4, Overhead Rs. 6.

24. The following data pertains to Process 1 for March 2008 of Beta Ltd.:

Opening Work-in-progress	1,500 units at	Rs. 15,000
Degree of completion:		
Material 100%; Labour and Overheads $33\frac{1}{4}$ %		
Input of materials	18,500 units at	Rs. 52,000
Direct labour		Rs. 14,000
Overheads		Rs. 28,000
Closing in work-in-progress	5,000 units	

Degree of completion: Material 90% and Labour and Overhead 30%
Normal Process Loss is 10% of total input
(Opening work-in-progress units + Units put in)
Scrap value Rs. 2.00 per unit.
Units transferred to the next process: 15,000 units.

You are required to:
(a) Compute equivalent units of production.
(b) Compute cost per equivalent unit for each cost element, that is, materials, labour and overheads.
(c) Compute the cost of finished output and closing work-in-progress.
(d) Prepare the process and other accounts.

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

(CA Inter, B. Com. (Hons), Delhi)

Ans: Cost per equivalent units Rs. 6, Cost of 15,000 units of finished output Rs. 99,000; Cost of closing WIP Rs. 18,000

25. (Average Costing)

From the following details prepare statement of equivalent production, statement of cost and find the value of

(a) Output transferred, and

(b) Closing work-in-progress applying average method of valuation of process stock and FIFO method.

Opening work-in-progress	2,000 units
Materials (100% complete)	Rs. 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 and the state 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	78,000
Overhead	39,000

(CA Inter)

Ans: Equivalent units: Materials 10,000, labour and overheads 9,000 each: (a) Rs 1,99,784, (b) Rs 35,723

26. The following details relate to an intermediary process in a factory:

	% Degree of completion	*No. of units*	*Cost Rs.*
Opening work-in-progress:		300	12,300
(a) Materials	50%		
(b) Labour	80%		
(c) Overheads	80%		
Transfer from previous process	100%	3,800	1,36,800
Process material added			7,900
Direct wages			37,400
Overheads			14,960
Transfer to next progress (finished)	100%	3,500	
Closing work-in-progress:		600	
(a) Material	100%		
(b) Labour	80%		
(c) Overheads	80%		

Prepare:

(a) Process cost accounts for the intermediary process.

(b) Statement of equivalent units (on FIFO basis).

(c) Statement of distribution of cost on the basis of equivalent units.

Ans: Transfer to next process 3,500 units Rs 1,79,840; Closing stock 600 units Rs 29,520

27. (Average Cost Method)

The following details are given in respect of a manufacturing unit for the month of April 1995:

(i) Opening work-in-progress 5,000 units

	Rs.
(a) Materials (100% complete)	18,750
(b) Labour (60% complete)	7,500
(c) Overheads (60% complete)	3,750

(ii) Units introduced into the process 17,500 units

(iii) 17,500 units are transferred to the next process

(iv) Process cost for the period are

Material	Rs. 2,50,000
Labour	Rs. 1,95,000
Overheads	Rs. 97,500

(v) The stage of completion of units in closing WIP are estimated to be: Material 100%, Labour 50% and Overheads 50%.

You are required to prepare a statement of equivalent unit of production, statement of cost. Also find the value of

(i) Output transferred

(ii) Closing work-in-progress, using average cost method. *(C.A. Inter June 1995)*

Ans: Average cost per equivalent unit Rs. 27.132, value of output transferred Rs. 474810, value of closing WIP Rs. 97,690

28. (Average Cost Method)

Process 2 receives units from Process 1 and after carrying out work on the units transfers them to Process 3. For the accounting period the relevant data were as follows:

Opening WIP 200 units (25% complete) valued at	Rs. 5,000
800 units received from Process I valued at	Rs. 8,600
840 units were transferred to Process 3	
Closing WIP 160 units (50% complete)	

The costs of the period were Rs. 33,160 and no units were scrapped.

Required:

Prepare the Process Account for Process 2 using the Average Cost Method of valuation. *(C.A. Inter Nov. 1995)*

Ans: Average cost per complete unit Rs. 50.826

cost of production	
840 complete units	Rs. 42,694
160 WIP units	Rs. 4,066

29. (Opening and Closing Work-in-Progress)

The following data relate to Process *Y* for accounting period 2.

At the beginning of period 2, there were 800 units partly completed which had the following values:

	Value (Rs.)	*Percentage complete*
Input material (from Process *X*)	8,200	100
Material introduced	5,600	55
Labour	3,200	60
Overheads	2,400	45

During the period 4,300 units were transferred from Process *X* at a value of Rs. 46,500 and other costs were:

	Rs.
Material introduced	24,000
Labour	19,500
Overhead	18,200

At the end of the period, the closing WIP was 600 units which were at the following stage of completion:

Input material	100% complete
Material introduced	50% complete
Labour	45% complete
Overheads	40% complete

The balance of 4,500 units was transferred to finished goods.
Calculate the value of units transferred to Finished Goods and the value of WIP and prepare the Process account using

(i) the FIFO method and
(ii) the average cost method.

(CA, Inter)

Inter Process Profit

30. The manufacturing operations of JK Ltd. involve three distinct processes in connection with the same unit. The output of Process *P* is charged to Process *Q* at a profit of 25% on cost, and the output of Process *Q* is charged to Process *R* on similar basis. The completed product is transferred into stock at a price which gives Process *R* a profit of 25% on transfer price. From the following particulars prepare process cost accounts and finished goods account. Stock in each process has been valued at prime cost.

Process	*P*	*Q*	*R*
Materials consumed	Rs. 14,000	Rs. 21,000	Rs. 7,000
Labour	21,000	14,000	28,000
Closing stock	7,000	14,000	21,000

Sales Rs. 1,26,000.
Closing stock of finished products amount to Rs. 14,000. Show also the actual realised profit to be taken to the credit of the Profit and Loss Account.

Ans: Profit, Process *P* Rs. 7,000, Process *Q* Rs. 14,000, Process *R* Rs. 28,000, Finished stock A/c Rs. 28,000, Actual realised profit Rs. 66,220, cost of closing stock: Process *Q* Rs. 12,600, Process *R* Rs. 17,080, Finished stock Rs. 8,540.

31. Cheap Sweets Ltd. has divided its manufacture into two processes, *A* and *B*. After leaving Process *B*, the product is passed into finished stock.
The output of Process *A* is transferred to Process *B* at a price which gives process *A* a Profit of 25% thereon, and the output of Process *B* is transferred to finished goods at a price which gives Process *B* a profit of 20% thereon.
The following information is provided in respect of the year ended 31st December, 2002:

	Process A	*Process B*
Stock on Ist January, 2002	Rs. 3,200	2,000
Materials used	6,400	2,700
Direct labour	12,500	8,500
Overheads	2,500	1,700
Stock on 31st December, 2002	2,100	900

Process stocks consist of products which have passed through the process completely and are valued at prime cost to the process concerned.

Finished goods were in stock on Ist January, 2002 to the value of Rs. 10,200 and on 31st December, 2002 to the value of Rs. 6,200. Both the opening and closing stocks were valued at the price at which they were transferred from Process *B*.

Sales amounting to Rs. 68,400 were effected during the year and included all the goods in stock at the beginning of the year.

The reserves on Ist January, 2002 for unrealised profit included in stock valuation were: Process *B*— Rs. 350; Finished goods Rs. 3,430.

Prepare the Process Accounts, Finished Goods Account and Trading Account for the year ended 31st December, 2002.

Ans: Profit Process *A* Rs. 7,500, Process *B* Rs. 11,000, Finished goods stock A/c Rs. 9,400, Trading A/c Profit Rs. 29,413.

32. Product *A* passes through three processes before it is transferred to finished stock. The following information is obtained for the month of July:

	Process I Rs.	*Process II* Rs.	*Process III* Rs.	*Finished stocks* Rs.
Opening stock	5,000	8,000	10,000	20,000
Direct materials	40,000	12,000	15,000	—
Direct wages	35,000	40,000	35,000	—
Manufacturing overhead	20,000	24,000	20,000	—
Closing stock	10,000	4,000	15,000	30,000
Profit % on transfer price to next process	25%	20%	10%	—
Inter-process profit for opening stock	—	1,395	2,690	6,534

Stocks in processes are valued at prime cost and finished stock has been valued at the price at which it is received from Process III. Sales during the period were Rs. 4,00,000.

Prepare and compute:

(a) Process cost accounts showing profit element at each stage,
(b) Actual realised profit, and
(c) Stock valuation for balance sheet purpose.

Ans: Profit Process I Rs. 30,000, Process II Rs. 50,000, Process III Rs. 35,000, Finished goods stock Rs. 60,000 Actual realised profit:

Process I	Rs. 30,000
Process II	Rs. 50,697
Process III	Rs. 33,655
Finished stock	Rs. 56,732

Stock valuation for balance sheet =

Process I	Rs. 10,000
Process II	Rs. 3,302
Process III	Rs. 10,965
Finished	Rs. 20,198
Total:	Rs. 44,465

Joint Product and By-Products

33. Calculate the estimated cost of production of by-products *X* and *Y* at the point of separation from the main product.

	By-product *X*	By-product *Y*
Selling price per unit	Rs. 12	Rs. 24
Cost per unit after separation from the main product	Rs. 3	Rs. 5
Units produced	500	200

Selling expenses amount to 25% of total works cost, that is, including both pre-separation and post-separation work cost.

Selling prices are arrived at by adding 20% of total cost, that is, the sum of works cost and selling expenses.

Ans: Total cost By-product *X* Rs. 2500, By-product *Y* Rs. 2,200, Cost per unit *X* Rs. 5, *Y* Rs. 11

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

Joint costs of the four products: Rs. 8,29,600

Outputs: *A* 5,00,000 litres, *B* 10,000 litres, *C* 5,000 litres, and *D* 9,000 kg.

Further Processing Costs: *A* Rs. 2,40,000, *B* Rs. 48,000, *C* Rs Nil, and *D* Rs. 8,030.

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

	As finished product	*As intermediate*
A Rs per litre	1.84	1.20
B Rs per litre	8.00	4.00
C Rs per litre	6.40	6.40
D Rs per kg	26.67	24.00

(a) Calculate the product-wise profit allocating joint costs on net realisable values.

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

Ans: (a) Profit Product *A* Rs. 39,459, Product *B* Rs. 2,631, Product *C* Rs. 2,105, Product *D* Rs. 14,205 (b) Profit with further processing *A* Rs. 1,19,452, *B* loss Rs. 5,369, *D* Rs 30,205.

Profit with not further processing *A* 39,459 *B* Rs. 2,631, *D* Rs. 14205

It is beneficial to further process Products *A* and *D* but not Product *B*.

35. In an oil mill, four products emerge from a refining process. The total cost of input during the quarter ending March 2002 is Rs. 1,48,000. The output, sales and additional processing costs are as under:

Product	*Output in litres*	*Additional processing* cost after split-off point (Rs)	*Sales value* Rs
AOXE	8,000	43,000	1,72,500
BOXE	4,000	9,000	15,000
COXE	2,000		6,000
DOXE	4,000	1,500	45,000

In case these products were disposed off at the split-off points, that is, before further processing, the selling price would have been:

AOXE Rs. 15.00; BOXE Rs. 6.00; COXE Rs. 3.00; DOXE Rs. 7.50.

Prepare a statement of profitability based on the following facts:

1. If the products are sold after further processing is carried out in the mills.
2. If they are sold at the split-off point. *(CA Inter)*

Ans: 1. Profit AOXE Rs. 30,833, BOXE Rs. 13,733 Loss, COXE Rs. 1,067, DOXE Rs. 18,833. 2. Profit AOXE Rs. 21,333, BOXE Rs. 4,267, COXE Rs. 1,067, DOXE Rs. 5,333.

36. *B* Ltd. manufacturers Product *A* which yield two by-products *B* and *C*. The actual joint expenses of manufacture for a period were Rs. 8,00,000.

It was estimated that the profits on each product as a percentage of sales would be 30%, 25% and 15% respectively. Subsequent expenses were:

	A	*B*	*C*
Materials	Rs. 10,000	Rs. 7,500	Rs. 2,500
Direct wages	20,000	12,500	5,000
Overheads	15,000	12,500	7,500
	45,000	32,500	15,000
Sales were	Rs. 6,00,000	Rs. 4,00,000	Rs. 2,50,000

Prepare a statement showing the apportionment of the joint expenses of manufacture over the different products.

(B. Com. (Hons), Delhi)

Ans:

	A	*B*	*C*
Share of joint costs (Rs.)	3,55,800	2,54,700	1,89,500

37. Two products *P* and *Q* are obtained in a crude form and require further processing at a cost of Rs. 5 for *P* and Rs. 4 for *Q* per unit before sale. Assuming a net margin of 25 per cent on cost, their sale prices are fixed at Rs. 13.75 and Rs. 8.75 per unit respectively. During the period, the joint cost was Rs. 88,000 and the outpurs were:

P 8,000 units
Q 6,000 units

Ascertain the joint cost per unit.

(B. Com. (Hons), Delhi), 2002;CA Inter May 1998)

Ans:

	P	*Q*
Joint cost per unit (Rs.)	8	4

38. Bright Chemicals Ltd. electrolyses common salt to obtain three joint products—caustic soda, chlorine and hydrogen. During a costing period, the expenditure relating to the inputs for the common process amounted to Rs. 3,50,000. After separation, expenses amounting to Rs. 1,60,000, Rs. 75,000, and Rs. 10,000 were incurred for caustic soda, chlorine and hydrogen respectively. The entire production was sold and Rs. 3,75,000; Rs. 2,50,000; and 60,000 were realised for caustic soda, chlorine and hydrogen respectively. The selling expenses were estimated at 5% of realisations from sale. The management expected profits @ 15%; 10% and 5% of realisations from sale of caustic soda, chlorine and hydrogen respectively.

Draw a columnar statement showing the apportionment of joint costs and the profitability of each product.

(ICWA Inter)

Ans:

	Caustic soda	Chlorine	Hydrogen
Profit (Rs.)	44,000	12,700	Loss (950)

39. In manufacturing the main product *A*, a company processes the resulting waste material into two by-products M_1 and M_2. Using the method of working back from sales value to an estimated cost, you are required to prepare a comparative profit and loss statement of the three products from the following data:

(i) Total cost upto separation point was Rs. 1,36,000.

	A	M_1	M_2
(ii) Sale (all production)	Rs. 3,28,000	Rs. 32,000	Rs. 48,000
(iii) Cost after separation	–	Rs. 9,600	Rs. 14,400
(iv) Estimated net profit percentage to sale value	–	20%	30%
(v) Estimated selling expenses as percentage of sale value	20%	20%	20%

(ICWA Inter)

Ans:

	Main Product	By-Products	
	A	M_1	M_2
Net profit (Rs.)	1,45,600	6,400	14,400

40. In a concern engaged in process industry, four products emerge from a particular process of operation. The total cost of input for the period ended 30th September, 2005 is Rs. 2,53,500. The details of output, additional cost after "split-off point" and sales value of the products are given below.

Product	*Output*	*Additional processing cost after split-off point*	*Sales value*
	kg	*Rs.*	*Rs.*
A	8,000	60,000	1,68,000
B	5,000	10,000	1,10,000
C	3,000	–	60,000
D	4,000	20,000	90,000

If the products are sold at "split-off point" without further processing, the sales value would have been

	Rs.
A	1,15,000
B	90,000
C	55,000
D	80,000

You are required to prepare a statement of profitability based on the products being sold:

(i) after further processing, and
(ii) at the split-off point.

(ICWA Inter)

Ans:

	A	*B*	*C*	*D*
Profit after further processing	(Rs.) 27,000	25,000	15,000	17,500
Profit at the splitoff point	(Rs.) 29,257	22,897	13,993	20,353

41. A company manufactures products *A*, *B*, and *C* from a joint process. Additional data are as follows:

	Product			
	A	*B*	*C*	*Total*
Units produced	8,000	4,000	2,000	14,000
Joint costs	Rs. 72,000	*a*	*b*	Rs. 1,20,000
Sales value at split-off	*c*	*d*	Rs. 30,000	2,00,000
Additional costs to process further	14,000	10,000	6,000	30,000
Sales value if processed further	1,40,000	60,000	40,000	2,40,000

Derive the values for the lettered spaces.

Ans: (a) Rs. 30,000; (b) Rs. 18,000; (c) Rs. 1,20,000; (d) Rs. 50,000

42. JB Limited produces four joint products, *A*, *B*, *C* and *D*, all of which emerge from the processing of one raw material. The following are the relevant data:
Production for the period:

Joint Product	*Number of units*	*Selling price per unit (Rs.)*
A	500	18.00
B	900	8.00
C	400	4.00
D	200	11.00

The company budgets for a profit of 10% on sales value. The other estimated costs are:

	Rs.
Carriage inwards	1,000
Direct wages	3,000
Manufacturing overhead	2,000
Administration overhead	10% of the sales value

You are required to:

(a) Calculate the maximum price that may be paid for the raw material.
(b) Prepare a comprehensive cost statement for each of the products allocating the materials and other costs based upon.

(i) Number of units
(ii) Sales value *(CA Inter,)*

Ans: (a) Rs. 10,000
(b) (i) Total cost *A*, Rs. 4,500; *B*, Rs. 8,100; *C*, Rs. 3000; *D*, Rs. 1,800
(ii) Total cost *A*, Rs. 8,100; *B*, Rs. 6,480; *C*, Rs. 1,440; *D*, Rs. 1,980

43. A manufacturing unit imports raw material and processes it to produce three different products, viz. bright, light and white. The raw material has F.O.B. value of Rs. 5 per kg. Freight and insurance are charged at 10% of F.O.B. price Customs duty a 120% of C.I.F. is levied at the time of import. Auxiliary duty at 20% is also charged on C.I.F. price. Countervailing duty is charged on C.I.F. plus duty at 10%. The landed cost includes 5% for clearing charges. Bright and light are joint products while white emerges as a by-product. The value of by-product after deducting 30% (10% being notional profit and 20% for selling expenses) from sale value is credited to process account. The unit consumed 4,000 kg of raw materials during a year. The relevant data is as follow:

	Bright	*Light*	*White*
Production and sale (kg)	1,400	1,600	1,000
Selling price (Rs. per kg)	30	26	12
Further processing cost (Rs.)	1,500	1,000	–

Assuming additional cost other than material at Rs. 15,800 for all product (includes Rs. 800 for white), prepare a statement showing:

(a) Credit to process A/c for by-product sale;
(b) Allocation of joint costs on relative sales value basis; and
(c) Profit on each product. *(ICWA, Inter)*

Ans: (a) Joint costs to be credited to process A/c Rs. 7,600
(b) Bright Rs. 34,356. Light Rs. 34,028.
(c)

	Bright	Light	White
Profit (Rs.)	6,144	6,572	1,200

44. A company processes a raw material in its department 1 to produce three products, viz, *A*, *B* and *X* at the same split-off stage. During a period 1,80,000 kg of raw materials were processed in Department 1 at a total cost of Rs. 12,88,000 and the resultant output of *A*, *B* and *X* were 18,000 kg, 10,000 kg. and 54,000 kg respectively. *A* and *B* were further processed in Department 2 at a cost of Rs. 1,80,000 and Rs. 1,50,000 respectively.
X was further processed in Department 2 at a cost of Rs. 1,80,000. There is no waste in further processing. The details of sales effected during the period were as under:

Particulars		*A*	*B*	*X*
Quantity Sold	(kg)	17,000	5,000	44,000
Sales Value	(Rs.)	12,24,000	2,50,000	7,92,000

There were no opening stocks. If these products were sold at split-off stage, the selling prices of *A*, *B* and *X* would have been Rs. 50, Rs. 40 and Rs. 10 per kg respectively.

Required:

(i) Prepare a statement showing the apportionment of joint costs to *A*, *B* and *X*.
(ii) Present a statement showing the cost per kg of each product indicating joint cost, further processing cost and total cost separately.
(iii) Prepare a statement showing the product wise and total profit for the period.

(iv) State with supporting calculations as to whether any or all the products should be further processed or not.

(C.A. Inter Nov. 1996)

Ans:

	A	*B*	*X*
(i) Apportionment of joint costs (Rs.)	6,30,000	2,80,000	3,78,000
(ii) Total cost per kg (Rs.)	45	43	9
(iii) Profit (Rs.)	4,59,000	35,000	3,96,000
(iv) Product *B* should not be further processed.			

45. Sunmoon Ltd. produces 2,00,000; 30,000; 25,000; 20,000 and 75,000 units of its five products *A*, *B*, *C D* and *E* respectively in a manufacturing process and sells them at Rs. 17, Rs. 13, Rs. 8, Rs. 10 and Rs. 14 per unit. Except product *D*, remaining products can be further processed and then can be sold at Rs. 25, Rs. 17, Rs. and Rs. 20 per unit in case of *A*, *B*, *C* and *E* respectively.

Raw material costs Rs. 35,90,000 and other manufacturing expenses cost Rs. 5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of *A*, *B*, *C* and *E* are Rs. 12,50,000; Rs. 1,50,000; Rs. 50,000 and Rs. 1,50,000 respectively. Fixed costs are Rs. 4,73,000. You are required to prepare the following in respect of the coming year:

(a) Statement showing income forecast of the company assuming that none of its products are to be further processed.

(b) Statement showing income forecast of the company assuming that products *A*, *B*, *C* and *E* are to be processed further.

Can you suggest any other production plan whereby the company can maximise its profits. If yes, then submit a statement showing income forecast arising out of adoption of that plan. *(C.A. Inter Nov. 1997)*

Ans: (a) Forecast income Total Rs. 6,30,000 (b) Forecast income Total Rs. 13,00,000

46. A company purchases raw materials worth Rs. 11.04 lakhs and processes them into four products *P*, *Q*, *R* and *S*, which have a unit sale value of Rs. 3, Rs 9, Rs. 16 and Rs. 60 respectively at split-off point, as they could be sold as such to other processors. However, during a year, the company decided to further process and sell products *P*, *Q* and *S*, while *R* was not to be processed further but sold at split-off point to other processors. The processing of raw materials into the four products cost Rs. 28 lakhs to the company. The other data for the year were as under:

Product	*Output (units)*	*Sales (Rs. in lakhs)*	*Additional processing Cost after split-off (all variable costs) (Rs. in lakhs)*
P	10,00,000	46.00	12.00
Q	20,000	4.00	2.40
R	10,000	1.60	–
S	18,000	12.000	0.40

You are required to work out the following information for managerial decision-making:

(a) If the joint costs are allocated amongst the four products on the basis of 'Net realisable Value' at split-off point, what would be the company's annual income?

(b) If the company had sold off all the other three products at split-off stage, identify the increase/decrease in the company's annual income as compared to (a) above.

(c) What sales strategy could the company have planned to maximise its profit in the year?

(d) Identify the net increase in income if the strategy at (c) is adopted, as compared to (a) above.

(I.C.W.A. Inter Dec. 1996)

Ans: (a) Rs. 9.76 lakhs (b) Annual income will decline by Rs. 4.60 lakhs (d) Overall income will increase by Rs. 0.20 lakhs.

SERVICE COSTING

Learning Objectives

After reading this chapter, you should be able to:

1. understand service costing;
2. explain transport costing—its nature and composition of costs involved, and
3. describe the nature of power house costing and canteen costing.

SERVICE COSTING

Service costing, also known as operating costing, is especially used where services are rendered and articles are not produced. According to the Institue of Cost and Management Accountants (UK) operating costing is "that form of operation costing which applies where standardised services are provided either by an undertaking or by a service cost centre within an undertaking". Service costings are particulary suitable for the costing of road and rail transport services, electricity undertakings and hospitals, etc. The following cost units are usually applied in different service undertaking:

Nature of Business	*Cost Unit*
Public carriers, trucks, goods trains	Per tonne km or per km
Electricity supply	Per kilowatt hour
Passenger buses and trains	Per km
Hospitals	Per patient day
	Per bed, per operation
Road maintenance	Per km of road
Hotels	Per room
Road lighiting	Per lamp
Canteen	Per meal

NATURE OF SERVICE COSTING

Service cost are usually collected under the following headings:

1. Fixed or standing charges.
2. Semi-fixed or maintenance charges.
3. Variable or running charges.

An important feature of service costing is that mostly such costs are fixed in nature. For example, the costs of operating a theatre are usually not influenced by the size of the audience.

TRANSPORT COSTING

In transport undertakings the cost unit is normally the tonne-mile or passenger-mile but the organisation of transport undertakings varies according to the nature of the undertakings. For example, rail transport is more complicated than road transport as provision has to be made not only for the vehicles but also for the maintenance of the permanent way, the station, signalling facilities, yards, engines, wagons, etc. For the railway, separate cost centres need to be established.

Composition of Costs

In transport operating costing, the total costs consist of: (i) standing charges, (ii) running (variable) charges, and (iii) maintenance charges.

Standing Charges

In motor transport costings the following are commonly the standing charges:

1. Licence duty and insurance
2. Garage costs and administrative expenses
3. Drivers' wages
4. Depreciation
5. Tax

Running (Variable) Costs

The following variable costs are found in motor transport costings:

1. Petrol
2. Oil
3. Grease

Maintenance Charges

1. Repairs and maintenance
2. Tyres
3. Garage charges

Cost Units

In transport costing, passenger-kilometre or tonne-kilometre is generally the cost unit. After collecting total cost, the cost per unit (per passenger km or tonne-km) is determined. The cost per unit is calculated as follows:

No. of vehichles × Capacity × Distance travelled × Days × Passenger/ Weight actually carried.

Ascertainment of Costs

Accumulation and control of costs in transport costing are achieved through a daily log sheet and operating cost sheet. A daily log report is a document which contains information regarding each journey, for example, passenger or weight carried, starting and returning time, distance covered, oil or petrol used. Figure 12.1 gives a proforma of a Daily Log Sheet.

Daily Log Sheet

Vehicle No. _____ Date _____
Dirver's Name _____ Starting time _____
Licence No. _____ Returning time _____

Particulars of Journey

Trip No.	*Starting*	*Arriving*		*Goods Carried*	
Place	*Time*	*Place*	*Time*	*Out Collected en route*	*Distance*
Petrol consumption:		Time lost:		Worker's time	
At start _____		Loading _____		Driver _____	
Recd./purchased		Unloading _____			
during the journey _____		Traffic _____		Mechanic _____	
At finish _____					
Total consumption _____		Accident _____		Cleaner _____	
Oil _____					
Grease _____					

Fig. 12.1 Daily Log Sheet

The operating cost sheet or cost statement is also known as the performance statement for each vehicle. Such cost sheets (Fig. 12.2) accumulate relevant costs regarding a vehicle from different sources, such as daily log sheet, wage book, purchase register or summary, repairs details, etc. Operating costs on a cost sheet are usually divided into three headings:

1. Running (variable) charges
2. Standing (fixed) charges
3. Maintenance charges

The operating cost sheet acts as a cost control device. The total and per unit cost calculated can be compared with past figures and performance can be evaluated.

POWER HOUSE COSTING

Power house costing is applied in those undertakings which are engaged in the production of steam and generation of electricity. In large firms, a power house (boiler house) is generally a service department assisting the production department. Operating cost statement in this case can be prepared after collecting data about the costs of producing the steam and costs of generating the electricity. The unit of cost for

production of steam may be 'Per 1b' and for generation of electricity 'per kilowatt'. A composite unit of cost may be used that is, the kilo Watt-hour. A proforma of a power house operating cost sheet is given in Fig. 12.3. This operating cost sheet shows also different elements of cost of steam production and generation of electricity.

(ABC Transport Company)
Cost Sheet (Monthly)

Vehicle No. _____ Month _____
Registration No. _____ Days operated _____

Charges	*Amount Rs.*
(A) Running Charges:	
Petrol	
Oil	
Grease	
Total	
(B) Standing charges:	
Depreciation	
Insurance	
Interest	
Tax	
Licence fees	
Driver's salary	
Total	
(C) Maintenance charges:	
Repairs	
Tyres	
Spares	
Garage charges	
Total	
Total charges	Rs. _____
Total tonne-km/passenger	km _____
Cost per tonne-km/passenger	km _____

Fig. 12.2 Cost Sheet

CANTEEN COSTING

In most organisations, canteen facilities are provided at subsidy so that food and other items can be provided at minimum price. The costs are accumulated on a cost sheet which gives the total cost incurred. From the total cost the subsidy is deducted to arrive at the net cost of operating the canteen. After camparing the net cost with the sales proceeds, profit/loss is calculated. A specimen of canteen cost sheet is given in Fig. 12.4.

Power House Cost Sheet

Month _____ Total steam consumption _____
Total steam produced _____ Electricity generated _____

	Items	*Cost per unit (Cost per 1,000 lb)*	*Total cost*
(A)	Fixed overheads:		
	Rent, rates, etc.		
	Depreciation of plant		
	Depreciation of building		
	Insurance		
(B)	Maintenance charges:		
	Meters		
	Furnance		
	Service materials		
	Tools and accessories		
(C)	Labour charges:		
	Coal handlers		
	Ash removers		
(D)	Fuel:		
	Fuel		
	Power		
(E)	Water charges:		
	Water purchased		
	Water softening		
(F)	Supervision and other charges:		
	Foremen		
	Engineers		
	General labourer		
	Cleaners		
	Total		

Fig. 12.3 Power House Cost Sheet

Canteen Cost Sheet

Month _____

Items	*Total costs*		*Cost per meal*
	Current month (Rs)	*Previous month (Rs)*	
(A) Provisions:			
Bread			
Biscuits			
Cakes			
Eggs			
Meat			

	Fish	
	Vegetables	
	Milk	
	Fruit	
	Others	
(B)	Labour and supervision:	
	Supervisor	
	Cooks	
	Helpers	
	Counter clerks	
	Cleaners	
	Sweepers	
(C)	Maintenance:	
	Crockery	
	Glassware	
	Towels	
	Rent	
	Light	
	Gas	
	Insurance	
	Comsumable stores	
	Total cost	
Less:	Subsidy	
	Net cost	
	Sales	
	Profit/Loss	

Fig. 12.4 Canteen Cost Sheet

Example 12.1

A City Municipality arranges for the removal of its garbage by means of motor vehicle transport. The following vehicles are maintained:

No. of Vehicles	*Specification*
20	5 tonne lorries
30	4 tonne lorries
50	3 tonne lorries
40	2 tonne lorries

On an average each lorry makes six trips a day and in each trip covers an average distance of five km. Each lorry carries garbage of 60% its capacity. On an annual average, 20% of the lorries are laid up for repairs. The conservancy work is carried out daily. Calculate tonne-km utilised for removal of garbage per month.

(B.Com. (Hons), Delhi, 2007)

Solution:

Calculation of Tonne-km

No. of Vehicles	*Specification*	*Total Capacity*
20	5	100
30	4	120
50	3	150
40	2	80
		450

Tonne-km

Total Capacity × Trip per day × Distance × Capacity utilisation × Effective use × No. of days in a month.

$$450 \times 6 \times 5 \times \frac{60}{100} \times \frac{80}{100} \times 30 = 1,94,400 \text{ tonne-km}$$

Example 12.2

A bus started from Delhi for Mussoorie with 50 passengers on board. 20 passengers got off at Dehradun and the bus proceeded with the remaining passengers. In the evening the same bus left Mussoorie with 50 passengers, 10 passengers got off at Dehradun and the bus resumed its journey with remaining passengers for Delhi. The distance between Delhi and Dehradun is 280 km and between Dehradun to Mussoorie it is 20 km

Compute the cost per passenger km, if the total cost of running the bus comes out to be Rs. 5,000.

(B. Com. (Hons), Delhi, 2003)

Solution:

Total passengers kilometres covered :

(i) Delhi to Dehradun = 50 passengers × 280 km	14,000
(ii) Dehradun to Mussoorie = 30 passengers × 20 km (20 passengers got off at Dehradun)	600
Back Journey in the Evening	
(i) From Mussoorie = 50 passengers × 20 km	1,000
(ii) From Dehradun to Delhi = 40 passengers × 280 km	11,200
(10 passengers got off at Dehradun)	26,800

Total cost of running the bus = Rs. 5,000

Total passenger kilometres covered = 26,800 km

$$\text{Cost per passenger km.} = \frac{\text{Rs. } 5,000}{\text{km } 26800}$$

$$= \text{Rs. } 0.186$$

Example 12.3

From the following information calculate the bus fare to be charged from each passenger for the journeys:

(a) Delhi to Agra ;
(b) Delhi to Bhiwani;
(c) Delhi to Chandigarh:

(i) Delhi to Agra 200 km
Delhi to Bhiwani 120 km
Delhi to Chandigarh 250 km
(ii) Effective passenger-km 3,72,000
(iii) Total operating costs (excluding conductor's commission @15% and passenger tax @ 5% of total taking) Rs. 1,48,800.
(iv) Desired profit—30% on total taking.

(B.Com. (Hons), Delhi, 2002)

Solution:

Effective passenger–km = 3,72,000

Total operating cost (excluding Conductor's Commission and Passenger Tax) 1,48,800

Conductor's Commission

(15% of Total taking, that is, Rs. 2,97,600) = 44,640

Passenger Tax (W.N. (ii))

(5% of Total taking that is, Rs. 2,97,600) = 14,880 (W.N. (iii))

Desired Profit (30% of Total Takings that is, 2,97,600) = 89,280 (W.N. (iv))

Total Takings = 2,97,600

Effective Passenger km = 3,72,000

$$\text{Rate per passenger-km} = \frac{2,97,600}{3,72,000} \times 100 = \text{Rs. } 0.80$$

Proposed fare to be charged per passenger km.

Delhi to Agra = Rs. 0.80 × 200 km

= Rs. 160

Delhi to Bhiwani = Rs. 0.80 × 120 km = Rs. 96

Delhi to Chandigarh = Rs. 0.80 × 250 km = Rs. 200

Working Notes:

(i) Conductor's Commission = 15% of Total takings

Passenger's Tax = 5% of Total Takings

Desired Profit = 30% of Total takings

Commission + Passenger Tax + Profit = 50% of Total takings

Cost (Balance)	50%	Operating Cost	= 1,48,800
Total Takings	100%	100% of this	= 1,48,800
			2,97,600

(ii) $$\text{Conductor's, Commission} = \frac{2,97,600 \times 15}{100} = \text{Rs. } 44,640$$

(iii) $$\text{Passenger Tax} = \frac{2,97,600 \times 5}{100} = \text{Rs. } 14,880$$

(iv) $$\text{Profit} = \frac{2,97,600 \times 30}{100}$$

$$\text{Total} = \text{Rs. } 89,280$$

Example 12.4

Mr. Singh started transport business with a fleet of 10 taxis. Expenses of operating the fleet are given below:

(i)	Cost of each taxi	Rs. 3,80,000
(ii)	Salary of office and garage staff	Rs. 38,000 p.m.
(iii)	Rent of garage	Rs. 12,000 p.m.
(iv)	Driver's salary per taxi	Rs. 4,000 p.m.
(v)	Insurance, tax and sundry expenses per taxi	Rs. 55,200 per yr.

The life of a taxi is 3,00,000 kms at the end of which it is estimated to be sold at Rs. 20,000. A taxi is expected to run on an average 4,000 kms per month. Petrol consumption is 12 kms per litre of petrol costing Rs. 30 per litre. You are required to:

(i) Calculate the cost of running taxi per km by preparing a statement of operating cost; and

(ii) Find out the profit Mr. Singh may expect to earn during the first month of operations if the hire charge is Rs. 10 per km. Assume that during the month each taxi runs on an average 4,000 km of which 800 km it runs empty. *(B.Com. (Hons), Delhi, 2004)*

Solution:

(i) Calculation of cost of running a taxi per km

Total Running = 4,000 km

Effective Running = 4,000 km – 800 km = 3,200 km.

	Amt. p.m. (each taxi)	*Rs.*
Standing Charges:		
Salary of office and garage staff (38,000 ÷ 10) =	3,800	
Rent of garages (12,000 ÷ 10) =	1,200	
Driver's Salary	4,000	
Insurance, Tax and Sundry Exp. (55200 ÷ 12)	4,600	
	13,600	
Fixed charges per taxi per km 13600 ÷ 3200		4.25
Variable expenses:		
Depreciation = $\frac{3,80,000 - 20,000}{3,00,000} \times 4,000$ =	4,800	
Petrol Cost = $\frac{400 \times 30}{12}$	10,000	
	14,800	
Variable cost per taxi per km.	14800 ÷ 3200	4.625
Total cost per km per taxi		**8.875**

(ii) Profit during the month	Rs.
Hire Charges per km	10.00
Less: Total cost per km	8.875
Profit per km	1.125

Total Profit per Taxi = 1.125 × 3200 km = Rs. 3600
Total Profit for 10 taxis = 3600 × 10 = Rs. 36,000 p.m.

Example 12.5

A transport company is running four buses between Delhi and Alwar, covering a distance of 100 km. The seating capacity of each bus is 40 passengers. The following particulars are obtained from its books for the month of October 2003:

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

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

Find out the fare the company should charge per passenger/km if it wants a profit of 20% on the taking.

(B. Com. (Hons), Delhi, 2004)

Solution:

Cost Statement

Period: October, 2003
Passenger km = 7,20,000

	Rs.	Total Rs.
(a) Standing charges:		
Salaries of office staff	3,000	
Honorarium of Accountant	1,000	
Road Tax and insurance	6,400	
Depreciation	10,400	
Interest and other charges	8,000	
Total (a)		28,800
(b) Maintenance charges		
Repairs	3,200	
Total (b)		3,200
(c) Running charges		
Wages of drivers and conductors	9,600	
Diesel oil etc.	16,000	
Total (c)		25,600
Total of (a + b + c) Rs.		57,600

(d) Total Passenger km for the month (km)	720000	
(e) Cost per passenger km. Rs. (57,600 ÷ 7,20,000 kms)	0.08	
Passenger km.		
100 × kms. × 2 ways × 4 buses × 30 days × 40 passengers =		960000
Less: 25% empty (or 75% capcity) =		240000
		720000
Total cost	Rs. 57,600	
Profit to be added		
20% of Taking or 25% of cost	Rs. 14,400	
Expected Revenue	72,000	
Total No. of passengers in a month:		
40 passengers × 2 ways × 4 buses × 30 days =		9600
Less: 25% Empty or 75% capacity		2400
		7200
Fare per passenger per trip		
Rs. 72,000 ÷ 7200 = Rs. 10		

Example 12.6

Hira Singh owns a taxi, a bus and a truck. The bus is 50 seater. The maximum capacity of the truck is 10 tonnes. The taxi runs on a average 3,000 km. in a month out of which 20% is normal running without fare. Variable cost of running the taxi is Rs. 8 per kilometre.

The bus and the truck run between Delhi and Jaipur, one way distance being 300 km. The bus makes 25 round trips in a month and is generally 90% occupied. Variable cost of running a bus is Rs. 13.50 per kilometre. The truck makes 20 round trips in a month and is fully loaded on outward journey but only 90% loaded on return. Variable cost of running a truck is Rs. 9.50 per kilometre.

You are required to calculate:

(i) Total variable cost per month and variable cost per effective kilometre for the taxi;
(ii) Total variable cost per month and variable cost per effective passenger-kilometre for the bus; and
(iii) Total variable cost per month and variable cost per effective tonne-kilometre for the truck.

(B.Com.(Hons.), Delhi, 2005)

Solution:

Computation of total variable cost per month and variable cost per effective km for the Taxi:

(A) *Total variable cost per month:*

= Rs. 3,000 × 8

= Rs. 24,000 per month.

(B) *Variable cost per effective km:*

$$= \frac{\text{Total variable cost}}{\text{Average km in a month with fare}}$$

$$= \frac{24,000}{1,800}$$

= Rs. 13.33 per effective km

(ii) Computation of total variable cost per month and variable cost per effective passenger km for bus:

(A) Total variable cost per month:

$$= \text{Total km of 25 trips} \times \text{Rate of VC}$$

$$= (300 \times 2 \times 25) \times 13.50$$

$$= \text{Rs. } 2,02,500.$$

(B) Variable cost per effective passenger km

$$\text{Passenger km} = (300 \times 2 \times 25) \times 50 \times 90\%$$

$$= 15000 \times 50 \times \frac{90}{100}$$

$$= 6,75,000 \text{ passenger km}$$

$$\text{Variable cost per effective passenger km} = \frac{202,500}{6,75,000} = 0.30 \text{ per passenger p. km.}$$

(iii) Total Variable cost per month of the truck:

$$= (300 \times 2 \times 20) \times 9.50$$

$$= \text{Rs. } 1,14,000$$

(C) Variable cost per effective tonne-kilometre:

Effective tonne-kilometre

$$= (300 \times 1 \times 20 \times 10)\ 100\% + (300 \times 1 \times 20 \times 10) \times 90\%$$

$$= (60,000) \times \frac{100}{100} + 60,000 \times \frac{90}{100}$$

$$= 60,000 + 54,000$$

$$= 1,14,000 \text{ ton kilometres.}$$

$$\text{Rate} = \frac{\text{VC}}{\text{tonne km}} = \frac{1,14,000}{1,14,000} = \text{Rs. } 1 \text{ per tonne km}$$

Example 12.7

Global Transport Ltd. charges Rs. 90 per tonne for its 6 tonne truck lorry load from city *A* to city *B*. The charges for the return journey are Rs. 84 per tonne. No concession or reduction in these rates is made for any delivery of goods at intermediate station *C*. In January, 1997 the truck made 12 outward journeys for city *B* with full load out of which 2 tonne were unloaded twice in the way at city *C*. The truck carried a load of 8 tons in its return journey for 5 times but was once caught by police and Rs. 1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city *C*. The distance from city *A* to city *C* and city *B* are 140 km and 300 km respectively.

Annual fixed costs and maintenance charges are Rs. 60,000 and Rs. 12,000 respectively. Running charges spent during January, 1997 are Rs. 2,944.

You are required to find out the cost per absolute ton-kilometre and the profit for January, 1997.

(B.Com.(Hons), Delhi, 2006, C.A. Inter, May 1997)

Solution:

Global Transport Ltd.
Operating Cost and Profit Statement During January, 1997

	Amount
	Rs.
Fixed Costs (Rs. 60,000/12)	5,000
Maintenance Charges (Rs. 12,000/12)	1,000
Running Costs	2,944
Total operating cost	8,944
Cost per absolute ton-km (Rs. 8,944/44, 720 absolute tonne km)	0.20
Net Revenue received (WN 4)	12,168
Less: Total Operating Costs (as given above)	8,944
Profit	3,224

Working Notes:

1. *Absolute tonne-km for outward journeys:*

(i) From city *A* to city *B*: 10 journeys × 300 km × 6 tonne	=	18,000 tonne-km
(ii) From city *A* to city *C*: 2 journeys × 140 km × 6 tonne	=	1,680 tonne-km
(iii) From city *C* to city *B*: 2 journeys × 160 km × 4 tonne	=	1,280 tonne-km
Total:		20,960 tonne-km

2. *Absolute kms for return journeys:*

(i) From city *B* to city *A*: 5 journeys × 300 km × 8 tonne	=	12,000 tonne-km
6 journeys × 300 km × 6 tonne	=	10,800 tonne-km
(ii) From city *B* to city *C*: 1 journey × 160 km × 6 tonne	=	960 tonne-km
Total		23,760 tonne-km

3. *Total Absolute Tonne-km of outward and return journeys:*
   = 20,960 tonne-km + 23,760 tonne-km = 44,720 tonne-km.

4. *Net Revenue received during January, 1997:*

	Rs.
12 trucks × 6 tonne × Rs. 90 (from city *A* to city *B*)	6,480
5 trucks × 8 tonne × Rs. 84 (from city *B* to city *A*)	3,360
6 trucks × 6 tonne × Rs. 84 (from city *B* to city *A*)	3,024
1 truck × 6 tonne × Rs. 84 (from city *B* to city *C*)	504
Total Revenue:	13,368
Less: Fine paid	1,200
Net Revenue received	12,168

Example 12.8

Sai Travels owns a bus and operates a tourist service on daily basis. The bus starts from Newcity to Restvillage and returns back to Newcity the same day. Distance between Newcity and Restvillage is 250 km. This trip operates for 10 days in a month. The bus also plies for another 10 days between Newcity and Shivapur and returns back to Newcity the same day; distance between these two places is 200 km. The bus makes local sightseeing trips for 5 days in a month, covering a total distance of 60 km per day.

The following data are given:
Cost of Bus Rs. 3,50,0000
Depreciation 25%
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 p.a.
Diesel consumption 4 km per litre @ Rs. 8 per litre.
Token tax Rs. 2,400 p.a.
Permit fee Rs. 1,000 p.m.
Lubricant oil Rs. 100 for every 200 km
Repairs and maintenance Rs. 1,500 p.m.
Normal capacity 50 persons.

While plying to and from Restvillage the bus occupies 90% of the capacity and 80% when it plies between Newcity 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 Restvillage and Shivapur from Newcity per passenger, if the profit required to be earned is 33% of net takings of the firm.

(CA Inter, June 1995)

Solution:

Basic Calculations

(i) *Total km covered per month*		km
Restvillage and Back $2 \times 250 \times 10$ days		5,000
Shivapur and back $2 \times 200 \times 10$ days		4,000
Local Trips @ 60 km for 5 days		300
		9,300
(ii) *Fuel Cost*		
(a) Diesel required	$\frac{9,300}{4} \times 8$	= 18,600
(b) Oil required	$\frac{9,300}{200} \times 100$	= 4,650
		23,250
(iii) *Total effective passenger-km per month*		
Restvillage $2 \times 250 \times 50 \times 10 \times 90/100$		= 2,25,000
Shivapur $2 \times 200 \times 50 \times 10 \times 80/100$		= 1,60,000
Local trips $5 \times 60 \times 50$		= 15,000
		4,00,000

(iv) *Compulation of Operating Cost*

Operating Cost Statement for the Month

Fixed Charges:	*Rs.*		*Rs.*
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 Fee	1,000	=	3,950
Running Charges :			
Depreciation			
$3,50,000 \times \frac{25}{100 \times 12}$	7,292		
Repairs and Maintenance	1,500		
Fuel Cost	23,250	=	32,042
Total Cost		=	35,992

Computation of Charges Per Passenger km

Total Cost (as per above)	Rs.	35,992
Profit on Takings (WN 1)	Rs.	53,719
Add: 20% for Passenger Tax (WN 2)	Rs.	10,744
Total Fare	Rs.	64,463

$$\text{Rate per Passenger km} = \frac{\text{Total Fare}}{\text{Effective Passenger km per month}}$$

$$= \frac{\text{Rs. } 64,463}{4,00,000} = \text{Re } 0.161$$

Charges per Passenger

(a) From Newcity to Restvillage : $250 \times 0.161 = \text{Rs. } 40.25$

(b) From Newcity to Shivapur : $200 \times 0.161 = \text{Rs. } 32.20$

Working Notes:

1. *Computation of Net Takings*

Let total takings be x

Profit is 33% of Net Takings (that is before passenger tax) = $0.33x$

$$x = 35,992 + 0.33x$$

or $$0.67x = 35,992$$

or $$x = \text{Rs. } 53,719$$

2. *Computation of Passenger Tax* (20% of Net Takings)

$$53,719 \times 20/100 = \text{Rs. } 10,744$$

Example 12.9

A transport company has a fleet of three trucks of 10 tonne capacity each plying in different directions for transport of customer's goods. The trucks run loaded with goods and return empty. The distance travelled, number of trips made and the load carried per day by each truck are as under:

Truck No.	*One way Distance km*	*No. of trips per day*	*Load carried per trip/day tonne*
1	16	4	6
2	40	2	9
3	30	3	8

The analysis of maintenance cost and the total distance travelled during the last two years is as under

Year	*Total distance travelled*	*Maintenance Cost Rs.*
1	1,60,200	46,050
2	1,56,700	45,175

The following are the details of expenses for the year under review:

Diesel	: Rs. 10 per litre. Each litre gives 4 km per litre of diesel on an average.
Driver's salary	: Rs. 2,000 per month
Licence and taxes	: Rs. 5,000 per annum per truck
Insurance	: Rs. 5,000 per annum for all the three vehicles.
Purchases Price per truck	: Rs. 3,00,000 Life 10 years. Scrap value at the end of life is Rs. 10,000.
Oil and sundries	: Rs. 25 per 100 km run.
General Overhead	: Rs. 11,084 per annum

The vehicles operate 24 days per month on an average.

Required

(i) Prepare an Annual Cost Statement covering the fleet of three vehicles.
(ii) Calculate the cost per km run.
(iii) Determine the freight rate per tonne km to yield a profit of 10% on freight.

(CA, PE, Exam. II, Group II, Nov. 2001)

Solution:

(i) Annual Cost Statement of three vehicles

	Rs.
Diesel (Refer to Working Note I) (1,34,784 km/4 km) × Rs. 10)	3,36,960
Oil and sundries (1,34,784 km/100 km) × Rs. 25	33,696
Maintenance (Refer to Working Note 2) {(1,34,784 km × 0.25) + Rs. 6,000}	39,696

	Rs.
Driver's salary (Rs. 2,000 × 12 months) × 3 trucks	72,000
Licence and taxes	15,000
Insurance	5,000
Depreciation (Rs. 2,90,000/10 years) × 3 trucks	87,000
General overhead	11,084
Total annual cost	6,00,436

(ii) Cost per km run

$$\text{Cost per kilometer run} = \frac{\text{Total annual cost of three vehicles}}{\text{Total kilometre travelled annually}}$$

(Refer to Working Note 1)

$$= \frac{\text{Rs. } 6,00,436}{1,34,784 \text{ km}} = \text{Rs. } 4.4548$$

(iii) Freight rate per tonne km (to yield a profit of 10% on freight)

$$\text{Cost per tonne km} = \frac{\text{Total annual cost of three vechicles}}{\text{Total effective tonnes km per annum}}$$

$$\text{(Refer to working note 1)} = \frac{\text{Rs. } 6,00,436}{5,25,312 \text{ km}} = \text{Rs. } 1.143$$

Freight rate per tonne km = Rs. 1.27

$$\left(\frac{\text{Rs.}1.143}{9}\right) \times 10$$

Working Notes:

1. Total kilometre travelled and tonnes kilometre (load carried) by three trucks in one year

Truck number	*One way distance in km*	*No. of trips*	*Total distance covered in km per day*	*Load carried per trip/day in tonnes*	*Total effective tonnes km*
1	16	4	128	6	384
2	40	2	160	9	720
3	30	3	180	8	720
Total			468		1824

Total kilometre travelled by three trucks in one year 1,34,784
(468 km × 24 days × 12 months)
Total effective tonnes kilometre of load carried by three trucks during one year 5,25,312
(1,824 tonnes km × 24 days × 12 months)

2. Fixed and variable component of maintenance cost:

$$\text{Variable maintenance cost per km} = \frac{\text{Difference in maintenance cost}}{\text{Difference in distance travelled}}$$

$$= \frac{\text{Rs. } 46{,}050 - \text{Rs.}45{,}175}{1{,}60{,}200 \text{ km} - 1{,}56{,}700 \text{ km}}$$

$$= \text{Rs. } 0.25$$

Fixed maintenance cost = Total maintenance cost – Variable maintenance cost

= Rs. 46,050 – 1,60,200 km × 0.25

= Rs. 6,000

Example 12.10

EPS is a Public School having 25 buses each plying in different directions for the transport of its school students. In view of large number of students availing of the bus service, the buses work two shifts daily both in the morning and in the afternoon. The buses are garaged in the school. The workload of the students has been so arranged that in the morning, the first trip picks up senior students and the second trip plying an hour later picks up junior students. Similarly, in the afternoon, the first trip takes the junior students and an hour later the second trip takes the senior students home.

The distance travelled by each bus, one way is 16 km. The school works 24 days in a month and remains closed for vacation in May and June. The bus fee, however, is payable by the students for all the 12 months in a year.

The details of expenses for the year 2003–2004 are as under:

Driver's salary — payable for all in 12 months	Rs. 5,000 per month per driver.
Cleaner's salary payable for all the 12 months (one cleaner has been employed for every five buses).	Rs. 3,000 per month per cleaner
Licence Fees, Taxes etc.	Rs. 2,300 per bus per annum
Insurance Premium	Rs. 15,600 per bus per annum
Repairs and Maintenance	Rs. 16,400 per bus per annum
Purchase price of the bus	Rs. 16,50,000 each
Life of the bus	16 years
Scrap value	Rs. 1,50,000
Diesel cost	Rs. 18.50 per litre

Each bus gives an average of 10 km per litre of diesel. The seating capacity of each bus is 60 students. The seating capacity is fully occupied during the whole year.

The school follows differential bus fees based on distance travelled as under:

Students picked up and dropped within the range of distance from the school	*Bus fee*	*Percentage of students availing this facility*
4 km	25% of Full	15%
8 km	50% of Full	30%
16 km	Full	55%

Ignore interest. Since the bus fees has to be based on average cost, you are required to

(i) prepare a statement showing the expenses of operating a single bus and the fleet of 25 buses for a year.

(ii) work out average cost per student per month in respect of:

(a) Students coming from a distance of upto 4 km from the school.
(b) Students coming from a distance of upto 8 km from the school; and
(c) Students coming from a distance of upto 16 km from the school.

(CA, PE, Exam. II, Group II, May 2004)

Solution:

(a) (i)

EPS Public School
Statement showing the expenses of operating a single bus and the fleet of 25 buses for a year

Particulars	*Per bus per annum (Rs.)*	*Fleet of 25 buses per annum (Rs.)*
Running costs: (A)		
Diesel (Refer to Working Note 1)	56,832	14,20,800
Repairs and maintenance costs: (*B*)	16,400	4,10,000
Fixed charges:		
Driver's salary	60,000	15,00,000
Cleaner's salary	7,200	1,80,000
Licence fee, taxes etc.	2,300	57,500
Insurance	15,600	3,90,000
Depreciation	93,750	23,43,750
Total fixed charges: (*C*)	1,78,850	44,71,250
Total expenses: (*A* + *B* + *C*)	2,52,082	63,02,050

(ii) **Average cost per student per month in respect of students coming from a distance of:**

(a) 4 km from the school (Rs. 2,52,082/354 students × 12 monts) (Refer to Working Note 2)	Rs. 59.34
(b) 8 km from the school (Rs. 59.34 × 2)	Rs. 118.68
(c) 16 km from the school (Rs. 59.34 × 4)	Rs. 237.36

Working Notes:

1. Calculation of diesel cost per bus:

No. of trips made by a bus each day	4
Distance travelled in one trip both ways (16 km × 2 trips)	32 km
Distance travelled per day by a bus (32 km × 4 shifts)	128 km
Distance travelled during a month (128 km × 24 days)	3,072 km
Distance travelled per year (3,072 km × 10 months)	30,720 km
No. of litres of diesel required per bus per year (30,720 km/10 kms)	3,072 litres

Cost of diesel per bus per year (3,072 litres × Rs. 18.50)	Rs. 56.832
2. *Calculation of number of students per bus:*	
Bus capacity of 2 trips	120 students
$1/4^{th}$ fare students (15% × 120 students)	18 students
$\frac{1}{2}$ fare 30% students (equivalent to $1/4^{th}$ fare students)	72 students
Full fare 55% students (equivalent to $1/4^{th}$ fare students)	264 students
Total $1/4^{th}$ fare students	354 students

Example 12.11

A company runs a holiday home. For this purpose, it has hired a building at rent of Rs. 10,000 per month alongwith 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.
Following information is given:

Type of suite	*Number*	*Occupancy percentage*
Single room	100	100%
Double rooms	50	80%
Triple rooms	30	60%

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple room suite as twice of the double rooms suite.
The other expenses for the year 2006 are as follows:

	Rs.
Staff salaries	14,25,000
Room attendant's wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

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

(CA, PE, Exam. II, Group II, May 2007)

Solution:

(i) **Total Equivalent Single Room Suites**

Nature of suite	*Occupancy*	*Equivalent single room suites*
Single room suites	100 × 360 × 100% = 36,000	36,000 × 1 = 36,000
Double rooms suites	50 × 360 × 80% = 14,400	14,400 × 2.5 = 36,000
Triple rooms suites	30 × 360 × 60% = 6,480	6,480 × 5 = 32,400
		Total 1,04,400

(ii) **Statement of Total Cost:**

	Rs.
Staff salaries	14,25,000
Room attendant's wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000
	25,21,000
Building rent 10,000 × 12 + 5% on total taking	1,20,000
	+ 5% on takings
Total cost	26,41,000 + 5% on total takings

Profit is 20% of total takings

$\therefore$ Total takings = Rs. 26,41,000 + 25% of total takings

Let x be rent for single room suite

Then $1{,}04{,}400\,x = 26{,}41{,}000 + 25\%$ of $(1{,}04{,}400\,x)$

or $1{,}04{,}400\,x = 26{,}41{,}000 + 26{,}100\,x$

or $78{,}300\,x = 26{,}41{,}000$

or $x = 33.73$

(ii) Rent to be charged for single room suite = Rs. 33.73
Rent for double rooms suites Rs. 33.73 × 2.5 = Rs. 84.325
Rent for triple rooms suites Rs. 33.73 × 5 = Rs. 168.65

Example 12.12

A Club runs a library for its members. As part of club policy, an annual subsidy of upto Rs. 5 per member including cost of books may be given from the general funds of the club. The management of the club has provided the following figures for its library department.

Number of Club members	5000
Number of Library members	1000
Library fee per member per month	Rs. 100
Fine for late return of books	Re. 1 per book per day
Average No. of books returned later per month	500
Average No. of days each book is returned late	5 days
Number of available old books	50,000 books
Cost of new books	Rs. 300 per book
Number of books purchased per year	1,200 books
Cost of maintenance per old book per year	Rs. 10

Staff details	No.	Per Employee Salary per month (Rs.)
Librarian	01	10,000
Assistant Librarian	03	7,000
Clerk	01	4,000

You are required to calculate:

(i) the cost of maintaining the library per year excluding the cost of new books;
(ii) the cost incurred per member per month on the library excluding cost of new books; and
(iii) the net income from the library per year.

If the club follows a policy that all new books must be purchased out of library revenue (a) What is the maximum number of books that can be purchased per year (b) How many excess books are being purchased by the library per year?

Also, comment on the subsidy policy of the club.

(CA, PE, Exam. II, Group II, May 2007)

Solution:

Computation of total revenue

No. of library members		1,000
Library fees per month	Rs.	1,00,000
Late fees per month (500 × 5 × 1)	Rs.	2,500
Total Revenue per month	Rs.	1,02,500
Total Revenue per annum (1,02,500 × 12)	Rs.	12,30,000

Computation of total cost

Staff details	*No.*	*Salary per month*	*Total cost*
		Rs.	Rs.
Librarian	1	10,000	10,000
Assistant Librarian	3	7,000	21,000
Clerk	1	4,000	4,000
Total Staff cost per month			35,000
Total Staff cost per year (35,000 × 12)			4,20,000

	No.	Cost per book	
Books maintenance cost	50,000	Rs. 10	5,00,000
Total maintenance cost per annum excluding cost of new books (4,20,000 + 5,00,000)			9,20,000
Cost incurred per library member per annum (Rs9,20,000/1,000)		Rs.	920
Cost incurred per member per month on the library excluding cost of new books (920/12)		Rs.	76.67
Cost incurred per club member per annum (9,20,000/5,000)		Rs.	184
Cost incurred per club member per month (184/12)		Rs.	15.33
Net income from the library per annum (12,30,000 – 9,20,000)		Rs.	3,10,000
Cost per new book		Rs.	300
Maximum number of new books per annum (3,10,000/300)			1033.333
Present number of books purchased			1200

Excess books purchased (1200 – 1033.333)		166.6667
Subsidy being given per annum	Rs.	50,000
Subsidy per library member per annum (50,000/1,000)	Rs.	50
Subsidy per club member per annum (50,000/5,000)	Rs.	10

Comment: The club is exceeding its subsidy target to members by Rs. 45 (Rs. 50 – 5) per library member and Rs. 5 (Rs. 10 – 5) per club member.

Example 12.13

PQ Limited plans to start a lodging house at a tourist centre with a capacity of 32 single occupancy rooms. Cost per day per room have been estimated as under:

	Cost per day per room (Rs.)
(A) **When occupied:**	
(a) Electricity and utilities	4
(b) Linen, laundry and sanitary supplies	9
When unoccupied:	
(c) Dusting, sweeping and cleaning	2
	15

(B) Over and above these costs, the following expenses represent the estimate of fixed charges per annum that is 365 days)

Staff expenses	Rs. 3,20,000
Other office expenses	64,000
Taxes, insurance, maintenance and depreciation	42,320
	Rs. 4,26,320

PQ Limited defines 100% occupancy to mean all the 32 rooms to fetch revenue for all the 365 days. You are required to answer the following, using a planning period of one year:

(a) What should be the tariff per day per room in order to reach break-even at an occupancy level of 50%?

(b) What would be the profits, if the occupancy level reaches (a) 60%; (b) 70%; and (c) 80% respectively?

(c) What would be the profits, if the tariff per day is reduced by 10% from the answer in (a) above and the occupancy level is 100%?

(CA, Inter)

Solution:

(a) 100% occupancy = 32 × 365 days = 11,680 room-days
50% occupancy = 0.5 × 11,680 = 5,840 room-days
60% occupancy = 0.6 × 11,680 = 7,008 room-days
70% occupancy = 0.7 × 11,680 = 8,176 room-days
80% occupancy = 0.8 × 11,680 = 9,344 room-days

(i) Tariff to break-even at 50% occupancy level

Fixed cost	Rs. 4,26,320
Expenses when unoccupied Rs. 2 × 11,680	23,360
Expenses when occupied Rs. 13 × 5,840	75,920
	5,25,600

Tariff per day to break-even: Rs. 5,25,600/5,840 = Rs. 90

(ii) Profit at various occupancy level

Contribution margin = (Rs. 90 – Rs. 13) = Rs. 77

Profit = (Man-days occupied – BEP man-days) × Contribution margin

Therefore,

Profit at 60% occupancy level = (7,008 – 5,840) × Rs. 77 = Rs. 89,936

Profit at 70% occupancy level = (8,176 – 5,840) × Rs. 77 = Rs. 1,79,872

Profit at 80% occupancy level = (9,344 – 5,840) × Rs. 77 = Rs. 2,69,808

(iii) Contribution margin at reduced tariff = (0.90 × Rs. 90 – 13) = Rs. 68

Profit at 100% occupancy level = Contribution – Fixed costs

= Rs. 11,680 × Re. 0.68 – Rs. 4,26,320 – Rs. 23,360 = Rs. 3,44,560

Example 12.14

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 10 km and *B* is at a distance of 15 km from railhead plots. A fleet of lorries of 5 tonne carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 km 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 a mine *B* loading time averages 20 minutes per load.

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

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

(C.A. Inter Nov. 2000)

Solution:

Statement Showing the Cost per Tonne-kilometre of Carrying Mineral from Each Mine

	Mine A Rs.	*Mine B* Rs.
Fixed cost per trip: (Driver's wages, depreciation, insurance and taxes)		
A:1 hour 20 minutes @ Rs. 9 per hour	12	
B: 1 hour 30 minutes @ Rs. 9 per hour (Refer to Working note 1)		13.50
Running and maintenance cost: (Fuel, oil, tyres, repairs and maintenance)		
A: 20 km Rs. 1.20 per km.	24	
B: 30 km Rs. 1.20 per km		36.00
Total cost per trip	36	49.50
Cost per tonne-km (Refer to Working Note 2)	0.72 (Rs. 36/50 tonnes-km)	0.66 (Rs. 49.50/75 tonnes-km)

Working Notes:

	Mine *A*	Mine *B*
1. Total operating time taken per trip		
Running time to and fro	40 minutes $\left(20 \text{ km} \times \frac{60 \text{ minutes}}{30 \text{ km}}\right)$	60 minutes $\left(30 \text{ km} \times \frac{60 \text{ minutes}}{30 \text{ km}}\right)$
Unloading time	10 minutes	10 minutes
Loading time	30 minutes	20 minutes
Total operating time	80 minutes or 1 hour 20 minutes	90 minutes or 1 hour 30 minutes
2. Effective tonnes-km	50 (5 tonne × 10 km)	75 (5 tonnes × 15 km)

Example 12.15

(a) The Holiday Hotel has 40 bedrooms with a maximum occupancy of 490 sleeper nights per week. Average occupancy is 60% throughout the year. Meals provided to guests have been costed and the average food cost per person per day is as follows:

	Rs.
Breakfast	3.60
Lunch	11.00
Dinner	13.40

Direct wages and staff meals per week are as under:

Restaurants and kitchens	3,430
Housekeeping	1,952
General	1,760

Direct expenses per annum are Rs. 45,760 for housekeeping and Rs. 52,000 for the restaurant.

Indirect expenses amount to Rs. 3,41,120, which should be based on floor area occupied by various cost centres. The floor areas are:

	sq. m
Bedrooms	3,600
Restaurant	1,200
Service area	600

A net profit of 10% each must be made on the restaurant takings and accommodation takings. You are required to calculate what inclusive terms per person should be charged per day. Show the split between meals and accommodation charges.

(b) There is also a proposal to take on hire an adjoining building available and covert it into a pastry shop. The annual cost estimates are:

	Rs.
Rates and taxes	12,000
Wages	54,000
Replacement of utensils	2,400
Depreciation of fixed assets	3,600
Fuel cost	10% of the cost of pastries

Sales are expected to average at Rs. 1,50,000 per annum. The monthly figures vary according to seasons. Prices shown on the tags are arrived at by marking up the costs by 150%. Calculate the estimated annual profit. Also draw an estimate of cost and profit for the month when the sales are expected to be Rs. 15,000.

(ICWA, Inter)

Solution:

(a)

1. Cost sheet: estimated cost per week

Particulars	*Basis*	*Cost per week (Rs.)*		
		Total	*Meal*	*Accommodation*
Food:	Allocated			
Breakfast 294 × Rs. 3.60		1,058.40	1,058.40	–
Lunch 294 × Rs. 11.00		3,234.00	3,234.00	–
Dinner 294 × Rs. 13.40		3,939.60	3,939.60	–
Sub-total		8,232.00	8,232.00	–
Direct wages: restaurant and kitchen	Allocated	3,430.00	3,430.00	–
House keeping	Allocated	1,952.00	–	1,952.00
General	Apportioned—direct wages 3430 : 1952	1,760.00	1,121.66	638.34
Sub-total		7,142.00	4,155.66	2,590.34
Direct expenses:	Allocated			
Restaurant 52,000/52		1,000.00	1,000.00	
Housekeeping 45,760/52		880.00	–	880.00
Sub-total		1,880.00	1,000.00	880.00
Indirect expenses: 3,41,120/52	Apportioned floor area 1,800 : 3,600	6,560.00	2,186.67	4,373.33
Total cost		23,814.00	15,970.33	7,843.67
Profit 10% of sales price or 1/9th of cost		2.646.00	1,774.48	871.52
Sales value		26,460	17,744.81	8,715.19

Tariff: Rate per sleeper night:	
Meal: Rs. 17,744.81/294	Rs. 60.36
Accommodation: Rs. 8,715.19/294	Rs. 29.74
	Rs. 90.00

Notes:

1. Normal capacity: 50% of 490, that is 294 sleeper nights per week.
   (a) Floor area of restaurant should include service area. Thus, total floor area for restaurant is (1,200 + 600) that is, 1,800 sq. m.
   (b) Estimated profit if adjoining building is taken on hire for pastry shop. Mark-up is 150% of cost. Therefore, selling price is 2.5 times of cost. Cost of pastry when sales value is Rs. 1,50,000 : Rs. 1,50,000/2.5 = Rs. 60,000.

2. Cost sheet: costs per annum	**Rs.**
Cost of pastry:	60,000
Fuel cost (10% of the cost of pastry)	6,000
Wages	54,000

Rent and rates		12,000
Replacement of utensils		2,400
Depreciation of fixed assets		3,600
		1,38,000
Profit (balancing Figure)		12,000
Sales value		1,50,000

3. Estimated cost and profit for one month

(a) Expected sales		Rs. 15,000
(b) Variable costs:		
Cost of pastry Rs. 15,000/2.5	Rs. 6,000	
Fuel cost (10% of cost of pastry)	600	
Wages (Rs. 54,000/1,50,000) × 15,000	5,400	(12,000)
(b) Period costs:		
Rent and taxes Rs. 12,000/12	1,000	
Replacement of utensils Rs. 2,400/12	200	
Depreciation 3,600/12	300	(1,500)
Profit		Rs. 1,500

Notes:

Cost per unit should always be normal cost. Therefore, tariff rates are calculated on the basis of normal occupancy and not on the basis of maximum occupancy.

THEORY QUESTIONS

1. What do you understand by operating costing? In what industries is this costing applied?
2. Write notes on (i) Transport-costing (ii) Power house costing and (iii) Canteen costing.
3. Distinguish between operating costing and operation costing.

(B.Com. (Hons) Delhi, 2006)

PROBLEMS

1. A Truck starts with a load of 10 tonnes of goods from station *P*. It unloads 4 tonnes at station *Q* and rest of the goods at station *R*. It reaches back directly to station *P* after getting reloaded with 8 tonnes of goods at station *R*. The distances between *P* to *Q*, *Q* to *R* and then from *R* to *P* are 40 km, 60 km and 80 km respectively. Compute Absolute tonne-km and commercial tonne-km. *(B. Com. (Hons), Delhi 1998)*

Ans: Absolute tonne-km 1,400
Commercial tonne-km 1,440

2. A transport company maintains a fleet of lorries for carrying goods from Delhi to Panipat, 100 km off. Each lorry, which operates 25 days on an average in a month, starts every day from Delhi with a load of 4 tonne and returens from Panipat with a load of 2 tonnes. Calculate the total commercial tonne-km and cost per commercial tonne-km when the total monthly charges for a lorry are Rs. 27,000. What rate per tonne should the company charge if it plans to earn a gross profit of 20% on the freightage? *(B. Com. Hons, Delhi 2000)*

Ans: Rate per tonne-km Rs. 2.25

3. A transport service company is running five buses between two towns which are 50 km apart. Seating capacity of each bus is 50 passengers. The following particulars were obtained from their books for April, 1998:

	Rs.
Wage of drivers, conductors and cleaners	24,000
Salaries of office staff	10,000
Diesel oil and other oil	35,000
Repairs and maintenance	8,000
Taxation, insurance etc.	16,000
Depreciation	26,000
Interest and other expenses	20,000
	1,39,000

Actual passengers carried were 75 per cent of seating capacity. All buses ran on all days of the month. Each bus made one round trip per day.
Find out the cost per passenger km. *(C.A. Inter Nov. 1998)*

Ans: Cost per passenger km Re. 0.2471

4. Anami Transport Company has given a route 40 km long to run bus. The bus costs the company a sum of Rs. 1,00,000. It has been insured at 3% p.a and the annual tax will amount to Rs. 2,000. Garage rent is Rs. 200 p.m. Annual repairs will be Rs. 2,000 and the bus is likely to last for 5 years. The driver's salary will be Rs. 300 p.m. and the conductor's salary will be Rs. 200 p.m. in addition to 10% of takings as commission (to be shared by the driver and the conductor equally).
Cost of stationery will be Rs. 100 p.m. Manager-cum-Accountant's salary is Rs. 700 p.m.
Petrol and oil will be Rs. 50 per 100 km. The bus will make 3 up and down trips carrying, on an average, 40 passengers on each trip. Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger. The bus will run on an average 25 days in a month. *(I.C.W.A Inter Dec 1998)*

Ans: Fare per passenger Rs. 1.50

5. Mr. *X* own bus which runs according to the following schedule:

(i) Delhi to Chandigarh and back, the same day.
Distance covered: 150 km one way
Number of days run each month: 8
Seating capacity occupied 90%

(ii) Delhi to Agra and back, the same day
Distance covered: 120 km one way
Number of days run each month: 10
Seating capacity occupied 85%

(iii) Delhi to Jaipur and back, the same day
Distance covered: 270 km one way
Number of days run each month: 6
Seating capacity occupied 100%

(iv) Following are the other details:

Cost of the bus	Rs. 6,00,000
Salary of the driver	Rs. 2,800 p.m.
Salary of the conductor	Rs. 2,200 p.m.
Salary of the part-time accountant	Rs. 200 p.m.
Insurance of the bus	Rs. 4,800 p.a.
Diesel consumption 4 km per litre at	Rs. 6 per litre
Road tax	Rs. 1,500 p.a.
Lubricant oil	Rs. 10 per 100 km
Permit fee	Rs. 315 p.m.

Repairs and maintenance	Rs. 1,000 p.m.
Depreciations of the bus	@ 20% p.a.
Seating capacity of the bus	50 persons

Passenger tax is 20% of the total takings. Calculate the bus fare to be charged from each passenger to earn a profit of 30% on total takings. The fares are to be indicated per passenger for the journeys:

(i) Delhi to Chandigarh
(ii) Delhi to Agra
(iii) Delhi to Jaipur

(CA, Inter)

Ans: Fare to be charged

(i) Delhi to Chandigarh	Rs. 24
(ii) Delhi to Agra	Rs. 19.20
(iii) Delhi to Jaipur	Rs. 43.20

6. The Kangaroo Transport Ltd. operates a fleet of lorries. The records for lorry L-14 reveal the following information for September 2003:

Days maintained	30
Days operated	25
Days idle	5
Total hours operated	300
Total km covered	2,500
Total tonnage carried	200(4 tonne-load per trip, return journey empty)

The following further information is made available:

(a) Opening costs for the month: petrol Rs. 400, oil Rs. 170, grease Rs. 90, wages to driver Rs. 550, wages to khalasi Rs. 350.
(b) Maintenance costs for the month: Repairs Rs. 170, overhaul Rs. 60, tyres Rs. 150, garage charges Rs. 100.
(c) Fixed cost for the month based on the estimates for the year; insurance Rs. 50, licence, tax etc., Rs. 80, interest Rs. 40, other overhead Rs. 190.
(d) Capital costs: cost of acquisition Rs. 54,000; residual value at the end of 5 years life is Rs. 36,000.

Prepare a cost-sheet and performance statement showing:

(a) Cost per day maintained;
(b) Cost per day operated;
(c) Cost per kilometre;
(d) Cost per hour;
(e) Cost per commercial ton-km.

(ICWA, Inter)

Ans: (a) Rs. 90 (b) Rs. 108 (c) Rs. 1.08 (d) Rs. 9.00 (e) Re. 0.54

A cement company transports its requirement of limestone from a quarry situated at a distance of 6 km from the factory. Presently, the company engages transport contractors for the purpose. The company has invited tenders from the local transport contractors and the lowest quotation received is Rs. 18 per tonne of limestone.
The management is concerned about the increasing cost of transport and has, therefore, under its consideration, a proposal for the purchase of a fleet of trucks for being used departmentally for the transport of limestone. You have been furnished with the following data to examine the feasibility of the proposal.

(i) The company has two options regarding purchase of a trucks, they are: (a) buy 10 tonne capacity trucks or (b) buy 8-tonne capacity trucks.

(ii) Operating cost data

(Rs.)

	10-tonne capacity truck	*8-tonne capacity truck*
Purchase price of each truck (Rs.)	4,30,000	4,00,000
Life in years	5	5
Sale value at the end of 5th year of life (Rs.)	82,000	40,000
Kilometre per litre of diesel	3	4
Repair and maintenance per annum per truck (Rs.)	47,100	38,400
Road tax per quarter per truck (Rs.)	600	600
Miscellaneous fixed expenses per month (Rs.)	3,000	3,000
Oil and sundries per 100 km run (Rs.)	10	10

(iii) Each truck will make 5 trips (to and fro) on an average for 24 days per month.
(iv) Cost of diesel Rs. 10 per litre.
(v) Salary of drivers Rs. 1,600 per month, two extras drivers will be employed to work as relievers.
(vi) Other staff required: One machine @ Rs. 2,000 per month
One filter @ Rs. 1,600 per month
One supervisor @ Rs. 3,200 per month
(vii) The capacity of the cement plant is 24,000 ton per month of limestone crushed.

Required:

(i) Present a comparative cost sheet on the basis of the aforesaid data showing the transport cost per tonne of operating 10 tonne and 8 ton capacity trucks at full capacity utilisation of the cement plant for an average month classifying the expenses into
(a) varying with kilometre run
(b) varying with number of trucks and
(c) fixed and suggest the best alternative out of the three choices available mainly, selection from two capacity trucks and hiring of transportation.

(ii) Apart from cost analysis as in (i) above, what other factors may be considered by the management before accepting the proposal for purchase of trucks.

(ICWA, Inter)

Ans: Cost per tonne.
10 tonne trucks Rs. 14.27
8 tonne trucks Rs. 15.90
The best alternative is to use 10 tonne capacity trucks

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

(i) Average occupancy: 75% for 365 days of the year
(ii) Current costs are:

	Variable cost Rs. per day	Fixed cost Rs. per day
Single room	400	200
Double rooms	500	250

(iii) Average sales per day of restaurant Rs. 1,00,000; contribution is at 30%. Fixed cost Rs. 10,00,000 per annum.
(iv) The sports centre swimming pool is likely to be used by 50 non-residents daily; average contribution per day non-resident is estimated at Rs. 50; fixed cost is Rs. 5,00,000 per annum.
(v) 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 per cent 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 area separately. *(CA, Final Year)*

Ans: (a) Rent per day for single room Rs. 756
Rent per day for double room Rs. 907
(b) Profit–Nil

9. Mr Harry is a travelling inspector for the Environment Protection Agency. He uses his own car and the agency reimburses him at Rs. 1.80 per kilometre. Mr Harry claims he needs to be paid Rs. 2.20 per kilometre just to break even. A scrutiny of his expenses by the agency reveals the following:

	Rs.
Oil charge every 4,800 km	120
Maintenance (other than oil) every 9,600 km	1,800
Yearly insurance (comprehensive with accident benefits)	4,000
Cost of car, with an average residual value of Rs. 60,000 and with a useful life of 3 years.	1,08,000

Petrol is Rs. 5 a litre and Harry gets 8 km per litre for his car. When Harry is on the road, he averages 192 kilometres a day. He works 5 days a week, has 10 days vacation in a year besides 6 holidays and spends 15 working days a month in the office.

You are required to determine:

(a) An equitable rate of reimbursement on the basis of the schedule he presently follows and (b) the number of kilometres a year he would have to travel, to break-even at the current rate of re-imbursement.

(ICWA Inter)

Ans: (a) Rs. 2.44 (b) 20,780 km

10. *SMC* is a public school having five buses each plying in different directions for the transportation of its students. In view of a large number of students availing of the bus service, the buses work two shifts daily both in the morning and in the afternoon. The buses are garaged in the school. The workload of the students has been so arranged that in the morning the first trip picks up senior students and the second trip plying an hour later picks up the junior students.

Similarly, in the afternoon the first trip drops the junior students and an hour later the second trip takes the senior students home.

The distance travelled by each bus one way is 8 km. The school works 25 days in a month and remains closed for vacation in May, June and December. Bus fee, however, is payable by students for all the 12 months in a year.

The details of expenses for a year are as under:

	Rs.	
Driver's salary	450	per month
Cleaner's salary	350	per month
(Salary payable for all 12 months)		
(One cleaner employed for all the five buses)		
Licence fee, taxes, etc.	860	per bus p.a.
Insurance	1,000	per bus p.a
Repairs and maintenance	3,500	per bus p.a
Purchase price of the bus	1,50,000	each
Life 12 years		
Scrap value	30,000	
Diesel cost	2.00	per litre

Each bus gives an average mileage of 4 km per litre of diesel.
Seating capacity of each bus is 50 students.
The seating capacity is fully occupied during the whole year.
Students picked up and dropped within a range of upto 4 km of distance from the school are charged half fare and 50% of the students travelling in each trip are in this category. Ignore interest. Since the charges are to be based on average cost you are required to:

(i) Prepare a statement showing the expenses of operating a single bus and a fleet of five buses for a year.
(ii) Work out the average cost per student per month in respect of:
  (a) Students coming from a distance of upto 4 km form the school, and
  (b) Students coming from a distance beyond 4 km from the school.

(CA Inter, B. Com. (Hons), Delhi, 1995)

Ans:

	per bus	fleet of 5 buses
Cost per month	Rs. 2,400	Rs. 12,000

11. A lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six off-season months in a year. During this period, half of the full-room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending 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:

	Rs.
(i) Staff Salary (excluding room attendants)	2,75,000
(ii) Repairs to Buildings	1,30,500
(iii) Laundry and Linen	40,000
(iv) Interior and Tapestry	87,500
(v) Sundry Expenses	95,400

(c) Annual depreciation is to be provided for buildings 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 is 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 for both during the season and the off season months, on the basis of the foregoing information. *(I.C.W.A. Inter Dec. 1995)*

Ans: Room rent during season Rs. 197, during off season Rs. 98.50

COST CONTROL ACCOUNTS

Learning Objectives

After reading this chapter, you should be able to:

1. explain non integrated system;
2. describe the procedure of accounting for cost items, and
3. discuss different journal entries for various transactions in cost control accounts.

NON-INTEGRATED SYSTEM

In cost accounting the cost books are basically maintained under the following two systems:

1. Non-integral or non-integrated cost accounting.
2. Integral or integrated cost accounting.

The system is called non-integral when cost and financial transactions are kept separately. On the contrary, when cost and financial transactions are integrated, the accounting system is known as integrated or integral. Under the system of non-integral accounting, separate ledgers are maintained for cost and financial transaction. The financial accountants look after financial transactions and the cost accountants are responsible for cost accounting transactions. The financial accounting department maintains the following financial ledgers:

1. *General ledger* It contains all real, nominal and personal accounts except trade debtors and creditors account.
2. *Debtors ledger* It has personal accounts of trade debtors.
3. *Creditors ledger* It has personal accounts of trade creditors.

The cost accounting department maintains the following cost ledgers:

1. *Stores ledger* This ledger contains all stores accounts.
2. *Work-in-progress ledger* All costs of material, wages and overhead for each job or manufacturing in progress are posted to the respective job accounts in this ledger.
3. *Finished goods/stock ledger* This ledger records details of finished goods and jobs.
4. *Cost ledger* This is main ledger and records impersonal accounts, that is, accounts relating to income and expenditure. The following accounts are maintained in cost ledger.

(i) Cost Control Accounts—These accounts are maintained to exercise control over the three subsidiary ledgers discussed above and also to complete double entry in cost accounts. They summarise all detailed information contained in the subsidiary ledgers and also help in reconciliation of cost and financial accounts.

The impbortant cost control accounts are as follows:

(a) Stores ledger control account—The purpose of stores ledger is to maintain item-wise record of raw materials and other stores. In cost ledger, a Stores Ledger Control Account is prepared relating to this subsidiary ledger. The total materials received in stores (which can be found in Purchases Journal also) is shown on the debit side of Stores Ledger Control Account and the total materials issued out of Stores (which can be found in Materials Abstract) is credited in the Account. The balance of this account shall talley with the total of the balances of the individual stores account in the Stores Ledger. Sometimes separate ledgers are kept for raw materials and other stores. In that case, there will be two separate control account namely Materials Ledger Control Account and Stores Ledger Control Account.

(b) Work-in-progress ledger control account—For every job, product or process, materials, labour and factory expenses are incurred. All such costs are debited in different accounts relating to different jobs or products. These accounts are kept in a job or work-in-progress ledger. A Work-in-progress Ledger Control Account is prepared in the Cost Ledger. The cost of production of completed jobs will be credited to this account and the total expenses incurred on all the jobs will be debited so as to show the total work-in-progress at any time. The balance of this account must be equal to the total of individual balances of Job or Process accounts in the Job Ledger. The Work-in-progress Ledger Control account is referred to as Work-in-progress Account also.

(c) Finished goods ledger control account—In Finished Goods Ledger, a separate account is opened for recording the quantity and price of each finished product manufactured or job completed. In Cost Ledger, a Finished Goods Ledger Control Account is maintained. It is also known as Stock Ledger Control Account. It gives the total value of finished goods in stock at a particular time.

(d) General ledger adjustment account—In Cost Ledger a General Ledger Adjustment Account is opened to record all items of income and expenditure. This account is also referred to as Cost Ledger Control Account (in costing books). Personal Accounts are shown in financial accounts and not in cost accounts. The General Ledger Adjustment Account completes the double entry in the cost ledger and hence all such accounts which pertain to fixed assets or cash or outsiders are posted to this account. All expenditures are shown on the credit side of this account; and the result (benefits) of such expenditure in the form of sale is shown on the debit side of this account. The balance represents the value of stores, stock-in-hand and the amount of work-in-progress.

Cost Ledger Control Account (in financial books)—Since the Costing Department does not act in isolation from the Financial Department and all the purchases and sales are recorded through financial books, a Cost Ledger Control Account must be opened in the financial books. This is only a memorandum account. In this account all the items of revenue and expenditure affecting Cost Accounts are recorded. This account is just the reverse or contrast of the General Ledger Adjustment Account in the Cost Ledger and, therefore, the balance of this account should tally with the balance of its counterpart in the Cost Ledger.

(ii) Other Accounts—They include all other impersonal accounts (real as well as nominal) which effect costs, for example, wages control account, factory overhead account, administration overhead account, selling and distribution overhead account, cost of sales account, etc. Sometimes, following additional accounts are also opened:

(a) Overheads suspense account—Sometimes, while valuing semi-finished jobs, factory overheads are not included. Similarly while valuing closing stock of finished goods, office and

administrative overheads are not included. In such cases normally, at the end of an accounting period, the estimated amount of such overheads is debited to Works or Office Overheads Suspense Account and credited to Works or Office Overheads Account, as the case may be. In the beginning of next accounting period, the entries are reversed to close the suspense accounts.

(b) Capital orders—For each item of capital nature work to be performed in the factory itself, for example, producing tools and equipments, certain expenditures shall be incurred in the form of materials, wages and other expenses. Such expenditures should be recorded in Capital Order Account and later on capitalised.

(c) Service orders—If repairs and maintenance work is done in the factory, the cost is debited to Repairs and Maintenance Account and later transferred to various overheads account, because the expenditure might have been incurred on production, administration and selling and distribution departments.

No separate account is maintained for direct expenses since they are directly charged to work-in-progress account.

When the finished goods are sold, they are transferred to Cost of Sales Account. In the last, a Costing Profit and Loss Account can be prepared with the help of all the above accounts.

ACCOUNTING FOR COST ITEMS

Materials

Some transactions relating to materials, such as purchase of materials and purchase returns influence both financial and cost ledgers. Some transactions namely, issues of materials from stores, transfer of materials from one job to another, return of excess material to stores, influence cost ledgers only.

Labour Cost

All wages are recorded in the cost accounting books through the wages control account and the general ledger adjustment account.

Overhead

The overhead—production, administration and selling and distribution—are absorbed to products or jobs on some equitable basis. Production overhead is absorbed on the basis of direct materials cost, direct labour cost or labour hours or machine hours or rate per unit. The production overhead account is credited with the amount of overhead absorbed and the work-in-progress account is debited. The administration overhead account is credited and the finished goods account is debited to recover administrative overhead for the production. Alternatively, administrative overhead is directly transferred to the profit and loss account and is not charged to production. Similarly, selling and distribution overhead may be charged to production by crediting selling and distribution overhead and debiting the cost of sales account.

The amount of under-absorption and over-absorption is transferred to the costing profit and loss account. Alternatively, it may be carried forward to the next accounting period.

JOURNAL ENTRIES

The use of double entry system in costing records will help in the preparation of trial balance for the costing transactions. The entries for various transactions which can be made with the help of control accounts are mentioned below:

(1) Receipts of materials into stores (cash and credit purchases)
In Cost books
Cost Ledger: Stores Ledger Control Account Dr.
To General Ledger Adjustment A/c
Stores Ledger: Individual stores accounts shall be debited.
In Financial Books
For credit purchases:
Purchases A/c Dr.
Cost Ledger Control A/c (memorandum)
To Creditors A/c
For cash purchases:
Purchases A/c Dr.
Cost Ledger Control A/c (memorandum)
To Cash A/c

(2) Returns to suppliers
In Cost Books
Cost Ledger: General Ledger Adjustment A/c Dr.
To Stores Ledger Control A/c
Stores Ledger: Individual Stores accounts shall be credited.
In Financial Books
Creditors A/c Dr.
To Purchase Returns A/c
To Cost Ledger Control A/c (memorandum)

(3) Receipt of materials for direct issue
In Cost Books
Cost Ledger: Work-in-progress Ledger Control A/c Dr.
To General Ledger Adjustment A/c
Job Ledger: Debit individual jobs for which materials have been received.
In Financial Books
Purchase A/c Dr.
Cost Ledger Control A/c (memorandum)
To Cash or Suppliers A/c

(4) Wages/salaries paid
In Cost Books Dr.
Cost Ledger: Wages Control A/c
To General Ledger adjustment A/c
In financial Books
Wages/Salaries A/c Dr.
Cost Ledger Control A/c (memorandum)
To Cash

(5) For payment of works, office and selling and distribution expenses
In Cost Books
Cost ledger:
Works Overheads A/c Dr.
Office Overheads A/c Dr.
Selling & Distribution Overheads A/c Dr.
To General Ledger Adjustment A/c

Overheads Ledger: Individual expenses accounts (if maintained) to be debited.

In Financial Books:

Expenses A/c Dr.
Cost Ledger Control A/c (memorandum)
To Cash

The following entries are made in cost books only and the financial account shall not be affected. The entries are merely for the transactions or transfers in Cost Ledger.

(6) For issue of direct material

In Cost Ledger:

Work-in-progress Ledger Control A/c Dr.
To Stores Ledger Control A/c
(Total as per materials abstract)

In Job and Stores Ledgers: Individual jobs for which materials have been received shall be debited and individual stores accounts in stores ledger shall be credited.

(7) For issue of indirect materials charging of indirect wages

In Cost Ledger: Dr.
Works/Office/Selling and Distribution Overheads A/c
To Stores Ledger Control A/c/Wages Control A/c

In Stores Ledger: Credit the individual Stores Accounts.

(8) For returns of materials from production to stores

In Cost Ledger: Dr.
Stores Ledger Control A/c
To Work-in-progress Ledger Control A/c

In Stores Ledger: Debit individual stores accounts.

In Job Ledger: Credit individual job accounts.

(9) Allocation of direct wages to production

In Cost ledger: Dr.
Work-in-progress Ledger Control A/c
To Wages Control A/c
(As per wages abstract)

In Job Ledger: Individual job accounts will be debited.

(10) Materials transferred from job No. 1 to job No. 2

In Job or Work-in-progress Ledger:

Job No. 2 A/c Dr.
To Job No. 1 A/c

(No entry is required in Work-in-progress Control A/c or Stores Ledger Control A/c)

(11) Allocation of overheads to jobs

(a) Works Overheads:

In Cost Ledger:

Work-in-progress Ledger Control A/c Dr.
To Works Overheads A/c

In Job Ledger:

Individual Job accounts to be debited.

(b) Office overheads:

In Cost ledger:

Finished Goods Ledger Control A/c

To Office Overheads A/c — Dr.

In Finished Goods Ledger:
Individual Job/product accounts to be debited.

(12) For normal wastage of stores and normal idle time wages
In Cost Ledger:
Work Overheads A/c — Dr.
To Stores Ledger Control A/c
To Wages Control A/c
In Overheads Ledger: Individual expense accounts (if maintained) to be debited.
In Stores Ledger: Individual stores accounts to be credited.

(13) For abnormal loss of material and abnormal idle time
In Cost Ledger:
Costing Profit and Loss A/c — Dr.
To Stores Ledger Control A/c
To Wages Control A/c
In stores Ledger: Individual stores accounts to be credited.

(14) For cost of production of finished artcles
In Cost Ledger:
Finished Goods Ledger Control A/c — Dr.
To Work-in-progress Ledger Control A/c
In Finished Goods Ledger: Individual product accounts to be debited.
In Job Ledger: Individual job accounts to be credited.

(15) For cost of goods sold
In Cost Ledger:
Cost of Sales A/c — Dr.
To Finished Goods Ledger Control A/c
In Finished Goods Ledger: Credit individual product accounts.
Following entries shall be made only in the Cost Ledger:

(16) For allocation of selling and distribution overheads
Cost of Sales A/c — Dr.
To Selling Overheads A/c

(17) For sales
General Ledger Adjustment A/c — Dr.
To Cost of Sales A/c

(18) For overhead on incomplete jobs
Works Overheads Suspense A/c — Dr.
Office Overheads Suspense A/c — Dr.
To Works Overheads A/c
To Office Overheads A/c.
(or alternatively the balances of works or office overheads may be carried forward)

(19) For transfer of profit
Cost of Sales A/c — Dr.
To Costing Profit & Loss A/c

(20) For over-charge of overheads (say, office)
Office Overheads A/c — Dr.
To Costing Profit and Loss A/c
(or alternatively, the balance may be carried forward)

However, if it is desired to charge a supplementary rate (negative), the following entry will be passed:
Office Overheads A/c
To Finished Goods Ledger Control A/c
To Cost of Sales A/c
(the two accounts will be credited in proportion to the value of finished goods in hand and cost of goods sold)

(21) For under-charge of overheads (say, works)
Costing Profit and Loss A/c Dr.
To Works Overheads A/c
(or alternatively the balance may be carried forward or treated as in case of Entry 20)

(22) For transfer of net profit
Costing Profit and Loss A/c
To General Ledger Adjustment A/c Dr.

Example 13.1

Pass journal entries in the cost books (non-integrated system) for the following transactions:

(i) Materials worth Rs. 25,000 returned to stores from job.

(ii) Gross total wages paid Rs. 48,000. Employer's contribution to PF and State Insurance amount to Rs. 2,000. Wages analysis book detailed Rs. 20,000 direct labour, Rs. 12,000 towards indirect factory labour, Rs. 10,000 towards salaries to office staff and Rs. 8,000 for salaries to selling and distribution staff. *(B.Com. (Hons Delhi) 1999)*

Solution:

Journal Entries

	Particulars		*Dr.* Rs.	*Cr.* Rs.
(i)	Stores Ledger Control A/c	Dr.	25,000	
	To WIP, Control A/c			25,000
	(Being material returned from stores)			
(ii)	Wages Control A/c	Dr.	50,000	
	To General Ledger and Adjustment A/c			48,000
	To Provident Fund and Employees' State Insurance Account			2,000
	(Being gross total wages paid)			
	Work-in-Progress Control A/c	Dr.	20,000	
	Factory Overheads Control A/c	Dr.	12,000	
	Office Overheads Control A/c	Dr.	10,000	
	Selling Overheads Control A/c	Dr.	8,000	
	To Wages Control A/c			50,000
	(Being wages allocated)			

Example 13.2

During the physical verification of stores of *X* Ltd. it was found that 100 units of raw material 'Wye' returned to the supplier has not been recorded. Its purchase invoice price is Rs. 5 per unit while the current standard cost is Rs. 4.80 per unit. Pass necessary journal entry to record the adjustment in the cost ledger of *X* Ltd. *(CA Inter Nov. 1997)*

Solution:

		Dr.	Cr.
		Rs.	Rs.
General Ledger adjustment A/c	Dr.	500	
To Stores Ledger Control A/c			480
To Material Price Variance A/c			20
(Being recording of materials returned to supplier, earlier ignored)			

Example 13.3

Pass journal entries in the cost books, maintained on non-integrated system, for the following:

(i) Issue of materials:	Direct Rs. 5,50,000; Indirect Rs. 1,50,000
(ii) Allocation of wages:	Direct Rs. 2,00,000; Indirect Rs. 40,000
(iii) Under/Over absorbed overheads:	Factory (over) Rs. 20,000; Administration (under) Rs. 10,000

(CA Inter Nov. 2000)

Solution:

Journal Entries in Cost Books maintained on non-integrated system

			Rs.	Rs.
(i)	Work-in-Progress Ledger Control A/c	Dr.	5,50,000	
	Factory Overhead Control A/c	Dr.	1,50,000	
	To Stores Ledger Control A/c			7,00,000
	(Being issue of materials)			
(ii)	Work-in-Progress Ledger Control A/c	Dr.	2,00,000	
	Factory Overhead Control A/c	Dr.	40,000	
	To Wages Control A/c			2,40,000
	(Being allocation of wages and salaries)			
(iii)	Factory Overhead Control A/c	Dr.	20,000	
	To Costing Profit & Loss A/c			20,000
	(Being transfer of over absorption of overhead)			
	Costing Profit & Loss A/c	Dr.	10,000	
	To Administration overhead Control A/c			10,000
	(Being transfer of under absorption of overhead)			

Example 13.4

The Profit and Loss account as shown in the financial books of a company for the year ended, 30.9.2007 together with a statement of reconciliation between the profit as per financial and cost accounts is given below:

Profit & Loss Account for the Year Ended 30.9.2007

	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 purchases		5,00,000	Finished goods	72,000	
Direct wages		2,00,000			2,23,000
Factory overheads		2,00,000	Miscellaneous Receipts		45,000
Administration expenses		1,70,000			
Selling and distribution expenses		2,20,000			
Preliminary expenses 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		
(a)	Difference in valuation of stock		1,63,000
	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 stock	1,650	
	Work in progress-closing stock	750	
	Total (B)	2,400	
	(A)–(B)		3,100
(b)	Other items		
	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 would appear in the Costing Ledger:

(i) Raw Material Control A/c
(ii) Work-in-Progress Control A/c
(iii) Finished Goods Control A/c
(iv) Cost of Sales A/c
(v) Costing Profit & Loss A/c *(ICWA Inter)*

Solution:

Basic Calculations
Computation of Items as per Cost Accounts

Particulars	*As per financial accounts Rs.*	*Valuation difference Rs.*	*As per cost accounts Rs.*
Raw Materials			
Opening stock	90,000	+ 1,650	91,650
Closing stock	98,000	+ 1,200	99,200
Work-in-progress			
Opening stock	50,000	– 1,300	48,700
Closing stock	53,000	– 750	52,250
Finished Goods			
Opening stock	70,000	– 2,000	68,000
Closing stock	72,000	+ 1,000	73,000

Raw Material Control Account

To Balance b/d	91,650	WIP Control A/c	4,92,450
To G.L. Adj. A/c	5,00,000	(balancing figure)	
		By Balance c/d	99,200
	5,91,650		5,91,650

WIP Control Account

To Balance b/d	48,700	By Finished goods control A/c	8,88,900
To Raw material control A/c	4,92,450	(balancing figure)	
To Wages control A/c	2,00,000		
To Factory overhead control A/c	2,00,000	By Balance c/d	52,250
	9,41,150		9,41,150

Finished Good Control Account

	Rs.		Rs.
To Balance b/d	68,000	By Cost of Sales A/c	10,53,900
To WIP control A/c	8,88,900	(balancing figure)	
To Admn. overheads control A/c	1,70,000	By Balance c/d	73,000
	11,26,900		11,26,900

Cost of Sales Account

	Rs.		Rs.
To Finished good control A/c	10,53,990	By General ledger adjustment A/c	15,00,000
To Selling and distribution control A/c	2,20,000		
To Profit taken to costing P & L A/c	2,26,100		
	15,00,000		15,00,000

Costing Profit & Loss Account

	Rs.		Rs.
To Balance transferred to general ledger adjustment A/c	2,26,100	By Cost of sales A/c	2,26,100
	2,26,100		2,26,100

Example 13.5

The following balance were extracted from a company's ledger as on 31st December, 1997:

	Rs.	Rs.
Raw materials control A/c	48,836	
Work-in-progress control A/c	14,745	
Finished stock control A/c	21,980	
Nominal ledger control A/c		85,561
	85,561	85,561

Further transactions took place during the following quarter as follows:

	Rs
Factory overhead—allocated to WIP	11,786
Goods finished—at cost	36,834
Raw materials purchased	22,422
Direct wages—allocated to WIP	18,370
Cost of goods sold	42,000
Raw materials—issued to production	17,000
Raw materials—credited by suppliers	1,000
Inventory audit—raw material losses	1,300
WIP rejected (with no scrap value)	1,800
Customer's returns (at cost) of finished goods	3,000

Prepare all the Ledger Accounts in Cost Ledger. *(C.A. Inter Nov. 1998)*

Solution:

Dr. Raw Materials Control Account Cr.

Particulars	*Amount Rs.*	*Particulars*	*Amount Rs*
To Balance b/d	48,836	By WIP control A/c	17,000
To Nominal Leger Control A/c	22,422	By Nominal Ledger Control A/c	1,000
		By Nominal Ledger Control A/c	1,300
		By Balance c/d	51,958
	71,258		71,258

Dr. Work-in-Progress Control Account Cr.

Particulars	*Amount Rs.*	*Particulars*	*Amount Rs.*
To Balance b/d	14,745	By Finished Stock Control A/c	36,834
To Nominal Ledger Control A/c	11,786	By Nominal Ledger Control A/c	1,800
To Raw Material Control A/c	17,000	By Balance c/d	23,267
To Nominal Ledger Control A/c	18,370		
	61,901		61,901

Dr. **Finished Stock Control Account** **Cr.**

Particulars	*Amount Rs.*	*Particulars*	*Amount Rs.*
To Balance b/d	21,980	By Nominal Ledger Control A/c	42,000
To WIP Control A/c	36,834	By Balance c/d	19,814
To Nominal Ledger Control A/c	3,000		
	61,814		61,814

Dr. **Nominal Ledger Control Account** **Cr.**

Particulars	*Amount Rs.*	*Particulars*	*Amount Rs.*
To Raw Material Control A/c	1,000	By Balance b/d	85,561
To Raw Material Control A/c	1,300	By Raw Material Control A/c	22,422
To Finished Stock Control A/c	42,000	By WIP Control A/c	11,786
To WIP Control A/c	1,800	By WIP Control A/c	18,370
To Balance c/d	95,039	By Finished Stock Control A/c	3,000
	1,41,139		1,41,139

Example 13.6

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

Particulars			*Rs. (in lakhs)*
Stores Ledger Control Account			80
Work-in-Progress Control Account			20
Finished Goods Control Account			430
Building Construction Account			10
Cost Ledger Control Account			540
During the month, the following transactions took place:			
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 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 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 accounts to record the above transactions in the cost ledger of the company.
(C.A. Inter May 1996)

Solution:

Cost Ledger Control Account *(Rs. in Lakhs)*

Particulars	*Rs.*	*Particulars*	*Rs.*
To Costing P & L A/c	450	By Balance b/d	540
To Building Construction A/c	44	By Stores Ledger Control A/c	40
To Balance c/d	483	By Wages Control A/c	150
		By Works Overhead Control A/c	160
		By Ro_ 'ty A/c	5
		By Selling, Distribution and Administration Overheads A/c	25
		By Costing Profit & Loss A/c	57
	977		977

Stores Ledger Control Account

Particulars	*Rs.*	*Particulars*	*Rs.*
To Balance b/d	80	By WIP Control A/c	50
To Cost Ledger Control A/c	40	By Works Overhead Control A/c	6
		By Building Const. A/c	4
		By Wor_ Overhead Control A/c (Loss)	5
		By Balar ce c/d	55
	120		120

Work-in-Progress Control Account

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

Finished Goods Control Account

Particulars	*Rs.*	*Particulars*	*Rs.*
To Balance b/d	430	By Cost of Goods sold A/c (*See Working Note*)	360
To WIP Control A/c	333	By Balance c/d	403
	763		763

Cost of Sales Account

Particulars	*Rs.*	*Particulars*	*Rs.*
To Cost of Goods Sold A/c	360	By Costing P/L A/c	385
To Selling, Distribution and Administration Overheads A/c	25		
	385		385

Costing P & L Account

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

Building Construction Account

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

Works Overhead Control Account

Particulars	*Rs.*	*Particulars*	*Rs.*
To Stores Ledger Control A/c	6	By Building Construction A/c	20
To Wages Control A/c	40	By WIP Control A/c	183
To Cost Ledger Control A/c	160	By Costing P & L A/c	8
To Stores Ledger Control A/c (Loss)	5		
	211		211

Wages Control Account

Particulars	*Rs.*	*Particulars*	*Rs.*
To Cost Ledger Control A/c	150	By Works Overhead Control A/c	40
		By Building Const. A/c	10
		By WIP Control A/c	100
	150		150

Royalty Account

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

Cost of Goods Sold Account

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 Account

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

Trial Balance

(Rs.in lakhs)

Particulars	*Dr.*	*Cr.*
Stores Ledger Control Account	55	
WIP Control Account	25	
Finished Goods Control Account	403	
Cost Ledger Control Account		483
	483	483

Working Note:

If Selling Price is Rs.100, Cost price is = Rs. 80

If Selling Price is Rs. 450, cost price will be = Rs. $\frac{80}{100}$ × Rs. 450 = Rs. 360 lakhs

Example 13.7

A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff in respect of January, 1997;

(i) *Incomplete Ledger Entries:*

Raw-Materials Account

	Rs.		Rs.
Beginning Inventory	32,000		

Work-in-Progress Account

	Rs.		Rs.
Beginning Inventory	9,200	Finished Stock	1,51,000

Creditors Account

	Rs.		Rs.
Closing Balance	19,200	Opening Balance	16,400

Manufacturing Overheads Account

	Rs.		Rs.
Amount Spent	29,600		

Finished Goods Account

	Rs.		Rs.
Opening Inventory	24,000	Closing Inventory	30,000

(ii) *Additional Information:*

(1) The Cash-book showed that Rs. 89,200 have been paid to creditors for raw-material.

(2) Ending inventory of work-in-progress included material Rs. 5,000 on which 300 direct labour hours have been booked against wages and overheads.

(3) The job card showed that workers have worked for 7,000 hours. The wage rate is Rs. 10 per labour hour.

(4) Overhead recovery rate was Rs. 4 per direct labour hour.

You are required to complete the above accounts in the cost ledger of the company.

(C.A. Inter May 1997)

Solution:

Dr. Creditors Account Cr.

Particulars	*Rs.*	*Particulars*	*Rs.*
To Cash and Bank (1)	89,200	By Balance b/d	16,400
To Balacne c/d	19,200	By Purchases (Balancing figure)	92,000
	1,08,400		1,08,400

Dr. Work-in-Progress Account Cr.

Particulars	*Rs.*	*Particulars*		*Rs.*
To Balance b/d	9,200	By Finished stock		1,51,000
To Raw-materials (Balancing figure)	53,000	By Balance c/d:		
		Material (2):	Rs. 5,000	
To Wages (3) (7,000 hrs. × Rs.10)	70,000	Labour (2): (300 hrs. × 10 hrs)	Rs. 3,000	
To Overheads (4)		Overheads (2):	Rs. 1,200	9,200
(7,000 hrs. × Rs. 4)	28,000	(300 hrs. × 4 hrs.)		
	1,60,200			1,60,200

Dr. **Raw-materials Account** **Cr.**

Particulars	*Rs.*	*Particulars*	*Rs.*
To Balance b/d	32,000	By Work-in-progress	53,000
To Purchases (as above)	92,000	(As above)	
		By Balance c/d	71,000
	1,24,000		1,24,000

Dr. **Finished Goods Account** **Cr.**

Particulars	*Rs.*	*Particulars*	*Rs.*
To Balance b/d	24,000	By Cost of Sales	1,45,000
To WIP (as above)	1,51,000	(Balancing figure)	
		By Balance c/d	30,000
	1,75,000		1,75,000

Dr. **Manufacturing Overheads A/c** **Cr.**

Particulars	*Rs.*	*Particulars*	*Rs.*
To Sundries	29,600	By WIP (7,000 × Rs.4)	28,000
		By Under-absorbed Overheads A/c	1,600
	29,600		29,600

Example 13.8

How will you transact the following in the material account and the stores ledger?

(a) Material ledger shows 120 units at an average cost of Rs. 10 white the physical count is 110 units, difference due to non-recording of a material requisition note.

(b) Physical units show 200 white the ledger balance shows a shortage due to non-receipt of an invoice for 20 units for a total cost of Rs. 100.

(c) Ledger balance indicates an excess of 50 units over the physical balance effected by atmospheric changes which are normal. The issue rate is Rs. 3.00 per unit.

(d) Physical balance shows a shortage, compared to the ledger balance of 10 units traced to having an effect of excess issue of material to production job. The issue price is Rs. 2.50 per unit.

(ICWA, Inter)

Solution:

(a) The material-requisition note will be recorded in the issue column of the particular material A/c in the stores ledger. The following will be the entry in the cost ledger:

Work-in-progress control A/c	Dr	Rs. 100	
To stores ledger control A/c	Cr		Rs. 100

The particular job A/c in the work-in-progress ledger will debited.

(b) The invoice for 20 units will be posted in the receipt column of the particular material A/c in the stores ledger. The following will be the entry in the cost ledger.

Stores-ledger control A/c	Dr	Rs. 100	
To general ledger adjustment A/c	Cr		Rs. 100

(c) This is a normal loss, hence to be treated as factory overhead. The balance in the particular material A/c in the stores ledger will be corrected by entering the normal loss of 50 units in the issue column. The following will be the entry in the cost ledger.

Factory overhead control A/c	Dr.	Rs. 150	
To stores ledger control A/c	Cr .		Rs. 150

(d) The 10 units issued in excess of the quantity shown in the materials-issue document should be taken back in the stores. No accounting entry will be required.

However, if the material cannot be traced on the shop floor, the value of the material will be charged to the particular job. The excess issue will be entered in the issue column of the particular materials A/c in the stores ledger. The following will be the entry in the cost ledger:

Work-in-progress control A/c	Dr.	Rs. 25	
To stores ledger control A/c	Cr.		Rs. 25

The particular job A/c in the work-in-progress ledger will be debited.

Example 13.9

The following incomplete accounts are furnished to you for the month ended 31st October, 2003:

Stores Control A/c

1.10.2003 To balance	Rs. 54,000		

Work-in-Progress Control A/c

1.10.2003 To balance	Rs. 6,000		

Finished Goods Control A/c

1.10.2003 To balance	Rs. 75,000		

Factory Overheads Control A/c

Total debited for October 2003	Rs. 45,000		

Creditors for Purchase A/c

		1.10.2003 By balance	Rs. 30,000

Additional information:

(i) The factory overheads are applied by using a budgeted rate based on direct labour-hours. The budget for overheads for 2003 is Rs. 6,75,000 and the budget for direct labour hours is 4,50,000.

(ii) The balance in the account of creditors for purchases on 31.10.2003 is Rs. 15,000 and payments made to creditors in October 2003 amounted to Rs. 1,05,000.

(iii) The finished goods inventory as on 31st October 2003 is Rs. 66,000.

(iv) The cost of goods sold during the month was Rs. 1,95,000.

(v) On 31st October 2003, there was only one unfinished job in the factory. The cost records show that Rs. 3,000 (1,200 direct labour-hours) of direct labour cost and Rs. 6,000 of direct material cost has been charged.

(vi) A total of 28,200 direct labour-hours were worked in October 2003. All workers earn same rate of pay.

(vii) All actual factory overheads incurred in October 2003 has been posted.

You are required to find:

(a) Materials purchased during October 2003

(b) Cost of goods completed in October 2003

(c) Overheads applied to production in October 2003

(d) Balance of work-in-progress as on 31st October 2003

(e) Direct materials consumed during October 2003

(f) Balance of stores control account on 31st October 2003
(g) Over-absorbed and under-absorbed overheads for October 2003. *(C.A. Inter)*

Solution:

(i) Overhead recovery rate: Rs. 6,75,000/4,50,000 = Rs. 1.50 per direct labour hour
(ii) Direct wage rate: Rs. 3,000/1,200 = Rs. 2.50 per hour
(iii) Total direct wages charged to production: 28,200 × Rs. 2.50 = Rs. 70,500

(a) Materials purchased during the year
Payment to creditor + Closing balance – Opening balance
= Rs. 1,05,000 + Rs. 15,000 – Rs. 30,000 = Rs. 90,000

(b) Cost of goods completed in October 2003
Cost of goods sold + Closing finished goods – Opening finished goods
= Rs. 1,95,000 + Rs. 66,000 – Rs. 75,000 = Rs. 1,86,000

(c) Overhead applied to production in October
Direct labour hours × Overhead = 28,200 × Rs. 1.50 = Rs. 42,300

(d) Balance of work-in-progress on 31st October 2003
Direct material cost + Direct labour cost + Overhead
= Rs. 6,000 + Rs. 3,000 + 1200 × Rs. 1.50 = Rs. 10,800

(e) Direct material consumed during October 2003: Rs. 78,000 (Ref: W.I.P. control A/c)

Dr. Cr.

Work-in-Progress Control A/c

	(Rs.)		(Rs.)
To Opening balance	6,000	By Finished goods	1,86,000
To Direct wages	70,500	By Closing balance	10,800
To Factory overheads	42,300		
To Stores Control A/c (Balancing figure)	78,000		
	1,96,800		1,96,800

(f) Balance of Stores Control A/c: Rs. 66,000 (Ref: Stores control A/c)

Dr. Cr.

Stores Control A/c

	(Rs.)		(Rs.)
To Opening balance	54,000	By W.I.P. control A/c	78,000
Materials purchased	90,000	By Closing balance (Balancing figure)	10,800
	1,44,000		1,44,000

(g) Under-absorbed overheads for October 2003: Rs. 2,700 (Ref: Factory overhead A/c)

Dr. Cr.

Factory Overhead A/c

	(Rs.)		(Rs.)
To General Ledger adj. A/c	45,000	By W.I.P. control A/c	42,300
		By Under-absorbed overhead A/c (Balancing figure)	2,700
	45,000		45,000

THEORY QUESTIONS

1. What is non-integral accounting system?
2. What are cost control accounts? Describe their advantages?
3. Mention the principal ledgers maintained in financial accounts and cost accounts.

PROBLEMS

1. During June 2007, the following transactions took place in *XYZ* Co. Ltd.

	Rs.
(i) Materials purchased:	
(a) Credit purchases	18,000
(b) Credit purchases for special job	800
(c) Cash purchases	2,000
(ii) Returns to suppliers	1,000
(iii) Direct materials issued to production	12,000
(iv) Indirect materials issued	1,200
(v) Materials returned from production to stores	200
(vi) Materials transferred from Job No. 20 to Job No. 21	400

You are required to enter the transactions in the financial and cost books.

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 balance	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; overhead incurred Rs. 2,50,000.
Items not included in Cost Records: Income from investments Rs. 10,000; Loss on 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)*

3. As at 31st March, the following balances existed in a company's cost ledger:

	Dr.	*Cr.*
Raw materials control A/c	Rs. 60,287	
Work-in-progress control A/c	24,473	
Finished stock control A/c	50,389	
Factory overhead control A/c	—	Rs.2,105
Cost ledger control A/c	—	1,33,044
	Rs.1,35,149	Rs.1,35,149

During the next three months the following items arose:

		Rs.
Finished output (at cost)		42,167
Factory overhead incurred		18,302
Raw materials purchased	Rs.	24,600
Direct wages payments	10,106	
Indirect labour (salaries)	4,333	14,439
Cost of sales		37,178
Materials issued to production		25,463
Sales returns (at cost)		1,076
Materials returned to and credited by suppliers		580
Factory overhead allocated to production		15,440

You are required to write up the accounts and schedule the closing balances, stating what each balance represents.

4. The cost ledger of a company shows the following balances as on January 1, 2007

	Dr.	Cr
	Rs.	
Work-in-progress control A/c	7,840	
Finished stock ledger control A/c	5,860	
Works overhead suspense A/c	400	
Office and administration overhead suspense A/c	200	
Stores ledger control A/c	10,500	
General adjustment A/c		24,800
Transactions for the year 2007 were:		
Wages (direct labour)		61,200
Wages (indirect labour)		2,800
Works overhead allocated to production		18,700
Office and administration overhead allocated		6,200
Stores issued to production		39,300
Goods finished during the year		1,20,000
Finished goods sold (no stock were left at the year end)		1,32,000
Stores purchased		36,000
Stores issued to factory repair orders		1,500
Carriage inwards on stores issued for production		600
Works expenses		14,000
Office and administration expenses		6,000

You are required to:

(a) Write up the cost ledger accounts recording the above transactions and make necessary transfers to control accounts.

(b) Prepare the Trial Balance as on 31st December, 2007.

5. The Cost Ledger of Motors Ltd. showed the following balances as at 1st July, 2007

	Rs.	Rs.
Stores ledger account	5,250	
Work-in-progress account	3,920	
Finished goods account	2,790	

	Rs.	Rs.
Works overheads account		50
Administration overheads account	30	
General ledger adjustment account		11,940
	11,990	11,990

Further balances resulting from the operations for the year ended 30th June, 2007 were:

Stores purchases	Rs. 18,000
Stores issued to production orders	19,650
Stored issued to repairs	750
Wages	30,750
Productive labour	29,500
Unproductive labour	1,250
Works overhead allocated to production orders	8,950
Carriage inwards	300
Works expenses	7,000
Administration expenses	900
Administration overheads allocated to production orders	920
Goods finished during the year	58,600
Finished goods sold	60,000
Sales expenses	670

Record the entries in the Cost Ledger Accounts for the year ended 30th June, 2007 and prepare a Schedule of Balances as at that date, explaining what each balance represents.

6. In the course of physical verification of stores as on 31st March 2007, following differences are revealed in case of AB Ltd.

Material	*Unit*	*Rate (Rs.)*	*Physical balance*	*Ledger balance*	*Remarks*
A	Nos	7.00	600	680	Wrong counting
B	Litres	12.00	1,100	1,155	Normal evaporation loss
C	Nos	6.00	350	400	Material issues not accounted for
D	Kg	22.00	900	930	Shortage due to pilferage and theft
E	Nos	15.00	1,475	1,325	150 nos. received but not entered in ledger
F	Metres	10.00	291	291	Obsolete materials. Realised sales value Rs. 1,650 awaiting despatch.

Prepare journal entries in the cost ledger to give effect to the above adjustments as called for. *(ICWA, Inter)*

INTEGRATED ACCOUNTING SYSTEM

Learning Objectives

After reading this chapter, you should be able to:

1. discuss the meaning and features of integrated accounting system;
2. describe the principal accounts in integral sytsem;
3. explain different journal entries recorded in integral and non-integral accounting system and
4. distinguish between interlocking and integration of cost and financial accounts.

MEANING AND FEATURES OF INTEGRATED ACCOUNTING SYSTEM

In integrated accounting system, the concept of a separate profit and loss account for financial and costing purposes is discarded in favour of a unified account which will serve both financial and costing purposes. Such a system of accounting is referred to as the "integrated" or "integral" cost accounting system. A single book-keeping system which contains both financial and cost accounts is known as an integral accounting system. An integrated accounting system has the following advantages:

1. There is no problem of reconciliation as there will only be one profit amount.
2. This system is economical and easy to understand. Duplication of work and labour are avoided.
3. Cost data can be presented promptly and regularly.
4. All cost data and accounts are automatically checked and thus cost figures are accurate.

The following factors should be considered before establishing an integrated cost accounting system:

1. *Degree of integration* The degree of integration should be determined. Some business firms may integrate up to the stage of prime cost or factory cost. On the other hand, many undertakings integrate the whole of the records.
2. *Control accounts* In place of classifying expenditure according to its nature, control accounts may be prepared for each of the elements of cost, such as:
   - Material Control Account
   - Direct Labour Control Account
   - Factory Overhead Control Account
   - Administrative Overhead Control Account
   - Selling and Distribution Overhead Control Account.

Some of the above control accounts could be separated into fixed and variable depending on the circumstances.

3. *Cost accumulation purposes* Full details about the cost data are provided to the cost accounting department so as to achieve the following objectives;
   (a) To provide the necessary costing data.
   (b) To form the basis of journal entries so that the control accounts can be cleared to suitable revenue accounts resulting into a cost of sales account.
4. Provisions for accured expenses, prepayments and stocks should be dealt with by transfers to suitable suspense accounts, so that the balance remaining in each control account represent the charges for the period.

PRINCIPAL ACCOUNTS

Under integrated accounting the following accounts are mainly kept.

Stock Control Account

This account is prepared for each of the following cost items:

(i) *Raw material* This account has opening stock and purchases on the debit side and material issues on credit side.

(ii) *Work-in-progress* This account is debited with opening stock and factory overhead and credited with cost of goods finished. The closing stock, if any, will be carried forward to the next year.

(iii) *Finished stock* This account is known as the finished goods account also. It is debited with goods finished and credited with the cost of sales.

The above stock accounts are usually used in place of the stock and purchase account which is maintained in the financial books.

Cost of Sales Account

The cost of goods sold is debited to this account and the finished goods account is credited.

Assets Account

Separate accounts are kept for different assets possessed by the firm, such as plant, furniture, building, etc.These individual assest accounts are prepared in the usual way. Any capital expenditure incurred is debited.

Debtors and Creditors Control Account

The creditors account mentions the transactions and their amounts with creditors and suppliers. The balance in creditors account should talley with the balance in the purchase ledger. Similarly, the debtors control account should talley with the sales ledger.

Prepayments Account and Outstanding Account

An expense account will show the prepaid amount made, if any. The prepaid amount is debited to the prepaid account and credited to overhead control accounts. Thus, the expense which is related to the period is charged to the work-in-progress account. In case of an expense due but not paid, the expense due account is credited and the overhead control account is debited. When the amount is actually paid, the expense due account is debited and cash account is credited or it can be adjusted through the overhead control account.

Direct Wages and Overhead Costs Control Account

When these costs are incurred, the appropriate control account is debited and the cash account credited. For example, the total direct wages paid will be debited to the direct labour control account. At the end of a period, they are transferred to work-in-progress accounts by crediting the appropriate control accounts and debiting the work-in-progress account. It is possible that actual payments for a period may not talley with the expenditure to be charged for the period and, therefore, adjustments should be made.

Departmental or Cost Centre Account

Under integrated account, an account is kept for each department or cost centre. This helps in knowing the cost of a department and controlling costs associated with different departments.

Cash Account

In this account all cash receipts are debited and cash disbursements are credited.

JOURNAL ENTRIES

Journal entries which are recorded in integral and non-integral accounting systems are given in the following pages.

Distinction between 'Interlocking' and 'Integration' of Cost and Financial Accounts

When independent sets of books are maintained for cost and financial accounts, they are 'interlocked' by control accounts maintained in the two sets of books. Cost Ledger Control Account is maintained in the financial books and a General Ledger Adjustment Account in the costing books. Thus, a link is established between the two sets of books. In costing books, all entries pertaining to fixed assets, cash, or outsiders are posted in General Ledger Adjustment Account. In case it is desired to integrate the two trial balances into one, the Cost Ledger Control Account and General Ledger Adjustment Account can be omitted because they are 'contra' accounts.

Integration requires the maintenance of only one set of books in which all transactions are recorded. By eliminating cost ledger, all the control accounts are maintained in general ledger.

Integration is preferable to interlocking from the point of view of economy but sometimes due to practical difficulties, the maintenance of 'interlocking' system is essential. Although integration (maintaining one set of accounts) offers better scope for economy and efficiency in accounting, sometimes it is desirable to have separate sets of accounts because of organisational problems involved in the maintenance of one set of books. Cost Accounting has assumed considerable significance in the planning and control of business operations and hence the need for a separate costing department is felt by the management. Therefore, generally, 'integral' system can be employed, with advantages, only in small units.

Journal Entries to be Recorded under Non-integral and Integral System

Items	*Non-integral System*		*Integral System*
	Financial books	*Cost books*	
1. Purchase of materials on credit	Purchases A/c Dr. To Bought Ledger To Bought Ledger Control (or creditors) A/c	Stores Ledger Control A/c Dr. To General Ledger Adjustment A/c	Stores Ledger Control A/c Dr. (or creditors) A/c To Creditors A/c
2. Issue of materials for production	No entry	Work-in-progress Ledger Control A/c Dr. To Stores Ledger Control A/c	Work-in-progress A/c Dr. To Stores Ledger Control A/c
3. Payment of wages	Wages A/c Dr. To Cash To Insurance To Tax	Wages A/c (or Wages Control A/c) Dr. To General Ledger Adjustment A/c	Wages A/c (wages control A/c) Dr. To Cash A/c
4. Analysis and distribution of wages	No entry	Work-in-progress A/c Dr. (for direct labour) Factory Ov. Control A/c Dr. (for factory indirect labour) Adm. Overhead Control A/c Dr. (for office indirect labour) S & D Overhead Control A/c Dr. (for selling and distribution indirect labour) To Wages Control A/c	Work-in-Progress Control A/c Dr. Factory Overhead A/c Dr. Administration Overhead A/c Dr. S & D Overhead A/c Dr. To Wages Control A/c
5. Payment for indirect expenses, for example power, repairs, etc.	Expenses A/c Dr. To Cash To Creditors	Factory/Adm./Selling & Dis. Overhead A/c Dr. To General Ledger adj. A/c	Factory/Office/Selling & Distribution Overhead A/c Dr. To Cash To Creditors
6. Recording of factory overheads at predetermined rates	No entry	Work-in-progress Control A/c Dr. To Factory Overheads Control A/c	Work-in-progress Control A/c Dr. To Factory Overhead Control A/c
7. Factory overheads over-absorbed	No entry	Factory Overhead Control A/c Dr. To Costing P&L A/c (or alternatively the balance may be carried forward)	Factory Overhead A/c Dr. To P&L A/c

(*Contd.*)