

6

Job Costing & Batch Costing

Learning Objectives

When you have finished studying this chapter, you should be able to

- Understand the meaning and distinctive features of Job and Batch Costing.
- Understand the accounting procedures to be applied in Job Costing and Batch Costing.

6.1 Methods of Costing

Today business and industry needs costing systems to meet their individual requirements. Costing experts believe that it may not be possible to devise a single costing system to fulfill everybody's needs. They have developed different methods of costing for different industries depending upon the type of manufacture and their nature. Mainly the industries can be grouped into two basic types i.e. Industries doing job work and Industries engaged in mass production of a single product or identical production.

6.1.1 For industry doing job work: A concern engaged in the execution of specification order is characterised as a firm producing several items distinguishable from one another by respective specifications and other details. Such a concern is thought of involved in performing job works. Production under job work is strictly according to customer's specifications and each lot, job or production order is unique. Examples of jobs order type of production are: ships building, roads, bridges, manufacture of heavy electrical machinery, machine tools, iron foundries, wood working shops, etc. Here each job or unit of production is treated as a separate identity for the purpose of costing. The methods of costing and for ascertaining cost of each job are known as a job costing, contract costing and Batch costing.

6.1.2 For continuous and process type of industries: The continuous or process type of industry is characterised by the continuous production of uniform products according to standard specifications. In such a case the successive lots are generally indistinguishable as to size and form and, even if there is some variation in specifications, it is of a minor character. Examples of continuous type of industries are chemical and pharmaceutical products, paper/food products, canning, paints, and varnish oil, rubber, textile etc. Here the

6.2 Cost Accounting

methods of Costing used for the purpose of ascertaining costs are: process costing; single costing; operating costing etc.

6.2 Job Costing

6.2.1 Meaning of Job Costing: CIMA London defines Job Costing as “the category of basic costing methods which is applicable where the work consists of separate contracts, jobs or batches each of which is authorised by specific order or contract.” According to this method costs are collected and accumulated according to jobs, contracts, products or work orders. Each job or unit of production is treated as a separate entity for the purpose of costing. Job costing is carried out for the purpose of ascertaining cost of each job and takes into account the cost of materials, labour and overhead etc. The job costing method is also applicable to industries in which production is in batches since batch production basically is of the same character as the job order production, the *difference being mainly one in the size of different orders*. The method then may also be described as “Batch Costing”.

6.2.2 Principles of Job Costing: The job costing method of costing may be regarded as the principal method of costing since the basic object and purpose of all costing

- Analysis and ascertain cost of each unit of production
- Control and regulate cost
- Determine the profitability

The basic principles enunciated for the job costing method are valid essentially for all types of industry. For example, printing; furniture; hardware; ship-building; heavy machinery; interior decoration, repairs and other similar work.

6.2.3 Process of Job costing

- *Prepare a separate cost sheet for each job*
- *Disclose cost of materials issued for the job*
- *Labour charges incurred (on the basis of bill of material and time cards respectively)*
- *When job is completed, overhead charges are added for ascertaining total expenditure*

6.2.4 Suitability of Job Costing

- When jobs are executed for different customers according to their specifications.
- When no two orders are alike and each order/job needs special treatment.
- Where the work-in-progress differs from period to period on the basis of the number of jobs in hand.

6.2.5 Format of Job Cost Sheet:

JOB COST SHEET					
Description : _____		Job No.: _____			
Blue Print No.: _____		Quantity: _____			
Material No.: _____		Date of delivery: _____			
Reference No.: _____		Date commenced: _____			
		Date finished: _____			
Date	Reference	Details	Material	Labour	Overhead
		Total			
<i>Summary of costs</i>		<i>Estimated (₹)</i>	<i>Actual (₹)</i>	For the job _____ Units produced _____ Cost/unit _____ Remarks _____ Prepared by : _____ Checked by: _____	
Direct material cost					
Direct wages					
Production overhead					
PRODUCTION COST					
Admn. Selling & Distrn. Ovds.					
TOTAL COST					
PROFIT/LOSS					
SELLING PRICE					

6.2.6 Difference between Job Costing and Process Costing: The main points which distinguish job costing and process costing are as below:

Job Costing	Process Costing
(i) A Job is carried out or a product is	The process of producing the product has a continuous flow and the product produced is

6.4 Cost Accounting

produced by specific orders.	homogeneous.
(ii) Costs are determined for each job.	Costs are compiled on time basis i.e., for production of a given accounting period for each process or department.
(iii) Each job is separate and independent of other jobs.	Products lose their individual identity as they are manufactured in a continuous flow.
(iv) Each job or order has a number and costs are collected against the same job number.	The unit cost of process is an average cost for the period.
(v) Costs are computed when a job is completed. The cost of a job may be determined by adding all costs against the job.	Costs are calculated at the end of the cost period. The unit cost of a process may be computed by dividing the total cost for the period by the output of the process during that period.
(vi) As production is not continuous and each job may be different, so more managerial attention is required for effective control.	Process of production is usually standardized and is therefore, quite stable. Hence control here is comparatively easier.

6.3 Procedure of job Cost Accounting

Accounting for Materials: An essential requirement of job cost accounting is that direct materials and their cost must be traced to and identified with specific job or work order. This segregation of materials cost by jobs or work order is brought about by the use of separate stores requisitions for each job or work order. Where a bill of material is prepared, it provides the basis for the preparation of these stores requisitions. But when the entire quantity of materials specified in the bill of materials is drawn in one lot or in installments, the bill itself could be made to serve as a substitute for the stores requisition.

After the materials have been issued and the stores requisitions have been priced, it is usual to enter the value of the stores requisition in a material abstract or analysis book. It serves to analyse and collect the cost of all direct materials according to job or work orders and departmental standing orders or expense code numbers. From the abstract book, the summary of materials cost of each job is posted to individual job cost sheets or cards in the Work-in-Progress ledger. The postings are usually made weekly or monthly. Similarly, at periodical intervals, from the material abstract books, summary cost of indirect material is posted to different standing orders or expense code numbers in the Overhead Expenses ledger. If any special material has been purchased for a particular job, it is generally the practice to charge such special material direct to the job concerned without passing it through the Stores Ledger, as soon as it is purchased.

If any surplus material is left over in the case of any job, unless it can be immediately and economically used on some other job, the same is returned to the store room with a proper supporting document/stores Debit Note or Shop Credit, and the relevant job account is credited with the value of excess material returned to the store room. If the surplus material is utilised on some other job, instead of being returned to the store room first, a material transfer note is prepared. The transfer note would show the number of the transfer to job as well as transferee job (or jobs) so that, on that basis, the cost thereof can be adjusted in the Work-in-Progress Ledger.

Accounting for Labour: All direct labour cost must be analysed according to individual jobs or work orders. Similarly, different types of indirect labour cost also must be collected and accumulated under appropriate standing order or expenses code number. The analysis of labour according to jobs or work orders is, usually, made by means of job time cards or sheets. All direct labour is booked against specific jobs in the job time cards or sheets. All the idle time also is booked against appropriate standing order expense code number either in the job time card for each job or on a separate idle time card for each worker (where the job time card is issued job-wise). The time booked or recorded in the job time and idle time cards is valued at appropriate rates and entered in the labour abstract or analysis book. All direct labour cost is accumulated under relevant job or work order numbers, and the total or the periodical total of each job or work order is then posted to the appropriate job cost card or sheet in Work-in-Progress ledger. The postings are usually made at the end of each week or month.

The abstraction of idle time costs under suitable standing order or expenses code numbers is likewise done and the amounts are posted to the relevant departmental standing order or expense code number in the Overhead Expenses Ledger at periodical intervals. As regards other items of indirect labour cost these are collected from the payrolls books for the purpose of posting against standing order or expenses code numbers in the Overhead Expenses ledger.

Accounting for Overhead: Manufacturing overheads are collected under suitable standing order numbers and selling and distribution overheads against cost accounts numbers. Total overhead expenses so collected are apportioned to service and production departments on some suitable basis. The expenses of service departments are finally transferred to production departments. The total overhead of production departments is then applied to products on some realistic basis, *e.g.* machine hour; labour hour; percentage of direct wages; percentage of direct materials; etc. It should be remembered that the use of different methods will lead to a different amounts being computed for the works overhead charged to a job hence to different total cost. The problem of accurately absorbing, in each individual job or work order, the overhead cost of different cost centres or departments involved in the manufacture is difficult under the job costing method. It is because the cost or the expenses thereof cannot be

6.6 Cost Accounting

traced to or identified with any particular job or work order. In such circumstances, the best that can be done is to apply a suitable overhead rate to each individual article manufactured or to each production order. This is essentially an *arbitrary* method.

Price of a job: Price of a job may be arrived by adding the desired percentage of profit to the total cost of the job.

Treatment of spoiled and defective work: Spoiled work is the quantity of production that has been totally rejected and cannot be rectified.

Defective work refers to production that is not as perfect as the saleable product but is capable of being rectified and brought to the required degree of perfection provided some additional expenditure is incurred. Normally, all the manufacturing operations are not fully successful; they result in turning out a certain amount of defective work. Nonetheless, over a period of time it is possible to work out a normal rate of defectives for each manufacturing process which would represent the number of defective articles which a process shall produce in spite of due care. Defects arise in the following circumstances:

Circumstances	Treatment
(1) Where a percentage of defective work is allowed in a particular batch as it cannot be avoided.	When a normal rate of defectives has already been established, if the actual number of defectives is within the normal limit or is near thereto the cost of rectification will be charged to the whole job and spread over the entire output of the batch. If, on the other hand, the number of defective units substantially exceeds the normal, the cost of rectification of the number which exceeds the normal will be written off as a loss in the Costing Profit and Loss Account.
(2) Where defect is due to bad workmanship.	In this case cost of rectification will be abnormal cost, <i>i.e.</i> , not a legitimate element of the cost. Therefore, the cost of rectification shall be written off as a loss, unless by an arrangement, it is to be recovered as a penalty from the workman concerned. It is possible, however that the management did provide for a certain proportion of defectives on account of bad workmanship as an unavoidable feature of production. If that be the case, the cost of rectifying to the extent provided for by the management will be treated as a normal cost and charged to the batch.
(3) Where defect is due to the Inspection Department wrongly	In this case the cost of rectification will be charged to the department and will not be considered as cost of manufacture of the batch. Being an abnormal cost, it

accepting incoming material of poor quality.	will be written off to the Costing Profit and Loss Account.
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6.3.1 Entries in Control Accounts

1. *For purchase of materials-*

Stores Ledger Control A/c	Dr.
To Cost Ledger Control A/c*	

2. *For the value of direct materials issued to jobs-*

Work-in-Progress Control A/c	Dr.
To Stores Ledger Control A/c	

3. *For return of direct materials from jobs-*

Stores Ledger Control A/c	Dr.
To Work-in-Progress Control A/c	

4. *For return of materials to suppliers –*

Cost Ledger Control A/c	Dr.
To Stores Ledger Control A/c	

5. *For indirect materials-*

Factory Overhead Control A/c	Dr.
To Stores Ledger Control A/c	

6. *For wages paid-*

Wages Control A/c	Dr.
To Cost Ledger Control A/c	

7. *For direct wages incurred on jobs-*

Work-in-Progress Control A/c	Dr.
To Wages Control A/c	

8. *For indirect wages –*

Factory Overhead Control A/c	Dr.
To Wages Control A/c	

9. *For any indirect expense paid-*

Factory Overhead Control A/c	Dr.
To Cost Ledger Control A/c	

10. *For charging overhead to jobs-*

Work-in-Progress Control A/c	Dr.
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6.8 Cost Accounting

- To Factory Overhead Control A/c
11. For the total cost of jobs completed-
- | | |
|-------------------|-----|
| Cost of Sales A/c | Dr. |
|-------------------|-----|
- To Work-in-Progress Control A/c
12. The balance of Cost of Sales A/c is transferred to Costing Profit and Loss a/c; For such transfer –
- | | |
|-----------------------------|-----|
| Costing Profit and Loss A/c | Dr. |
|-----------------------------|-----|
- To Cost of Sales A/c
13. For the sales value of jobs completed -
- | | |
|-------------------------|-----|
| Cost Ledger Control A/c | Dr. |
|-------------------------|-----|
- To Costing Profit and Loss A/c**

*General ledger adjustment account is the other name of Cost Ledger Control Account.

**The balance of Costing Profit and Loss Account shall now represent profit or loss. The balance of Cost Ledger Control Account shall be carried forwarded. With the balance on all the accounts trial balance can be drawn.

Illustration 1 (Journal entries in Cost Accounting)

The manufacturing cost of a work order is ₹ 1,000; 8% of the production against that order spoiled and the rejection is estimated to have a realisable value of ₹ 20 only. The normal rate of spoilage is 2%. Record this in the costing journal.

Solution:

Actual loss due to spoilage = 8% of ₹ 1,000 = ₹80 and Normal loss = 2% of ₹ 1,000 = ₹ 20, therefore abnormal loss = ₹ 60.

The rejection has a realisable value of ₹ 20, which is to be apportioned between normal loss and abnormal loss in the ratio of 2 : 6.

The accounting entries necessary for recording the above facts would be :

		(₹)	(₹)
Material Control Account	Dr.	20	
Overhead Control Account	Dr.	15	
Costing Profit and Loss Control Account	Dr.	45	
To Work-in-Progress Control Account			80

In the case of defectives being inherent in the manufacturing process, the rectification cost may be charged to the specific jobs in which they have arisen. In case defectives cannot be identified with jobs, the cost of rectification may be treated as factory overheads. Abnormal defectives should be written off to the Costing Profit and Loss Account.

Illustration 2 (Preparation of job cost sheet)

A shop floor supervisor of a small factory presented the following cost for Job No. 303, to determine the selling price.

	<i>Per Unit</i> (₹)
Materials	70
Direct wages 18 hours @ ₹2.50 (Deptt. X 8 hours ; Deptt. Y 6 hours; Deptt. Z 4 hours)	45
Chargeable expenses	<u>5</u>
	120
Add : 33-1/3 % for expenses cost	<u>40</u>
	<u>160</u>

**Analysis of the Profit/Loss Account
(for the year 2012)**

	(₹)		(₹)
Materials used	1,50,000	Sales less returns	2,50,000
Direct wages:			
Deptt. X	10,000		
Deptt. Y	12,000		
Deptt. Z	<u>8,000</u>		
	30,000		
Special stores items	4,000		
Overheads:			
Deptt. X	5,000		
Deptt. Y	9,000		
Deptt. Z	<u>2,000</u>		
	<u>16,000</u>		
Works cost	2,00,000		
Gross profit c/d	<u>50,000</u>		
	<u>2,50,000</u>		<u>2,50,000</u>
Selling expenses	20,000	Gross profit b/d	50,000
Net profit	<u>30,000</u>		
	<u>50,000</u>		<u>50,000</u>

It is also noted that average hourly rates for the three Departments X, Y and Z are similar.

You are required to:

- Draw up a job cost sheet.
- Calculate the entire revised cost using 2012 actual figures as basis.
- Add 20% to total cost to determine selling price.

6.10 Cost Accounting

Solution:

Job Cost Sheet

Customer Details _____
Date of commencement _____

Job No. _____
Date of completion _____

Particulars	Amount (₹)
Direct materials	70
Direct wages :	
Deptt. X ₹ 2.50 × 8 hrs. = ₹ 20.00	
Deptt. Y ₹ 2.50 × 6 hrs. = ₹ 15.00	
Deptt. Z ₹ 2.50 × 4 hrs. = ₹ 10.00	45
Chargeable expenses	<u>5</u>
Prime cost	120
Overheads:	
Deptt. X = $\frac{₹ 5,000}{₹ 10,000} \times 100 = 50\% \text{ of } ₹ 20 = ₹ 10.00$	
Deptt. Y = $\frac{₹ 9,000}{₹ 12,000} \times 100 = 75\% \text{ of } ₹ 15 = ₹ 11.25$	
Deptt. Z = $\frac{₹ 2,000}{₹ 8,000} \times 100 = 25\% \text{ of } ₹ 10 = ₹ 2.50$	23.75
Works cost	143.75
Selling expenses = $\frac{₹ 20,000}{₹ 2,00,000} \times 100 = 10\% \text{ of work cost}$	14.38
Total cost	158.13
Profit (20% of total cost)	<u>31.63</u>
Selling price	<u>189.76</u>

Illustration 3 (Preparation of factory cost statement and Invoice price of Job)

In a factory following the Job Costing Method, an abstract from the work-in-progress as on 30th September was prepared as under.

Job No.	Materials (₹)	Direct hrs.	Labour (₹)	Factory Overheads applied (₹)
115	1325	400 hrs.	800	640
118	810	250 hrs.	500	400
120	<u>765</u>	300 hrs.	<u>475</u>	<u>380</u>
	<u>2,900</u>		<u>1,775</u>	<u>1,420</u>

Materials used in October were as follows:

Materials Requisition No.	Job No.	Cost (₹)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	<u>720</u>
		<u>3,535</u>

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

Job No.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	<u>25</u>	<u>10</u>
	<u>275</u>	<u>75</u>

Indirect Labour: Waiting of material	20	10
Machine breakdown	10	5
Idle time	5	6
Overtime premium	<u>6</u>	<u>5</u>
	<u>316</u>	<u>101</u>

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

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

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

6.12 Cost Accounting

Solution:

Factory Cost Statement of Completed Job.

Month	Job No.	Materials	Direct labour	Factory overheads (80% of direct labour cost)	Factory cost
	(₹)	(₹)	(₹)	(₹)	(₹)
September	115	1,325	800	640	2,765
October	<u>115</u>	--	<u>125</u>	<u>100</u>	<u>225</u>
Total		<u>1,325</u>	<u>925</u>	<u>740</u>	<u>2,990</u>
September	118	810	500	400	1,710
October	<u>118</u>	<u>515</u>	<u>330</u>	<u>264</u>	<u>1,109</u>
Total		<u>1,325</u>	<u>830</u>	<u>664</u>	<u>2,819</u>
September	120	765	475	380	1,620
October	<u>120</u>	<u>665</u>	<u>245</u>	<u>196</u>	<u>1,106</u>
Total		<u>1,430</u>	<u>720</u>	<u>576</u>	<u>2,726</u>

Invoice Price of Complete Job

Job No.	115 (₹)	118 (₹)	120 (₹)
Factory cost	2,990.00	2,819.00	2,726.00
Administration and selling overheads @ 10% of factory cost	<u>299.00</u>	<u>281.90</u>	<u>272.60</u>
Total cost	3,289.00	3,100.90	2,998.60
Profit (20% of total cost)	<u>657.80</u>	<u>620.18</u>	<u>599.72</u>
Invoice Price	<u>3,946.80</u>	<u>3,721.08</u>	<u>3,598.32</u>

Assumption: - Indirect labour costs have been included in the factory overhead which has been recovered as 80% of the labour cost.

6.3.2 Advantages and Disadvantages of Job Costing

Some of the advantages and disadvantages of Job costing are summarised as below:

Advantages	Disadvantages
1. The details of Cost of material, labour and overhead for all job is available to control.	1. Job Costing is costly and laborious method.
2. Profitability of each job can be derived.	2. As lot of clerical process is involved the

	chances of error is more.
3. It facilitates production planning.	3. This method is not suitable in inflationary condition.
4. Budgetary control and Standard Costing can be applied in job costing.	4. Previous records of costs will be meaningless if there is any change in market condition.
5. Spoilage and defective can be identified and responsibilities can be fixed accordingly.	

6.4 Batch Costing

6.4.1 Meaning of Batch Costing: In batch costing articles are produced in a lot i.e. one unit of product is not produced but a lot of 'say' 500 or 1000 units of such product is produced.

This is a form of job costing. Under job costing, executed job is used as a cost unit, whereas under batch costing, a lot of similar units which comprises the batch may be used as a cost unit for ascertaining cost. In the case of batch costing separate cost sheets are maintained for each batch of products by assigning a batch number. Cost per unit in a batch is ascertained by dividing the total cost of a batch by number of items produced in that batch. In batch costing Material cost, direct labour engaged in batch wise and overhead are also recovered in batchwise. Such a method of Costing is used in the case of pharmaceutical or drug industries, ready-made garments, industries manufacturing electronic parts of T.V., radio sets etc

Cost per unit in a batch= Total cost of a batch/Number of item produced.

Illustration 4 (Calculation of cost and profit per piece of each batch)

A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual. Overheads are levied at a rate per labour hour. The selling price contracted for is ₹ 8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	Batch Output	Material cost (₹)	Direct wages (₹)	Direct labour hours
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

6.14 Cost Accounting

The other details are:

Month	Chargeable expenses (₹)	Direct labour hours
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

Solution:

	Jan.	Feb.	March	April	May	June	Total
Batch output (in units)	210	200	220	180	200	220	1,230
Sale value	₹ 1,680	1,600	1,760	1,440	1,600	1,760	9,840
Material cost	₹ 650	640	680	630	700	720	4,020
Direct wages	₹ 120	140	150	140	150	160	860
Chargeable expenses*	₹ 600	672	672	621	780	800	4,145
Total cost	₹ 1,370	1,452	1,502	1,391	1,630	1,680	9,025
Profit per batch	₹ 310	148	258	49	-30	80	815
Total cost per unit	₹ 6.52	7.26	6.83	7.73	8.15	7.64	7.34
Profit per unit	₹ 1.48	0.74	1.17	0.27	-0.15	0.36	0.66

Overall position of the order for 1,200 units

Sales value of 1,200 units @ ₹ 8 per unit	₹ 9,600
Total cost of 1,200 units @ ₹ 7.34 per unit	<u>₹ 8,808</u>
Profit	<u>₹ 792</u>

* $\frac{\text{Chargeable expenses}}{\text{Direct labour hour for the month}} \times \text{Direct labour hours for batch}$

Illustration 5 (Preparation of Statement of Cost under batch costing)

Rio Limited undertakes to supply 1000 units of a component per month for the months of January, February and March 2013. Every month a batch order is opened against which materials and labour cost are booked at actual. Overheads are levied at a rate per labour hour. The selling price is contracted at ₹ 15 per unit.

From the following data, present the profit per unit of each batch order and the overall position of the order for the 3000 units.

Month	Batch Output (Numbers)	Material Cost (₹)	Labour Cost (₹)
January 2013	1,250	6,250	2,500
February 2013	1,500	9,000	3,000
March 2013	1,000	5,000	2,000

Labour is paid at the rate of ₹ 2 per hour. The other details are:

Month	Overheads (₹)	Total Labour Hours
January 2013	12,000	4,000
February 2013	9,000	4,500
March 2013	15,000	5,000

Solution:

Statement of Cost and Profit per unit of each batch

	Jan. 2013	Feb. 2013	March. 2013	Total
a) Batch Output (Nos.)	1,250	1,500	1,000	3,750
b) Sales Value (@ ₹ 15 per unit)	(₹) 18,750	(₹) 22,500	(₹) 15,000	(₹) 56,250
Cost				
Material	6,250	9,000	5,000	20,250
Wages	2,500	3,000	2,000	7,500
Overheads	3,750	3,000	3,000	9,750
c) Total	12,500	15,000	10,000	37,500
d) Profit per batch (b) – (c)	6,250	7,500	5,000	18,750
e) Cost per unit (c) ÷ (a)	10	10	10	
f) Profit per unit (d) ÷ (a)	5	5	5	

Overall Position of the Order for 3000 Units

Sales value (3,000 units × ₹ 15)	₹45,000
Less: Total cost (3,000 units × ₹ 10)	<u>30,000</u>
Profit	<u>15,000</u>

Calculation of overhead per hour:

	Jan. 2013	Feb. 2013	March 2013
i. Labour hours:			

6.16 Cost Accounting

= $\frac{\text{Labour cost}}{\text{Labour rates per hour}}$	$\frac{\text{₹ 2,500}}{2} = 1,250$	$\frac{\text{₹ 3,000}}{2} = 1,500$	$\frac{\text{₹ 2,000}}{2} = 1,000$
ii. Overhead per hour :			
= $\frac{\text{Total Overheads}}{\text{Total labour hour}}$	$\frac{\text{₹ 12,000}}{4,000} = \text{₹ 3}$	$\frac{\text{₹ 9,000}}{4,500} = \text{₹ 2}$	$\frac{\text{₹ 15,000}}{5,000} = \text{₹ 3}$
iii. Overhead for batch (i) × (ii)	₹ 3,750	₹ 3,000	₹ 3,000

6.4.2 Economic Batch Quantity: In batch costing the most important problem is the determination of optimum size of the batch (how much to produce) or Economic Batch Quantity.

The determination of economic batch quantity involve two types of costs viz.,

- (i) Set up cost (or preparation cost) and
- (ii) Carrying cost.

With the increase in the batch size, there is an increase in the carrying cost but the set up cost per unit of product is reduced; this situation is reversed when the batch size is reduced. Thus there is one particular batch size for which both set up and carrying costs are minimum. This size is known as economic or optimum batch quantity.

Economic batch quantity can be determined with the help of a table, graph or mathematical formula. The mathematical formula usually used for its determination is as follows :

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

Where, D = Annual demand for the product
 S = Setting up cost per batch
 C = Carrying cost per unit of production

Note : If the rate of interest (I) and unit cost of production (C) are given, the following formula should be used for determining EBQ.

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

Illustration 6 (Determination of economic batch quantity)

Monthly demand for a product	500 units
Setting-up cost per batch	₹ 60
Cost of manufacturing per unit	₹ 20
Rate of interest	10% p.a.
Determine economic batch quantity.	

Solution:

$$EBQ = \sqrt{\frac{2DS}{C}} = \sqrt{\frac{2 \times 500 \times 12 \times 60}{0.1 \times 20}} = 600 \text{ units.}$$

Illustration 7 (Calculation of EBQ and minimum inventory holding cost)

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

- (a) What would be the optimum run size for bearing manufacture?
- (b) Assuming that the company has a policy of manufacturing 6,000 bearings per run, how much extra costs the company would be incurring as compared to the optimum run suggested in (a) above?
- (c) What is the minimum inventory holding cost?

Solution:

(a) *Optimum production run size (Q)* = $\sqrt{\frac{2DS}{C}}$

where,

- D = No. of units to be produced within one year.
- S = Set-up cost per production run
- C = Carrying cost per unit per annum.

$$= \sqrt{\frac{2DS}{C}} = \sqrt{\frac{2 \times 24,000 \times ₹ 324}{0.10 \times 12}} = 3,600 \text{ bearings.}$$

- (b) *Total Cost (of maintaining the inventories) when production run size (Q) are 3,600 and 6,000 bearings respectively*

Total cost = Total set-up cost + Total carrying cost.

	When run size is 3,600 bearings	When run size is 6,000 bearings
Total set up cost	$= \frac{24,000}{3,600} \times ₹ 324 = ₹ 2,160$	$= \frac{24,000}{6,000} \times ₹ 324 = ₹ 1,29$
Total Carrying cost	$1/2 \times 3,600 \times 0.10P \times ₹ 12$ $= ₹ 2,160$	$1/2 \times 6,000 \times 0.10P \times ₹ 12$ $= ₹ 3,600$
Total Cost	₹ 4,320	₹ 4,896

6.18 Cost Accounting

- (c) *Minimum inventory holding cost* = $1/2 Q \times C$
(when $Q = 3,600$ bearings) = $1/2 \times 3,600 \text{ bearings} \times 0.10P \times ₹ 12 = ₹ 2,160$

6.5 Summary

- *Job Costing* : Production/work done as per customer specification
- *Meaning of spoiled and defective work under job costing*:-
 - ◆ *Spoiled* :- Produced units cannot be rectified.
 - ◆ *Defective* :- Units can be rectified with some additional cost.
- *Batch Costing* :- Articles are produced in a lot and cost are computed per unit in a batch.
Cost per unit in a batch = *Total cost of a batch/Number of item produced.*

EBQ = Points where Set up and carrying cost are minimum.

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