MODULE 5

COSTING AND DEPRECIATION

OBJECTIVES

- Causes of computation of depreciation, tax concepts and corporate income tax.
- The objective of this unit is to study Components of costs and estimation of selling price

Introduction

Costing can be called as a specialized branch of accounting which deals with classification, recording, allocation and control of costs. It is the technique and process of ascertaining costs (ICWA, England definition). In common terms costing can be defined as the process of determining actual cost of an item after adding different expenses incurred to bring it to the final form, ready for marketing. With the help of estimating and costing, a manufacturer finds out the total cost of each article he makes and fixes the selling price of the article in order to make a definite profit. Cost data provide a basis for important decisions on pricing, product mix, product design, process improvement and technology acquisition. Poor decisions in these areas can severely impair the ability of the company to compete.

Estimation is the assessment of the total cost in manufacturing a product even before it is manufactured. One must have a sound knowledge of material, labour, processing costs, quality and quantity of material required, selection of manufacturing method, manufacturing time required, etc. in order to do a proper estimation. The engineer must be able to state the probable cost at the stage when only sketch plans are drawn. If the available funds are known, the designer has to work backwards i.e. will have to design the building/product which may be constructed within the available sum.

Estimation involves the computation of the quantities required and expenses likely to be incurred in the construction of a work. The amount estimated should be sufficient to cover the probable expenditure on the work without revision by reason of minor unanticipated contingencies, but it should not be so excessive as to permit of extravagance in execution.

The essentials of an estimate are:

1. The drawings − plans, elevations and sections of the work;
2. Specifications indicating the nature and class of work and materials to be employed;
3. The local rates at which different types of work can be executed. The designs of an engineer will be of little use of he is not able to give an idea of cost.

NEED FOR ESTIMATING AND COSTING:

Following points illustrate the need for estimation and costing:

1. For determining the cost of production: Estimating and costing provides reliable data regarding expenditure on materials, wages and other things which helps in determining the cost of production precisely.
2. For controlling the costs: It provides the cost for each product, process, job, department etc., which helps in identifying profitable and non-profitable areas in the organization. This guides the management to take corrective measures of their non-profitable activities. It helps in reducing the total manufacturing cost. It helps to reduce material wastages and control labour wages.
3. For fixing selling price: Costing provides information for fixing the selling price of the product. The cost and volume of production, profit and break-even analysis serves as a basis for determining the selling price of the product.
4. For preparing the quotations and submitting tenders: A quotation is the information regarding the selling price of a product or service offered to a prospective buyer. A tender is the information regarding the selling price given to a prospective buyer, but given in a sealed envelope. The principles of costing help immensely in preparing quotations and submitting tenders.
5. For specific managerial decisions: Costing provides invaluable information for taking the managerial decisions like make or buy, whether to own fixed assets or buy them, whether to replace the existing machinery before its useful life, etc. Costing also provides information on wage incentive plans, cost control measures for materials and supplies, budget and budgetary control, etc.
6. It helps in formulating the policies of the concern for changing prices of the products.
7. It helps in making the product more economical by incorporating suitable changes in the design.

ESTIMATING PROCEDURE:

Production planning department:

(a). Decides the specification of the product to be manufactured.

(b). Make out the drawings: Lays down the method of manufacturing and required operations Machines to be used Labour rates Accuracy and finish required Prepare a list of components of the product Make or buy decision.

Determine the material cost.

Determine the time required for various operations.

Determine labour cost.

Determine prime cost = Direct expenses + direct material cost + direct labour cost.

Determine factory overheads, depreciation, maintenance and insurance cost, power cost, etc.

Determine the administrative overheads.

Determine the packing and delivery charge.

Determine the total cost.

Determine the selling price = total cost + profit.

Decide the discount allowed to the distributors.

Decide delivery time

Components or Elements Of Cost:

The total cost of a product is the sum of several elementary costs that are involved in its manufacture. The major costs in manufacturing a product consist of:

1. Material cost
   (a). Direct material cost (b). Indirect material cost
2. Labour cost
   (a). Direct labour cost (b). Indirect labour cost
3. Expenses
   (a). Direct expenses (b). Indirect expenses or overheads or on cost

Figure 1 shows the elements of product cost.

Direct Material Cost:

It is the cost of materials with which the product is made of. In other words, it is the cost of materials which are processed through various stages to form a part of the product or the whole product itself. Example: mild steel rods for making shafts, sheet metal for making cupboards, etc.

Indirect Material Cost:

It is the cost of materials which are essentially needed for helping the direct materials to be converted into finished products. It includes the cost of materials that are necessary for the

production process, but are not directly used in the product itself. Example: cost of grease, lubricating oil, coolant, cotton waste, etc.

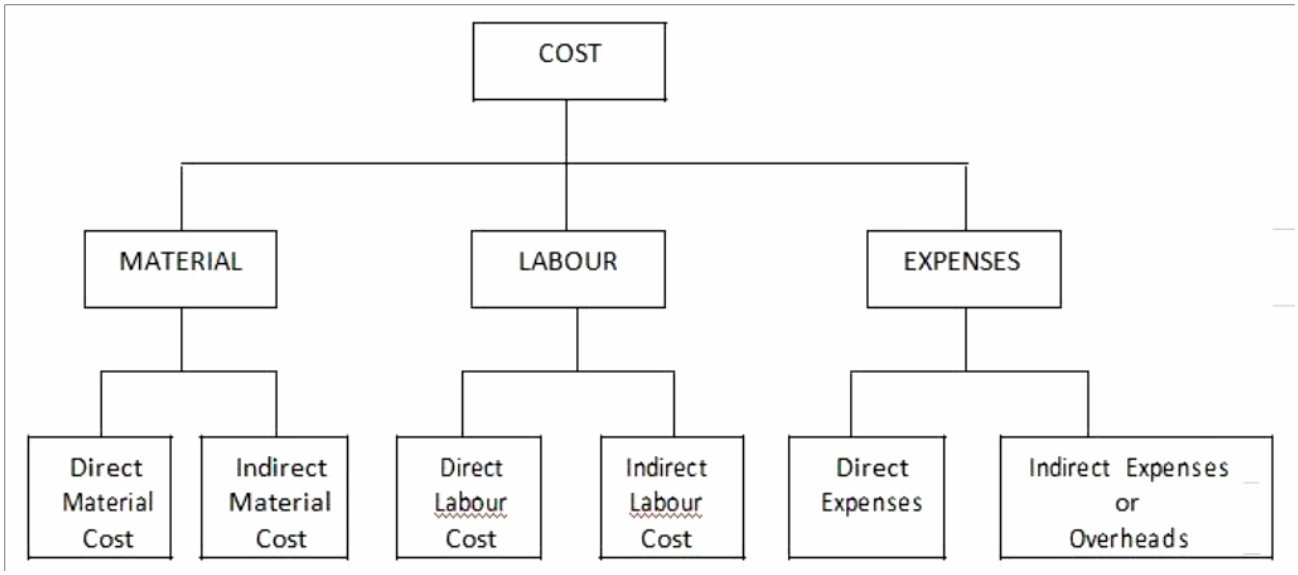

Figure 5.1: Elements of Product cost

Calculation of material cost:

The method is as follows:

i. Calculate the volume of each component by applying mensuration. Volume of the material is calculated after adding due allowance for machining purpose on those sides which need machining.

ii. Calculate the total volume of the product by adding all the volumes of components.

iii. Determine the weight of the material by multiplying total volume and density of the material.

iv. Determine the cost of the material by multiplying cost per unit weight with the total volume of the material required.

Direct Labour Cost:

Direct or productive labours are the workers who actually involve either manually or with the aid of machines in manufacturing components using different materials. The nature of their duties is such that their wages may be directly related to the job they are manufacturing. Direct labour include the workers operating various production machines in machine shop, welding shop, fitting shop, assembly shop, etc. Direct labour cost consists of wages paid to the workers directly engaged in the manufacturing of a product. It also includes the wages paid to the workers engaged in handling the product within the department. Example: wages paid to the machinist, turner, fitter, welder, moulder, etc.

Indirect Labour Cost:

It consists of wages paid to the workers who are indirectly helpful for the production. In other words, it is the wages paid to the labour who help the direct labour in performing their duties.

Indirect labour cost cannot be associated directly to a particular job, but are charged on the whole log of products produced in the plant during a particular period. Example: wages paid to supervisor, inspector, sweeper, helper, loader, watchman, store keeper, crane driver, etc.

Calculation of Direct labour cost:

For calculating the labour cost, the estimator should know about the types of tools and machines required operations to be carried out to bring the raw material into final product. He should consult the production department to get the details on the estimated time for each operation. Some of the time estimates are given below:

a) Set up time: It is the time required to set and fix the tools and jobs on the machine. It includes time to study drawings, blue prints, to set machines, to study job, etc. It is independent of the number of jobs produced.

b) Operation time or cutting time or floor to floor time: It is the time required to carry out specific operations on machines. It includes both work handling and machining times.

c) Tear-down time: It is the time considered from the moment, the last operation has been completed.

d) Miscellaneous allowances:

i. Personal allowances: It is the time allowance given to a worker to attend his personal needs. It is about 5% of the total working time.

ii. Fatigue allowances: Excessive and continuous work, improper illumination, excessive machine noise, etc. lead to fatigue. To maintain the efficiency of the worker, about 5% of the total working time is allotted as fatigue allowance.

iii. Tool changing and grinding allowances: It is the time allowance given to remove the tool from holder, to fix another tool, etc. It is nearly 5-10% of the total working time.

e) Measurement and checking allowances: It includes time taken for measuring and checking different dimensions of the product. It is generally taken as 2-3% of the total working time.

f) Other allowances: They include time taken for periodic cleaning, oiling and lubrication, procuring inventory, disposing scraps and surplus stocks, etc. This allowance may sometimes as high as 15-20% of the operation time.

Expenses:

Apart from direct material cost and direct labour cost, there are several other expenditures involved in the manufacture of a product. They are known as expenses. They include building rent, depreciation charges of plant and factory building, administrative, selling and distribution expenses, etc.

i. Direct expenses:

These are the expenses which are directly charged to a particular job and are incurred for that specific job only. Direct expenses are identified and allocated to persons and materials involved in that job.

Example: cost of preparing designs and drawings, cost of manufacturing jigs and fixtures for a particular product, cost of patterns, moulding boxes, dies, cost of consultancy charges for the design and manufacture of a specific product, etc.

ii. Indirect expenses:

They are also called as overheads, on-costs, indirect charges or burden. These expenses cannot be charged directly to a particular product manufactured. All expenses other than the direct material cost, direct labour cost and direct expenses are considered as indirect expenses.

Indirect expenses can be classified as given below:

iii. Production or Factory overheads:

They include all the expenditure made on the actual operation of the product in the plant like indirect material and indirect labour. They are also known as works on cost. Some of the expenses charged under factory overheads are as follows:

i. Cost of indirect materials or consumables such as grease, coolants, cotton waste, etc.

ii. Indirect labour wages paid to foreman, inspectors, sweepers, helpers, watchman, etc.

iii. Factory rent and lighting, water, fuel, power, internal transport, maintenance charges.

iv. Insurance of plant and factory.

v. Depreciation on machinery, factory, plant.

vi. Stationery consumed in the factory.

vii. Works canteen and labour welfare activities expenses.

iv. Administrative expenses:

These expenses include the following:

i. Salaries to MD, GM, personal manager, medical officer, finance manager, secretary and staff.

ii. Expenses incurred on legal, banking and audit charges.

iii. Telephone, telegraph, postal charges.

iv. Printing and stationary for office.

v. Office rent, repair and depreciation charges.

vi. Office lighting and power charges.

vii. Insurance of office building and equipment.

v. Selling and distribution overheads:

These expenses include the following:

i. Salaries of sales manager, sales representatives, agents

ii. Cost of advertisement and publicity.

iii. Travelling expenses, commission and other facilities to salesman.

iv. Showroom expenses.

v. Packing, loading and unloading expenses and carriage charges.

vi. Printing of pricelist and catalogue.

vii. Expenses for the preparation of quotations and tenders.

viii. Insurance for finished goods, showrooms, goods in transit and in go downs.

ix. Delivery van maintenance, repair, depreciation and running expenses.

x. Entertainment expenses, telephone and postal expenditure of sales department.

xi. Rebate to customers, legal charges incurred for debt recovery.

xii. Salaries to store keepers, stores officers and their assistants.

vi. R & D overheads:

These expenses include the following:

i. Salaries to R & D staff.

ii. Costs of R & D equipments and activities, etc.

Selling Price Of The Product:

The selling price of the product is derived as shown below:

a) **Prime cost or Direct cost:** It is the sum of all direct costs.

Prime cost or Direct cost = Direct material cost + Direct labour cost + Direct Expenses

b).**Factory cost or Works cost:** It consists of prime cost and factory expenses.

Factory cost or Works cost = Prime cost + factory expenses (production overheads)

c).**Office cost or Manufacturing cost or Production cost or Gross cost:**

It consists of factory and administrative overheads.

Office cost or Gross cost = Factory cost + Office and Administrative overheads.

d).**Total cost or Selling cost:**

It consists of office cost and selling and distribution expenses.

Total cost or selling cost = Office cost or Gross cost + selling and distribution Overheads

e). **Selling Price:**

The customers buy the product by paying the price which is known as selling price. It consists of total cost and profit.

Selling price = Total cost + Profit

Figure 2 shows the various elements of cost and determination of selling price of a product.

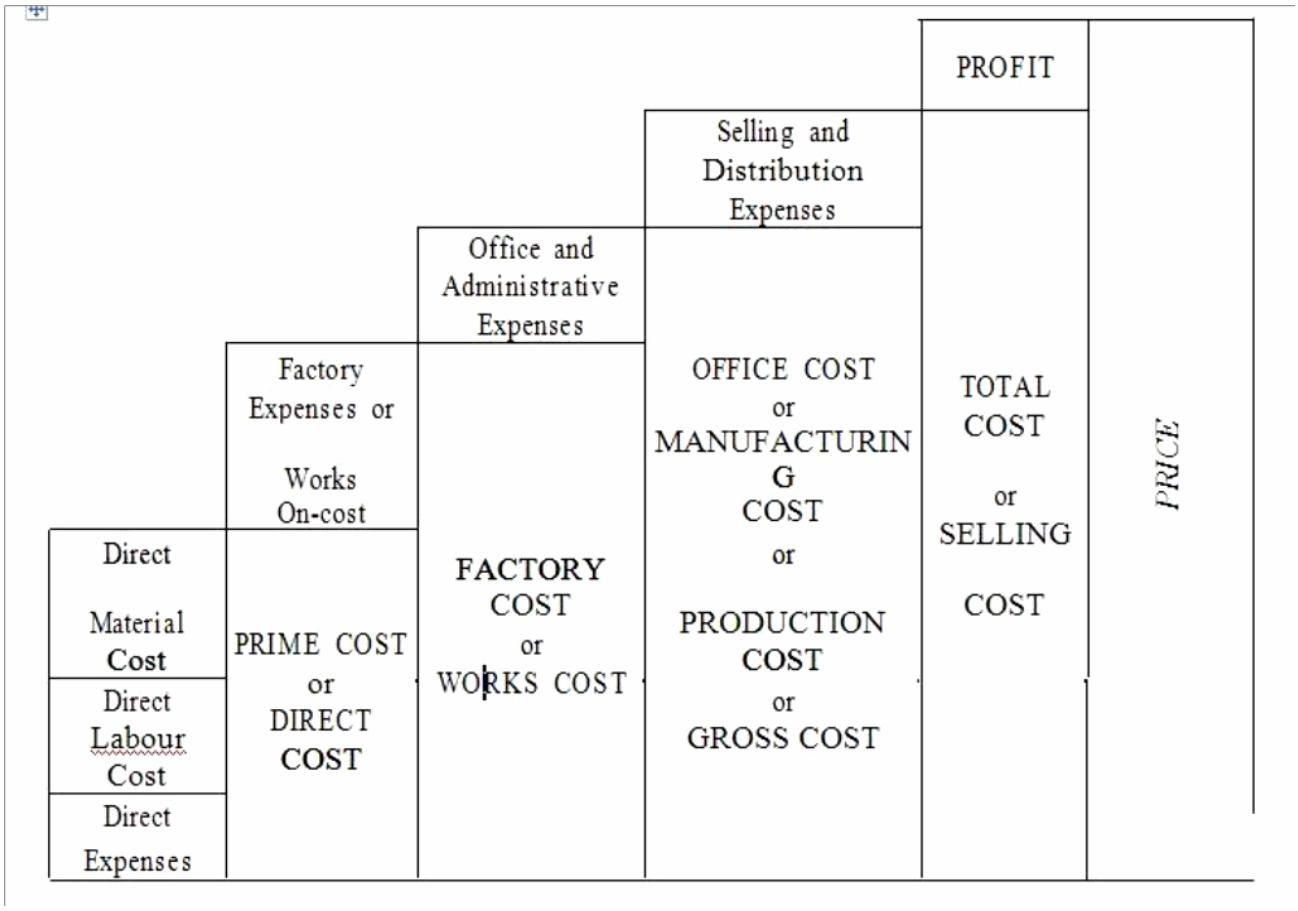

Figure 5.2 : Determination of selling price of the product

Fixed and Variable Costs:

Fixed costs remain constant irrespective of the volume of production. They remain the same whether the production is smaller, larger or nil. Examples for fixed costs are: costs on land, building, salaries to top management, rent of building and insurance, depreciation, taxes on property, interest on the invested capital, etc. Variable costs vary with the volume of production. Variable costs are the function of the output. Higher the production, higher will be the production costs. Variable costs become zero when the production is stopped. Prime costs are generally variable costs. Examples for variable costs are: power or fuel consumed costs of raw materials, labour, packing costs, transportation of finished goods, etc.

Allocation of Overheads:

Once the total overheads are determined, the next step is to allocate this cost over the production. The variation of overheads with production volume should be essentially known from economical aspect of running the firm. Different methods of allocating overheads are as follows:

i. Percentage on Prime cost:

The total overhead or on-cost is expressed as a percentage of prime cost. This percentage is charged on each job being manufactured. This method is more suitable when both direct material and direct labour costs are almost same and where only one type of product is being manufactured.

Percentage on-cost = [Total overheads/Prime cost] x 100

This method does not consider the fact that the material cost has nothing to do with the overheads and the products which require more manufacturing time should have more overhead expenses.

ii. Percentage on direct material cost:

The allocation of overhead is based on the total direct material cost. This method is suitable when the material cost has the major share as in foundries or mines.

Percentage on-cost = [Total overheads/Total direct material cost] x 100

iii. Percentage on direct labour cost:

The allocation of overhead is based on the total direct labour cost. This method is suitable where production is mainly carried out manually (by hand).

Percentage on-cost = [Total overheads/Total direct labour cost] x 100

iv. Man hour or Labour hour rate:

On-cost is expressed in terms of total direct man hour or labour hour spent to finish a job.

Man hour rate = [Total overheads/Total direct man hours or labour hours spent]

v. Machine hour rate:

On-cost is expressed based on the total productive machine hours. The total overheads are distributed over a group of similar machines as explained below: Building rents, taxes, insurance, lighting charges, indirect material and labour costs are distributed based on the floor area occupied by the machines. Power consumed and depreciation charges are measured separately. The expenses of wages paid for the machine idle periods is separately charged from the profit and loss account and not considered in the overheads.

Machine hour rate = [Total overheads/Total productive machine hours]

vi. Combination of man hour and machine hour rate:

It is the combination of man hour and machine hour rate methods. In industries both man and machine should coordinate to finish a job. Whenever a machine is used, machine hour rate is applied and whenever work is done by hand, man hour rate is used.

vii. Unit rate method or production unit basis method:

Cost allocation is done based on number of units produced. This method is applied where only one type of production is carried out.

Overheads per unit = [Total overheads/Quantity of production]

Method of Costing:

The methods of costing that are commonly used to assist the determination of selling price of a product are listed below. The method differs according to the nature of business and types of products manufactured.

Job costing and Order costing

Process costing

Operating cost method

Departmental costing

Unit cost

Job costing or Order costing:

It is concerned with finding the cost of each individual job and then fixing the selling price based on it. Each job has to be planned and its cost is determined separately. The method is adopted in job order industries, special purpose machine units, ship building, fabrication and structural construction, etc.

Process costing:

This method is employed when a standard product is made which involves a sequence of processes. It indicates the cost of a product at different stages as it passes through various processes or departments. It is used in industries like chemical, paper mills, oil refineries, paint and cement manufacturing, etc. By-products and their cost of disposal should also be taken into account while calculating the cost of each manufacturing process and the subsequent selling price.

Operating cost:

This method is used in firms providing utility services like transport, water and electricity boards, railways and airways, etc. The cost is determined on the basis of operating expenses and charges are made in terms of per km, per litre, per kWh, etc.

Departmental costing:

This method is used in industries like steel and automobile, where each department produces independently one or more components. The actual expenditures of each department on various products is entered on a separate cost sheet and the costing of each department is separately undertaken.

Unit cost:

This method is adopted by single product manufacturers who make products such as bricks, cement, milk, etc, than a variety of products. Costing is done on per unit basis.

OUTCOMES:

At the end of the unit, the students are able to:

- Identify the components of costs.
- Obtain selling price of a product based on estimates of costs.

Solve the numerical problems

SELF-TEST QUESTIONS:

1. Find the production cost per crankshaft of a 22 BHP 4stroke oil engine from the following details.
   i. Forging cost per shaft= 0.25Rs
   ii. Iron used per week at a rate of 1Rs/Kg is 3 tons.
   iii. Pay of four operators is Rs 24/day/worker.
   iv. Depreciation of machine is Rs 500/Month.
   v. Transportation cost Rs25/day
   vi. Packing charges for 12 shafts is Rs 3.
   vii. Electrical charges Rs 30/Month.
   viii. Salary of managers and other staff is 1400/Month.

   If 500 crankshafts are produced per month and the factory runs for 26 days in a month. What would be the selling price of each shaft to earn a profit of 20% on Factory cost.
2. Explain briefly standard cost and marginal cost.
3. Explain briefly the components of cost.
4. Explain objectives of costing.
5. What are the different elements of cost? Explain.

FURTHER READING:

1. **Engineering Economy,** Tarachand, 2000.
2. **Industrial Engineering and Management**, OP Khanna, Dhanpat Rai & Sons. 2000
3. **Financial Mangement,** Prasanna Chandra, 7th Ed., TMH, 2004
4. **Finacial Management,** IM PANDEY, Vikas Pub. House, 2002