FOOTWEAR PRODUCTION SUPERVISION

Level IV

Based on February 2019, Version 5 Occupational Standards and February 2020 Version 1 Curriculum

Module Title: - Calculating Product Costing

LG Code: IND FPS4 M08 02020 (1-3) LG (37-39)

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Bishoftu Ethiopia

LG #37	LO #1- Gather information

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Acquiring details of the product requirements.
- Providing details of products and/or services
- Determining delivery point and methods of transportation.
- Recording details

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Obtain the information of the product requirements
- Gather & confirm the products / services to be provided
- Determine the delivery point & methods of transportation
- Recording the details in accordance to the enterprise practice & standards.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet- 1	Acquiring details of the product requirements.

INTRODUCTION:

Product costs are the direct and indirect costs of producing goods or services. For the production of a product, direct costs include materials such as leather, lining, sole, buckle etc. as well as labor directly involved in the production of a pair of shoe. In addition to direct materials and direct labor costs, product costs also include overhead costs related to production. Production overhead includes costs related to the manufacturing facility, such as depreciation of equipment and insurance costs. Product costs exclude the cost of operating activities that are not directly related to production, such as selling and administration.

The ease with which production costs are traced to individual products or services often depends on the degree of customization & nature of business. As illustrated in fig. 1, some goods and services are one of a kind, and some are uniform. Other products require a hybrid process, in which most of the product is uniform but select features are customized.

S. No.	Product or Service	Customized	Hybrid	Uniform
1	Shoes	One-of-a-kind shoe (for, example, customized shoe)	Produced on an assembly line but customer chooses colors amenities high fashion	Produced on a continuous flow assembly line without customer specifications such as formal, canvas etc.
2	Jewelry	Hand-designed and fabricated	Setting a specific diamond into a mass-produced gold ring	Uniform pieces of jewelry produced continuously
3	Accounting and tax services	Income tax research performed for a	Tax services offered by the hour	Mass-produced tax returns

		specific client		
4.	Health services	Hospitals: each patient receives treatment using different resources	Blood donation center	Flu vaccinations

Table 1: Products with Varying Degrees of Customization

Definition of product costs:

Product costs are inventorial costs. These are the costs, which are assigned to the product. Under marginal costing variable manufacturing costs and under absorption costing, total manufacturing costs constitute product costs.

Purposes for computing product costs:

The three different purposes for computing product costs are as follows:

(i) ***Preparation of financial statements:*** Here focus is on inventorial costs.

(ii) ***Product pricing:*** It is an important purpose for which product costs are used. For this purpose, the cost of the areas along with the value chain should be included to make the product available to the customer.

(iii) ***Contracting with government agencies:*** For this purpose government agencies may not allow the contractors to recover research and development and marketing costs under cost plus contracts.

Box1: Definition & purpose of product costing

Classification of the cost:

Classification is the process of grouping costs according to their common characteristics or features. There are various methods of classifying costs on the basis of requirements. The following are the important bases on which costs are classified:

(a) On the basis of Nature (or) Elements.
(b) On the basis of Function.
(c) On the basis of Variability.
(d) On the basis of Normality.
(e) On the basis of Controllability and Decision Making.

(1) On the basis of Nature or Elements: One of the important classification cost is on the basis of nature or elements. Based on elements, it is classified into Material Cost, Labour Cost and Other Expenses. They can be further subdivided into Direct and Indirect Material Cost, Direct and Indirect Labor Cost and Direct and Indirect Other Expenses.

(2) On the basis of Function: The classification of costs on the basis of the various function of a concern is known as function-wise classification. Here there are four important functional divisions in the business organization, viz.: (a) Production Cost (b) Administration Cost (c) Selling Cost and (d) Distribution Cost.

(3) On the basis of Variability: On the basis of variability with the volume of production Cost is classified into Fixed Cost, Variable Cost and Semi Variable Cost; Fixed Costs are those costs incurred which remain constant with the volume of production. Rent and rates of office and factory buildings are examples of fixed cost. Variable costs are those costs incurred directly with the volume of output. For example, cost of materials and wages to workers are the expenses chargeable with direct proportion to the volume of production. Semi-Variable Costs are those costs incurred, partly fixed and partly variable, with the volume of production. Accordingly, it has both fixed and variable features. For example, depreciations and ~maintenance cost of plant and machinery.

(4) **On the basis of Normality:** Costs are classified into normal costs and abnormal costs on the basis of normality features. Normal costs are those incurred normally within the target output or fixed plan.

(5) **On the basis of Controllability and Decision Making:** Based on the managerial decision making and controllability the classifications are as follows: (a) Controllable Cost; (b) Uncontrollable Cost; (c) Sunk Cost; (d) Opportunity Cost; (e) Replacement Cost; and, (f) Conversion Cost.

(a) Controllable Costs: Controllable Costs are the costs which can be influenced by the action of a specified number of an undertaking. Controllable Costs incurred in a particular responsibility center can be influenced by the action of the executive heading that responsibility center. For example, direct materials and indirect materials.

(b) Uncontrollable Costs: Uncontrollable Costs are those costs which cannot be influenced by the action of a specified number of an undertaking. In fact, no cost is controllable; it is only in relation to a particular individual that may specify a particular cost to either controllable or non-controllable. For example, rent and rates.

(c) Sunk Cost: These are historical costs which were incurred in the past and are not relevant to the particular decision making problem being considered. While considering the replacement of a plant, the depreciated book-value of the old asset is irrelevant as the amount is a sunk cost which is to be written-off at the time of replacement. Unlike incremental or decremental costs, sunk costs are not affected by increase or decrease of volume. Example of sunk cost includes dedicated fixed assets, development cost already incurred.

(d) Opportunity Cost: Opportunity costs mean the costs off or going or giving up an opportunity. It is the notional value of going without the next best use of time, effort and money. These indicate the income or potential benefits sacrificed because a certain course of action has been taken. An example of opportunity

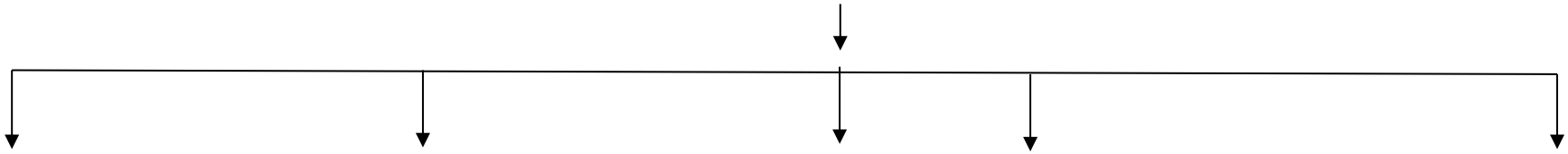
costs is the market value forgone or sacrificed when an old machine is being used.

***(e) Replacement Cost**:* Such expenses may be incurred due to factors like change in method of production, an addition or alteration in the factory building, change in flow of production etc. All such expenses are treated as production overheads; when amount of such expenses is large, it may be spread over a period of time.

(f) Conversion Cost: Conversion Costs are those costs incurred while converting materials into semi-finished or finished goods. It is the aggregate of direct wages, direct expenses and overhead costs of converting raw materials into finished products.

Classification of Cost

(On the basis of)



Nature (or) Elements Controllability	Function	Variability	Normality	Decision Making &
(a) Material Cost	(a) Production Cost	(a) Fixed Cost	(a) Normal Cost	(a) Controllable Cost
(b) Labor Cost	(b) Administration Cost	(b) Variable Cost	(b) Abnormal Cost	(b) Uncontrollable Cost
(c) Other Expenses	(c) Selling Cost	(c) Semi-Variable Cost (or) Semi-Fixed Cost		(c) Sunk Cost
(d) Distribution Cost				(d) Opportunity Cost
				(e) Replacement Cost

(f) Conversion Cost

Chart 1: Classification of the costs

Manufacturing methods & costing systems:

A. **Process Costing:** When goods or services are uniform and are mass-produced, tracing product costs to individual units is generally inefficient, if not impossible. For example, it would be impractical to trace the cost of food ingredients to a single box of breakfast cereal that is mass-produced. **Process costing** allocates both direct and overhead costs to continuous-flow processing lines

It is the approach generally used for mass-produced products. Direct and indirect costs are traced and allocated to production departments, and then allocated to units. Industries that use process costing include food and beverage manufacturers, petroleum refiners, and plastic and metal manufacturers.

B **Job Costing:** When a customer with specific product or service requirements places an order, we call the order a job. For example, a runner may ask a shoe maker to design his shoes as per his body & running requirement. Orders are also placed for batches of product, such as a batch of a particular style and size of men's running shoes sold under the brand name of a retail shoe store. The shoe manufacturer would consider this order a job.

Job costing is the process of assigning costs to custom products or services. Direct materials and direct labor are traced to individual jobs, and production overhead is allocated. Manufacturers that use job costing include aircraft builders, custom motorcycle and automobile manufacturers, and custom designed jewelers, among others. Job costing is also frequently used in service industry organizations such as hospitals, accounting firms, and repair shops.

C. **Batch costing:** It is a variant of job costing. Under batch costing, a lot of similar units which comprises the batch may be used as a 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 the number of units produced in that batch.

Such a method of costing is used in the case of pharmaceutical or drug industries, readymade garment industries, footwear industries, manufacturing electronic parts of T.V. radio sets etc.

JOB COSTING	PROCESS COSTING
A Job is carried out or a product is produced by specific orders.	The process of producing the product has a continuous flow and the product produced is homogeneous.
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.
Each job is separate and independent of other jobs.	Products lose their individual identity as they are manufactured in a continuous flow.
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.
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.
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.

Table 2: Difference between Process & Job costing:

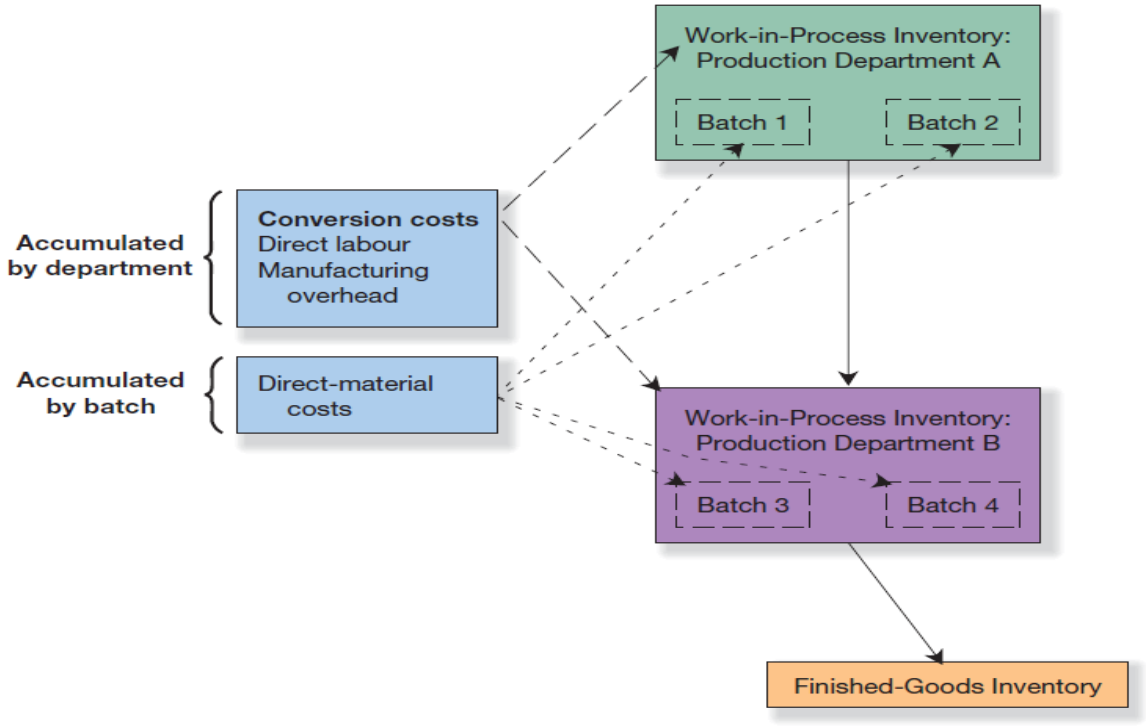


Fig. 1 Operation costing under batch costin

Advantage & disadvantage of batch costing:

There are several advantages of batch production; it can reduce initial capital outlay (the cost of setting up the machines) because a single production line can be used to produce several products. As shown in the example, batch production can be useful for small businesses who cannot afford to run continuous production lines. If a retailer buys a batch of a product that does not sell, then the producer can cease production without having to sustain huge losses. Batch production is also useful for a factory that makes seasonal items, products for which it is difficult to forecast demand, a trial run for production, or products that have a high profit margin.

Production is an organized activity of converting raw materials (RM) into useful products. Production activity takes place in a wide range of manufacturing and service sectors. Production system requires the optimal utilization of natural resources like men (labor), money, machine, materials, and time.

Thus, it is essential that before starting the work of actual production, production planning is done in order to anticipate possible difficulties, and decide in advance as to how the production should be carried out in a best and economical way.

Operation and Production are sometimes used as synonyms but in reality operation is a more comprehensive term, whereas production is a special type of operation in industrial context. Operation could be a fighting a war or a literacy drive among masses or poverty eradication from society and so on.

Production Planning

Production planning is the process of specifying the production procedure to obtain a desired output in a given time at optimum cost and in conformance with specified standards of quality. And control is essential to ensure that manufacture takes place in the manner stated in the plan.

“Production planning is also the determination, acquisition & arrangement of all facilities necessary for future production of items. In other words production planning is essentially a pre- production activity, associated with the design of the production system.

Production control is the corollary to short term production planning or scheduling , and is quite simply concerned with the implementation of production schedules. Production control goes on during production and consists essentially of the steps:

- Initiating production
- Dispatching of items (i.e. establishing priorities between items competing for time on the same facility).
- Progressing
- Reporting back to production planning

Fig. 2: Factory process

1.1 Production process is based on the quantity to be scheduled. To authorize the activities of PPC department for:

- Items manufactured to customers orders , sales order / order acceptance is raised by the sales department , This sales order serves as a communication and authorization for PPC department
- Piece parts & sub assemblies of a product, a stock order are raised by the finished part stores. This stock serves as a formal request to PPC to manufacture item mentioned there in
- Goods manufactured to stock, a “shipment order” is raised by the sales department, the copy of which is sent to the PPC department. PPC department is expected to maintain inventory of finished goods in the company’s warehouse and periodically undertake replenishment action as stocks are depleted.

Product costing evolved in an environment of mass production in the second half of the 20th century as ever more managerial attention was focused on optimizing the production function. Traditional financial accounting approaches have been—and continue to be—based on measurements of fairly rough granularity. For determining corporate profitability, it is sufficient generally to track raw materials, labor, tooling, and energy inputs and to sum these into production costs. Pricing of different products, of course, necessitated finer distinctions so that costs associated with classes of products would be available as a basis for differential pricing. Closer attention to the costs of, for

instance, low-, medium-, and high-end models of a vehicle or a device then proliferated "downward." The costing of composite products required costing of their components. In turn operations on each component might vary. Some might require more or less strength and hence heavier forgings; these in turn might need more or less additional machining. Some components could be attached mechanically, others had to be welded. These operations could be measured in time, time in dollars. A systematic analysis of how a product came to be, the inputs costed as received and then the operations performed on them individually estimated, produced the final cost of production from which receipts from sale of scrap would be deducted to get a net cost. Product costing evolved further from this point by assigning an appropriate percentage of total overhead and also measuring additional costs upstream—such as packaging, warehousing, and delivery to the ultimate buyer.

Product costing is the process of assigning costs to inventory and production based on the expenses that go into producing or buying inventory. It is an especially important process for manufacturers, and there are several potential costing methods that businesses choose for their simplicity, accuracy or other factors. If a business contracts out accounting services, the accounting firm may offer in-depth product costing analysis as part of its service. There are several benefits to such customized costing.

Product costing can be described as a methodology associated with managerial accounting, i.e., accounting intended to serve management in an operational context rather than to measure corporate performance as such, although, of course, any kind of cost accounting, including product costing, contributes to overall results. More specifically product costing is intended accurately to determine the cost of a unit of production (or of a service delivered) by study of every resource used in its creation. The activity is only in part motivated by obtaining an accurate final cost that incorporates all contributing streams. In part it is a way of identifying cost components that can be addressed specifically in order to take cost out of the product by purchasing, redesign, reengineering, retooling, packaging, and other interventions by management at any stages.

The analytical resources made available by such detailed information have made product costing a routine aspect of most significantly-sized manufacturing operations. Product costing data act as feedback to designers, are used in manufacturing management to identify ideal workflow, influence the purchase of tooling, and are used in precise pricing of goods. Product costing is used in most routine production activities, including service occupations, although the level of detail sought is variable and usually determined by the size of the operation. Even in quite small businesses, some level of product costing is practiced in that managements usually know the costs associated with important functions identified with different products.

1.1.1 **Quantity of products** play a major role in fixing product costing as higher the quantity, more time it takes to produce the total order but the raw materials like leather can be tanned easily, insoles in higher quantity can be procured easily, When demand for a product is constant over the year and each new order is delivered in full when inventory reaches zero it is called economic order quantity. There is a fixed cost for each order placed, regardless of the number of units ordered. There is also a cost for each unit held in storage, commonly known as holding cost, sometimes expressed as a percentage of the purchase cost of the item.

We want to determine the optimal number of units to order so that we minimize the total cost associated with the purchase, delivery and storage of the product.

The required parameters to the solution are the total demand for the year, the purchase cost for each item, the fixed cost to place the order and the storage cost for each item per year. Note that the number of times an order is placed will also affect the total cost, though this number can be determined from the other parameters.

1. The ordering cost is constant.
2. The rate of demand is known, and spread evenly throughout the year.
3. The lead time is fixed.
4. The purchase price of the item is constant i.e. no discount is available

5. The replenishment is made instantaneously; the whole batch is delivered at once.
6. Only one product is involved.

EOQ is the quantity to order, so that the sum of ordering cost and holding cost is at its minimum. These costs will be equal to one another at the minimized cost point.

In case of batch costing the form of specific order costing which applies where similar articles are manufactured in batches either for sale or for use within the company. This system is to be utilized when a firm manufactures products in readily identifiable batches or definite lots. A batch is a cost unit which consists of a group of similar articles which maintain its identity throughout one or more stages of production.

Job costing is tailored to meet the customer's specifications whereas batch costing produced inventory for future sale to customer. Furniture making, small tool making, clothing, toys & food processing industries.

Production scheduling tools greatly outperform older manual scheduling methods. These provide the production scheduler with powerful graphical interfaces which can be used to visually optimize real-time workloads in various stages of production, and pattern recognition allows the software to automatically create scheduling opportunities which might not be apparent without this view into the data. For example, an airline might wish to minimize the number of airport gates required for its aircraft, in order to reduce costs, and scheduling software can allow the planners to see how this can be done, by analyzing time tables, aircraft usage, or the flow of passengers.

Companies use backward and forward scheduling to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials.

Forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date. Backward scheduling is planning the tasks from the due date or required-by date to determine the start date and/or any changes in capacity required.

1.1.2 Delivery date plays a major role in planning of the production processes & scheduling is carried out in the organizations for delivery dates. It is an important tool for manufacturing and engineering, where it can have a major impact on the productivity of a process. In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility when to make, with which staff, and on which equipment. Production scheduling aims to maximize the efficiency of the operation and reduce costs. Delivery date plays an important role in product costing, as the buyer requires the commitment from the company or brand from production to the physical delivery of goods. The payment terms are decided on the basis of delivery schedule. The various payment terms decides the cost of the product. Any goods delivered on credit terms will have a higher cost to pay, as it requires the time & investment from the producers' point of view. A delay in delivery of goods might result in penalty from buyer & can thus result in increase of product costing & pricing of the product.

The benefits of production scheduling include:

- Process change-over reduction
- Inventory reduction, leveling
- Reduced scheduling effort
- Increased production efficiency
- Labor load leveling
- Accurate delivery date quotes
- Real time information

Job order – Job order production units are those units which manufacture jobs against customer's order. Typical examples of job production units are ancillary suppliers, large repair shops, foundries, machinists & fabricators.

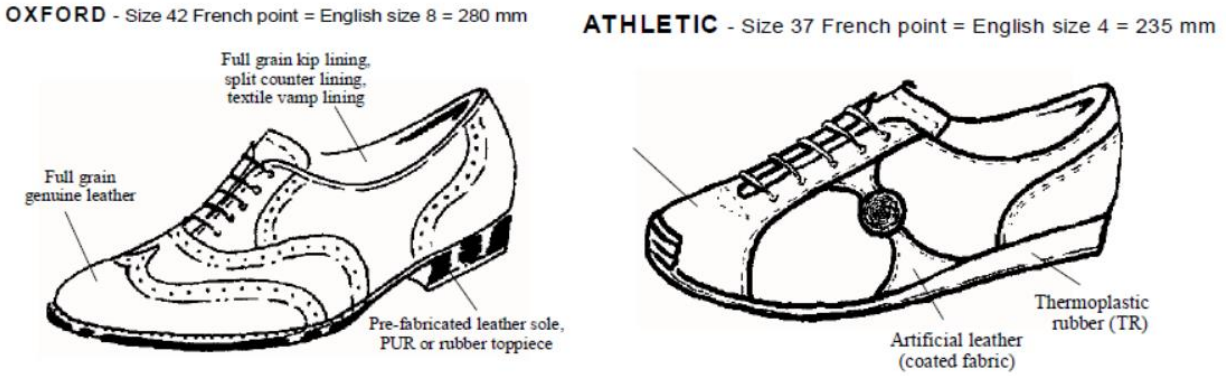
1.1.3 Bill of material:

Definition:

Basically, a bill of material (BOM) is a complete list of the components making up an object or assembly. It is also part of material requirements planning (MRP).

The Bill of Materials (BOM) is the foundation of the Manufacturing Suite and provides the user with a powerful and flexible BOM and production tool, it includes:

The bill of materials/manufacturing functionality makes the task of maintaining detailed bills of components, sub components and expenses for a product easy. Bills can be manually created within the system or imported from external data files.
BOMs can be created, maintained and deleted, and multiple versions of each BOM are possible with user definable names and pictures for each version. Maximum and minimum production limits can be set, and different costing methods are available for different BOMs. Work flows for producing BOM can be managed using powerful stage and work centre functionality. Stages and work centers can be integrated with the scheduling module to provide flexible finite capacity functionality.



How can a BOM be used in your organization?

- Several software programs are available that store item information and prepare bill of materials automatically.

Types of BOMs

- **Static (fixed) bill**

– A bill of material for a part that is normally made from the same components, labor and raw materials.

– Used for standard assemblies, components, and engineer-to-order customer orders.

Example:

– A bill of materials for a standard chair

- **Dynamic (parametric) bill**

– A bill of material for a product or part for which size, color, laminate, and other options can be selected.

Example:

– A bill of materials for a Dell computer

- **Single level bill of material**

– A bill of material that lists the materials, parts and labor required to make another part.

Example:

– A bill of materials to make a Dell computer

- **Multilevel bill of material**

– A bill of material that lists the components, assemblies, and materials required to make a part, the components, assemblies, and materials required to make each component and assembly of the part, and so forth.

Example:

– A BOM for the battery inside the Dell computer.

Structure of a BOM

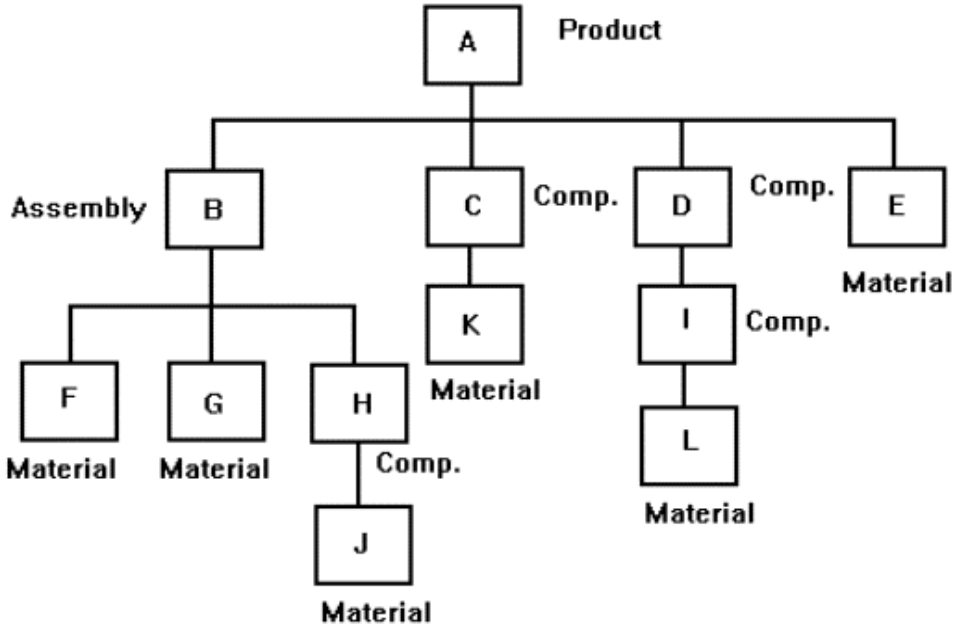


Fig. 3: Structure of BOM

What information is on a BOM?

1. Quantity
2. Item ID#
3. Description of Item
4. Cost of Item
5. Total Project Cost

1. Quantity

Tells user how many of each part is needed for each project

Example:

- A chair needs 1 seat, 4 legs, 1 back, and 5 nails.

2. Item ID #

- Tells us which part to order
- Can be any of the following:
  - Catalog number, UPC, or any other identification number.

Example:

- The chair needs a 2PC seat, 5DR legs, 6TU8 back, and 1 inch nails.

3. Description of Item

- Provides a check that the correct item is being ordered.

4. Cost of Item

- Cost is included to show how much each part is per item and the total cost of all like parts.
- Example:
  - The cost of a leg is $5 per leg. Then the total price of the legs ordered would be $20 because there are 4 legs.

5. Total Project Cost

- Shows the total cost of all items and is also the total cost of the direct materials used in the project.
- Example:
  - Seat-$10, Back-$5, Leg-$5 per leg, Nail-$.5 per nail
  - Total Cost of a chair = 10 + 5 + 5*4 + .5*5 = $37.50

Benefits of a BOM

- Optimize engineering, planning and purchasing efforts by providing centralized and up-to-date information in Make-To-Stock, Repetitive, JIT or Job Shop environments.
- Improve material management by responding to changes in production.
- Reduce inventory levels and obsolete parts.
- Reduce manufacturing costs.
- Minimize clerical and engineering efforts by optimizing the tasks of maintaining and changing multi-level bills.
- What-If capabilities for estimating or quoting.
- Supports variable length part numbers and unlimited descriptive text.
- Easy methods for accessing part information

BOM Example

Quantity	ID#	Description	Unit Price	Total Cost
1	6TU8	Back	$5/Unit	$ 5.00
4	5DR	Legs	$5/Unit	20.00
1	2PC	Seat	$10/Unit	10.00
5	1”	Nails	$0.50/Unit	2.50
			Total Project Cost	$37.50

161kV H-Frame Tangent

Quantity	Catalog No.	Description
2		70-feet Wood Pole
1	DP1-457-156-156	Crossarm Shop Assembly
2	DP1-457-156-156W	Crossarm, 3-5/8" x 9-1/2" x 32'-0", Laminated
3	5860-3545	Adjustable Spacer Filling Assembly, 8-3/4" to 12-3/4“
6	W4104-4S	Bolt, Washerhead, 1/2" x 10-1/2", SN
12	W5050-3S	Bolt, Washerhead, 5/8" x 5", SN
1	41058BS	Bolt, Bent Double End 7/8" x 8", 2SN, 2MF
2	41058BB	Bolt, Bent Machine 7/8" x 6", SN, MF

Project Bill of Materials

Pine Lake Home Sites

Cost Item	Quantity	Cost/Item	Total $

Site Development

Clearing & Grading	1.00 Each	59,429.00	59,429.00
Paving	1.00 Each	114,549.00	114,549.00
Curb & Gutter	1.00 Each	64,232.00	64,232.00
Sanitary Sewer	1.00 Each	158,810.00	158,810.00
Storm Sewer	1.00 Each	61,277.00	61,277.00
Water	1.00 Each	63,602.00	63,602.00
Entrance	1.00 Each	36,000.00	36,000.00
Power & Street Lighting	1.00 Each	9,300.00	9,300.00
Amenity	1.00 Each	270,000.00	270,000.00
Contingency	1.00 Each	35,000.00	35,000.00
		Total Site Development	$872,199.00

Screenshots of BOM Software

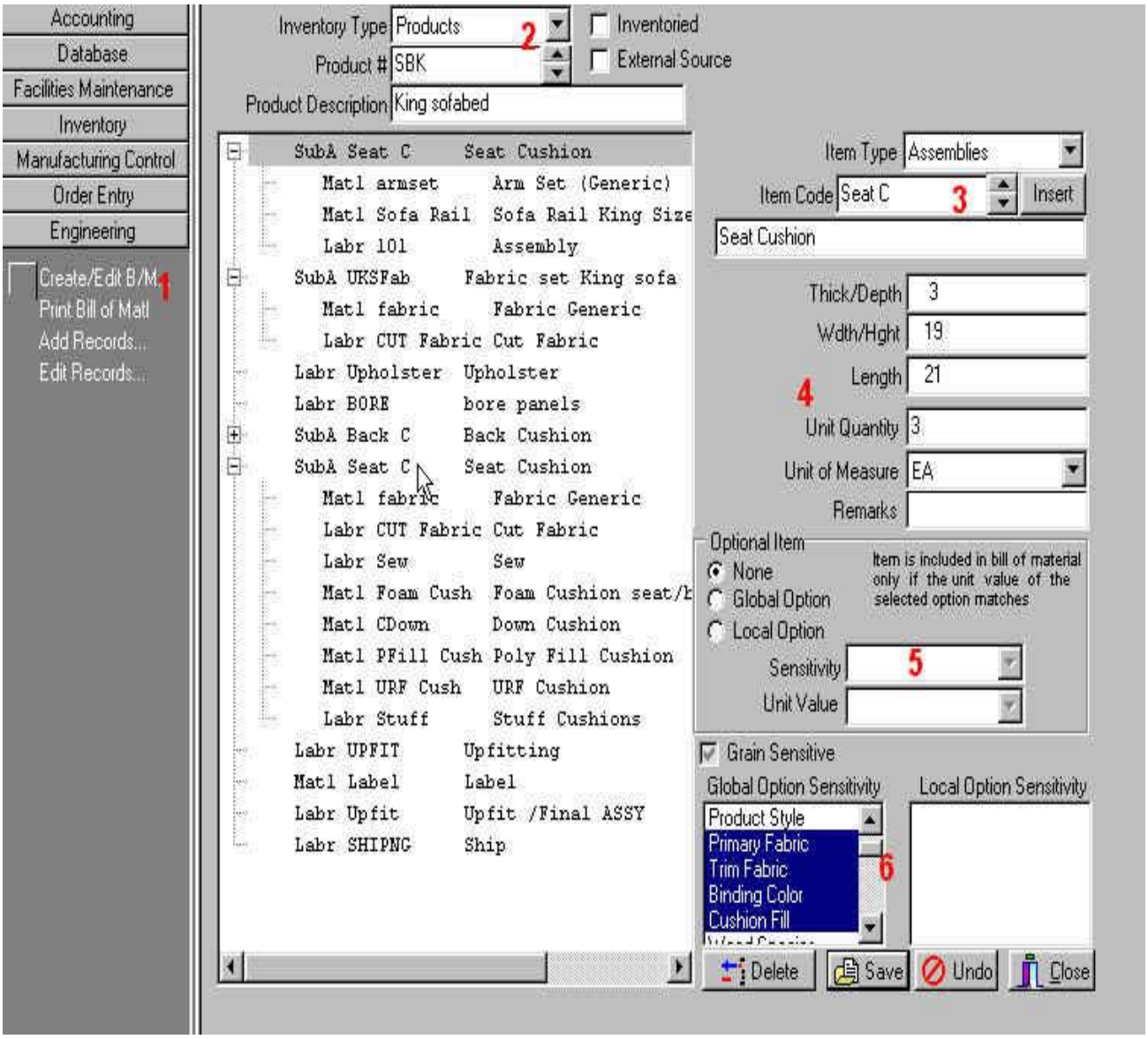


Fig. 4: BOM Software

Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total points: 20)**

1. True or False **(6 points)**

1. Production planning is the process of specifying the production procedure to obtain a desired output in a given time at optimum cost and in conformance with specified standards of quality.
2. Product costing is the process of assigning price to inventory and production based on the expenses that go into producing or buying inventory
3. Quantity of products play a major role in fixing product costing as higher the quantity, more time it takes to produce the total order.
4. In case of batch costing the form of specific order costing which applies where different articles are manufactured in batches either for sale or for use within the company.
5. Job costing is tailored to meet the customer's specifications whereas batch costing produced inventory for future sale to customer.
6. Delivery date plays a major role in planning of the production processes & scheduling is carried out in the organizations for delivery dates.

2. Short answers questions: **(14 points)**

1. What is product costing (2 points)

2. How does economic order quantity affects the product costing (2 points)

3. What are TQM principles? (2 points)

4. Explain briefly about bill of materials (BOM) (2 points)

5. Explain briefly the benefits of production scheduling (2 points)

6. Write a small note on quality. (2 points)

7. State the difference between forward & backward scheduling (2 points)

Note: **Satisfactory rating - 10 points and above Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-2	Providing details of products and/or services

Shoe Making- How Shoes are made

Footwear can be defined as garments that are worn on the feet. Their main purpose is protecting one's feet. Of late, footwear has become an important component of fashion accessories. Although, their basic purpose remains that of protection, adornment or defining style statement has become their additional and a significant function. There are many types of footwear- shoes, boots, sandals, slippers etc. They are further categorized into many more types.

Shoes and Shoe making

Shoes are further divided into many categories such as athletic shoes also known as sneakers, galoshes, high heels, Stiletto heels, kitten heels, lace-up shoes, high-Tops, loafers, Mary Janes, platform shoes, school shoes and many others. Shoemaking can be considered a traditional handicraft profession. However, now it has been largely taken over by industrial manufacture of footwear. A variety of materials are used for making shoes- leather fabrics, plastic, rubber, fabrics, wood, jute fabrics, and metal. More than 200 operations are required for making a pair of shoes. However, with the development of modern machines, a pair of shoes can be made in very less time as each step in its manufacturing is generally performed by a separate footwear making machine.

Parts of a Shoe

A shoe consists of sole, insole, outsole, midsole, heel, and vamp (upper). They are the basic parts of a shoe that are mostly included in all types off shoes. Other parts of a shoe are lining, tongue, quarter, welt and backstay. These parts are included as per the design of the shoes.

Sole: The exterior bottom part of a shoe is the sole.

Insole: The interior bottom of a shoe, which sits directly beneath the foot, is its insole. They can be removable and replaceable too. In some of the shoes, extra insoles are often added for comfort, health or other reasons, such as to control the shape, moisture, or smell of the shoe.

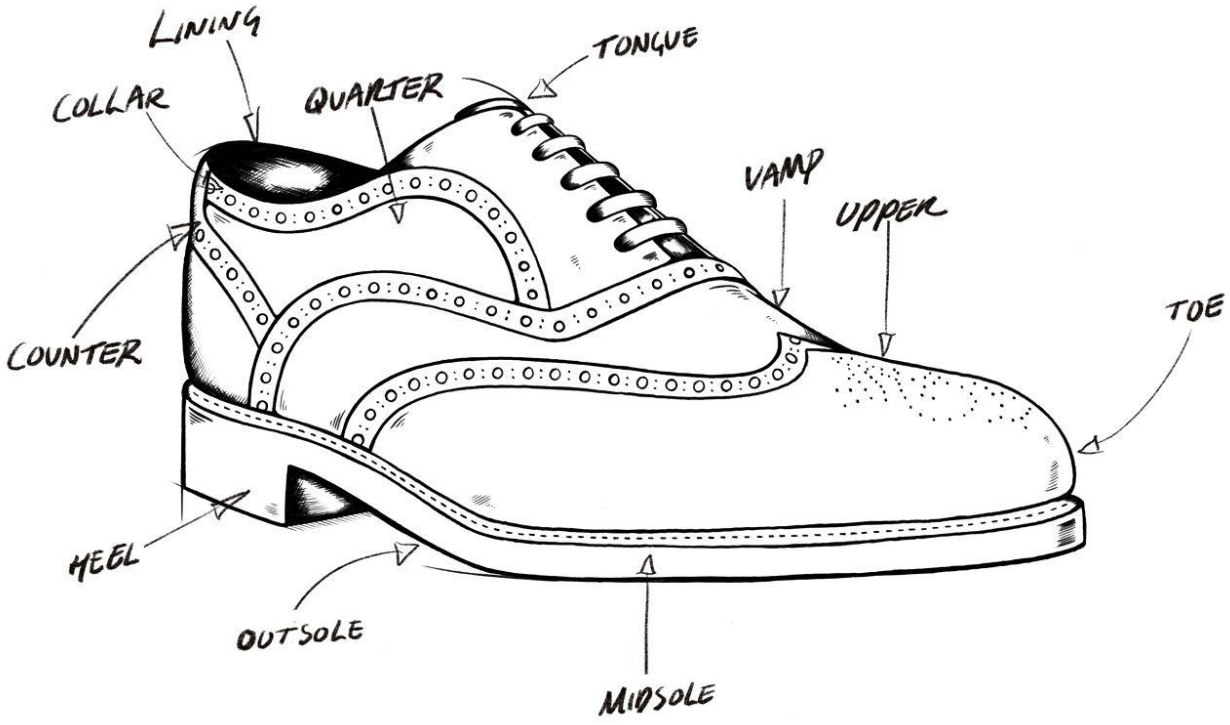
Outsole: It is that layer of the shoe that is in direct contact with the ground. These can be made of various materials like leather, natural or synthetic rubber etc. Often the heel of the sole is made from rubber for durability and traction and the front is made of leather for style. Special purpose shoes often have refined modifications, for example, athletic cleats have spikes embedded in the outsole to grip the ground, dance shoes have much softer or harder soles.

Midsole: The layer that lies between the outsole and the insole for shock absorption, is the midsole. Some special shoes, like running shoes have other materials for shock

absorption, that usually lie beneath the heel where one puts the most pressure down. Materials used for midsoles depend on the shoe manufacturers. Some shoes can be made even without a midsole.

Heel: The rear part at the bottom of a shoe is the heel. It supports the heels of the feet. Heels of a shoe are often made from the same material as the sole of the shoe. It can be high for fashion purpose or for making a person look taller. They are also flat for comfort and practical use.

Vamp or upper: The upper part of a shoe that helps in holding the shoe onto the foot is the vamp or simply called the upper. This part is often embellished or given different styles to make shoes attractive.



Shoe Making Process

A footwear company has mainly four departments in which a progressive route is followed for producing finished shoes. This are- Clicking or Cutting Department, Closing or Machining Department, Lasting & Making Department, Finishing Department and the Shoe Room.

Clicking or Cutting Department

In this department, the top part of the shoe or the "upper" is made. The clicking operative is given skins of leather, mostly cow leather but not restricted to this type of leather. Using metal strip knives, the worker cuts out pieces of various shapes that will take the form of "uppers". This operation needs a high level of skill as the expensive leather has to be wasted at the minimum level possible. Leather may also have various defects on the surface such as barbed wire scratches which needs to be avoided, so that they are not used for the uppers.

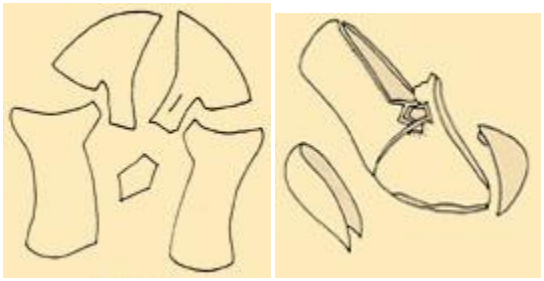


Fig. 11: Upper Cutting

Closing or Machining Department

Here the component pieces are sewn together by highly skilled machinists so as to produce the completed upper. The work is divided in stages. In early stages, the pieces are sewn together on the flat machine. In the later stages, when the upper is no longer flat and has become three-dimensional, the machine called post machine is used. The sewing surface of the machine is elevated on a post to enable the operative to sew the three dimensional upper. Various edge treatments are also done onto the leather for giving an attractive look to the finished upper. At this stage only, the eyelets are also inserted in order to accommodate the laces in the finished shoes.

Lasting & Making Department

The completed uppers are molded into a shape of foot with the help of a "Last". Last is a plastic shape that simulates the foot shape. It is later removed from the finished shoe to be used further in making other shoes. Firstly, an insole to the bottom of the last is attached. It is only a temporary attachment. Sometimes, mostly when welted shoes are manufactured, the insole has a rib attached to its under edge. The upper is stretched and molded over the last and attached to the insole rib. After the procedure completes, a "lasted shoe" is obtained. Now, the welt- a strip of leather or plastic- is sewn onto the shoe through the rib. The upper and all the surplus material is trimmed off the seam. The sole is then attached to the welt and both are stitched together. The heel is then attached which completes the "making" of the shoe.

That was the process for heeled shoes. When a flat shoe is in the making, there are considerably fewer operations. The insoles in this case is flat and when the uppers are 'lasted', they are glued down to the surface of the inner side of the insole. The part of the upper, that is glued down, is then roughed with a wire brush to take off the smooth finish of the leather. This is done because rough surface absorbs glue to give a stronger bond. The soles are usually cut, finished and prepared as a separate component so that when they are glued to the lasted upper, the result is a complete and finished shoe. Soles can also be pre-molded as a separate component out of various synthetic materials and again glued to the lasted upper to complete the shoe.

Finishing Department and the Shoe Room

The finishing of a shoe depends on the material used for making it. If made of leather, the sole edge and heel are trimmed and buffed to give a smooth finish. To give them an attractive finish and to ensure that the edge is waterproof, they are stained, polished and waxed. The bottom of the sole is often lightly buffed, stained and polished and different types of patterns are marked on the surface to give it a craft finished look. A "finished shoe" has now been made.

For shoe room operation, an internal sock is fitted into shoe which can be of any length- full, half or quarter. They usually have the manufacturers details or a brand name

wherever applicable. Depending on the materials used for the uppers, they are then cleaned, polished and sprayed. Laces and any tags that might have to be attached to the shoes, such as shoe care instructions, are also attached. The shoes, at last, get packaged in boxes.

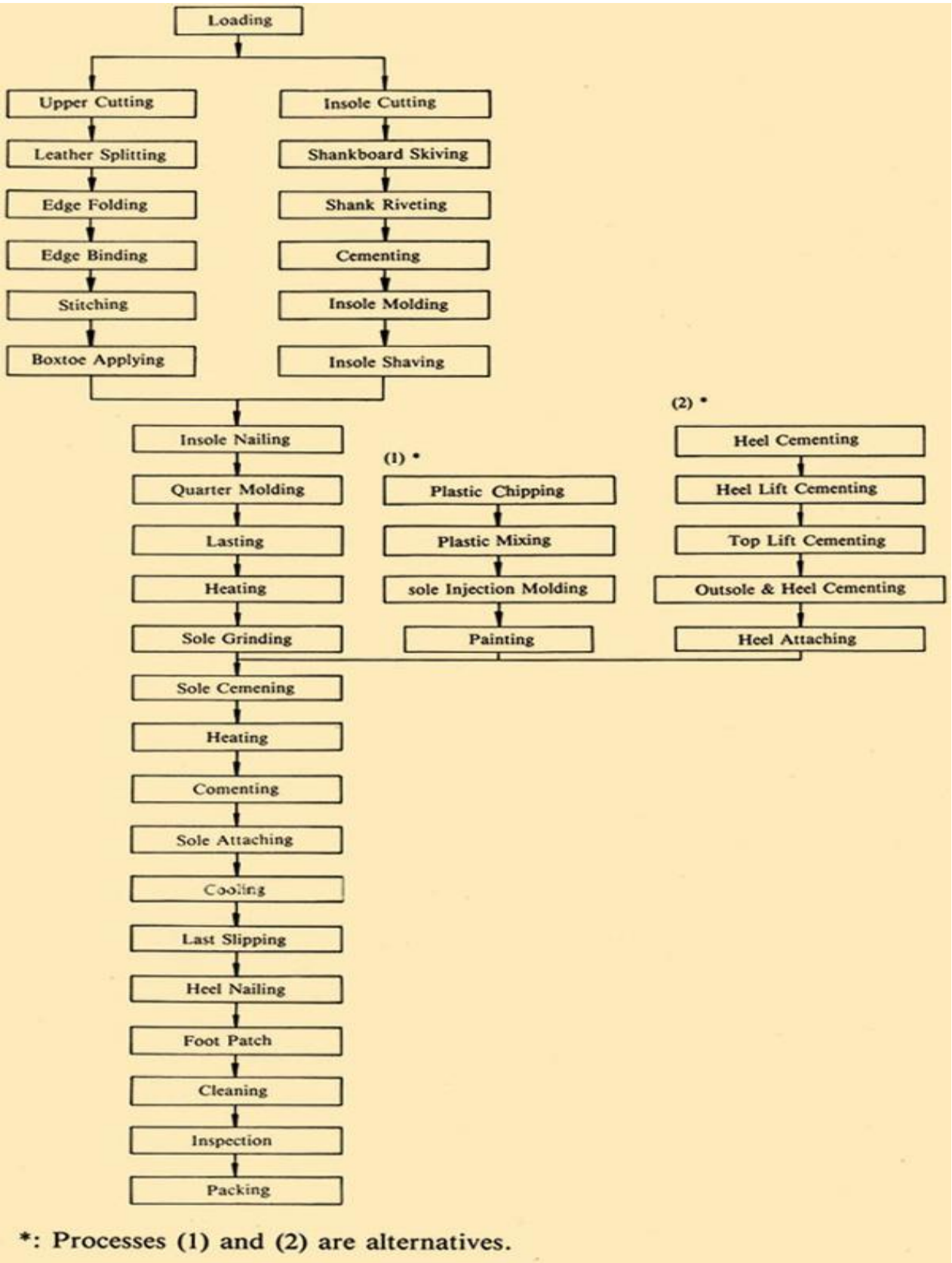
1.5.2 FLOW CHART –

A flowchart is a formalized graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure. The purpose of a flow chart is to provide people with a common language or reference point when dealing with a project or process.

Flowcharts use simple geometric symbols and arrows to define relationships. In programming, for instance, the beginning or end of a program is represented by an oval. A process is represented by a rectangle, a decision is represented by a diamond and an I/O process is represented by a parallelogram. The Internet is represented by a cloud.

In other words we can say:

Flow chart is a schematic representation of a sequence of operations, as in a manufacturing process or computer program. It is also called *flow diagram*, *flow sheet*.


Loading
Upper Cutting
Leather Splitting
Edge Folding
Edge Binding
Stitching
Boxtoe Applying
Insole Cutting
Shankboard Skiving
Shank Riveting
Cementing
Insole Molding
Insole Shaving
Insole Nailing
Quarter Molding
Lasting
Heating
Sole Grinding
(1) *
Plastic Chipping
Plastic Mixing
sole Injection Molding
Painting
(2) *
Heel Cementing
Heel Lift Cementing
Top Lift Cementing
Outsole & Heel Cementing
Heel Attaching
Sole Cemening
Heating
Comenting
Sole Attaching
Cooling
Last Slipping
Heel Nailing
Foot Patch
Cleaning
Inspection
Packing
*: Processes (1) and (2) are alternatives.

1.5.3 ALTERNATIVE PATH - Alternative path is the path which can be followed if there are complex projects, which requires a series of activities that can be performed in parallel with other activities.

In the example of flow chart given above there are two alternate path of material. We have to follow these paths parallel with other activities. These alternate paths are:

Alternate 1

1. Plastic chipping
2. Plastic mixing
3. Sole injection molding
4. Painting

Alternate 2

1. Heel cementing
2. Heel lift cementing
3. Top lift cementing
4. Outsole & heel cementing
5. Heel attaching

Self-Check 2	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total Points: 20)**

State True or False **(10 points)**

1. Information regarding the sequence of the operations must be available in the production unit.
2. The information should not be present in the production floor about the alternatives available in case if the sequence cannot be followed due to any reasons like non availability of material
3. Sequence of material requires information about the succeeding & preceding operations in a factory.
4. The planning of material according to the sequence of operation should not be done so that the idle time is not given for machine & labour.
5. As in case of Toe cap oxford the same design or footwear can also be manufactured by following other sequence of operations , where two operation can be done simultaneously
6. There should not be enough flexibility in the production processes & layout of the factory in order to increase cost effectiveness & loading & scheduling of the line & worker in the industry.
7. The planning of material according to the sequence of operation must be done so that the idle time is not given for machine & labor.
8. The flow chart explains the flow of manpower in the direction as defined.

9. To fix sequence of operations the process engineer should begin his process with the qualifying operations.
10. The process should not route through critical operations & secondary operations carry it through qualifying operations & finally end up with auxiliary operations

Short answers: **(10 Points)**

1. Explain briefly sequence of operation in your own words (2 points)
2. List the path of material in footwear industry (2 points)
3. What is alternative path of sequence of operation (2 points)
4. What is the first step to fix sequence of operation (2 points)
5. Draw a flow chart of the process carries out on the leather received from the tannery (2 points)

Note: **Satisfactory rating - 10 points and above** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-3	Determining delivery point and methods of transportation.

INTRODUCTION

Work Transportation

For high production units material flow from one workstation to another is very important as this takes lot of time and can disturb the desired output if the material is not feeded on time at different work stations. Various methods are adopted by production units to transport the material to different workstations. Material handling is important to control the production.

Raw material, semi-finished, work in progress or finished products can be transported by bins, trolleys or conveyors to various locations in the factory. Production units adopt any of these methods as per the capacity of the factories, which they find most suitable to transport the material. These transportation techniques have their own advantages and disadvantages.

The main methods of transportation are as follows:

i) Basket/Bins
ii) Trolleys
iii) Transporters
iv) Conveyors

i) Basket/Bins

In this method basket or bins are used to move the material from one workstation to another. Batch of 10 –12 pairs are put in one basket. A full time feeder is required to move the basket to different workstations that collect the basket from the operator when he finishes his operation and then move it to another operator for the next operation or

the operator himself will pass on the basket to the other worker on completion of his work. The salient points of this system are:

- Manual transportation process
- Machinery can be in any order. However, it is best to have some sort of sequence
- A place should be allocated for basket storage.
- The batch size of preferably 10-12 pairs determines the basket size.
- Baskets are inexpensive.
- More than one style can be in progress at the same time.
- Work can be split, e.g. in a footwear stitching section, the linings and outsides can be sent to different operators within the section and they can be re- joined at another operation.
- Requires a high work in progress. Work in progress means the total no. of pairs on the floor, at the end of a normal working day.
- Baskets are heavy to carry around (depending upon the lot size). Both supervisor and the operators become tired by the end of the day.
- It is easy for the work to become lost if it is a complicated job as operators can hide a basket of work under an easier job and keep on working by placing other baskets on top of it, as a result of which, it never moves or progresses through the section, creating production sequence shortages.
- Baskets can have ribbons attached or the rim can be painted in different colors to denote the production sequence.

  e.g. Colors day planning for production sequence:

Mon	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**
Black	Red	Green	Blue	Brown	Yellow

ii) Trolleys

In this system trolleys of different sizes are used to move the upper to different workstation. Trolley is easier to move in the shop floor and can contain several trays.

A batch of 10 to 12 pairs is put in each tray. Trolleys are moved to different workstation after the completion of work at one work station. Each trolley will hold uppers of one style only. The salient points of this system are:

- The trolley is approximately: 1” Wide x 2” Long, 4” deep trays, 6” between trays, 3 trays per trolley. This gives space for 10- 12 pairs/ tray= 30- 36 pairs per trolley. Hence, 28 trolleys are required for a day’s work of 1000 pairs.
- A colored card identifies the day’s work in daily sequence as per the basket system.
- The machinery and manual workstation should be placed in clusters to avoid back tracking. Although with some designs, it is almost impossible to avoid back- tracking.
- The cluster areas should be marked out on the floor leaving enough room for trolley storage. Signs can also be hung from the ceiling.
- The footwear being processed should have a sequence card made for each individual style. This is placed on the side of each trolley. Only that style of footwear could be loaded on that particular trolley.
- Handling frequency is less than that of the basket system, with the operator completing 30- 36 pairs before the trolley is moved on.

iii) Transporters

Material handling requires too much of manual movement which cause too much wastage of time and loss of production. To overcome the difficulty in handling of the goods gravity conveyor or motorized/powered conveyors are now commonly used in many factories. Material can be moved from zone to zone under the gravity flow or through a powered conveyor.

Gravity Transporter

It is an economical and efficient means of transporting product where power is not required. It can be easily installed, dismantled and relocated. Material is moved from zone to zone or workstation-to-workstation under gravity flow by manual push. Such conveyors are useful in upper section or packing section in shoe factory. Gravity conveyors can have skate wheel or roller to convey the good to different location under the gravity flow. These conveyors can have curve shapes as well to suit the production requirement. These conveyors can be engineered to carry light, medium and heavy weight and can have variety of length and width.

Fig. 11: Gravity roller conveyor

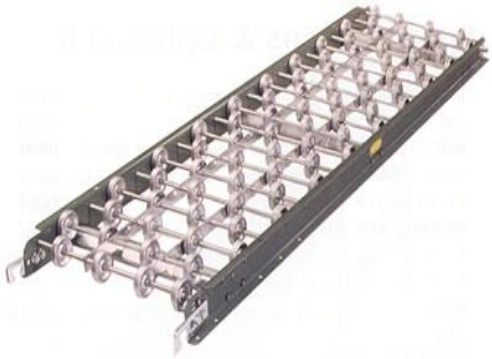


Fig. 12: Gravity skate wheel conveyor

In closing section of the footwear manufacturing such conveyor can be classified as Feeder-Operator-Operator as feeder just feeds the work initially then operator himself moves the work by manual push to next operator after completion of the work.

Motorized Transporter

Such transporter requires power driven roller or belt. This type of conveyor can handle heavier load and can be driven at various speed. These roller and belts also provides a solid surface for people working with products - helping to improve efficiency. Such conveyor can also move products up an incline, delivering reliable transportation between different conveying elevations. This type of transporter in the closing section of

the footwear manufacturing, requires a full time feeder who feeds the work to different operators and receive the finished work from them through the powered belt.

The basic system of a motorized transporter consists of a conveyor belt used in the transferring of the boxes from the dispatching point to the workstations and a series of work stations situated on either side of the conveyor belt whose distance in between, is determined by the size of the work tables as well as the size of the boxes.

iv) Shoe conveyor

Fig. 13: A mechanized footwear conveyor

The conveyor is majorly used in the lasting section of the footwear manufacturing process. It provides a systematic production process. Apart from improving skill, quality, production, it also saves time. It requires a minimum space to avoid over crowd on the production floor. Minimum maintenance is required. Better lighting and air pipe distribution system is present on the Y bars.

Modular Systems are other systems of transportation. Popular in this are the Just in time or JIT and Kanban system

Just-In-time manufacturing, or JIT, is a management philosophy aimed at eliminating manufacturing wastes by producing only the right amount and combination of parts at the right place at the right time. This is based on the fact that wastes result from any activity that adds cost without adding value to the product, such as transferring of inventories from one place to another or even the mere act of storing them.

The goal of JIT, therefore, is to minimize the presence of non-value-adding operations and non-moving inventories in the production line. This will result in shorter throughput times, better on-time delivery performance, higher equipment utilization, lesser space requirement, lower costs, and greater profits.

Kanban systems are often associated with JIT implementation. In fact, some people have the impression that JIT requires the use of a Kanban system. Having a Kanban system is not a strict requirement of JIT implementation, but its use as a tool for practicing JIT has become quite popular owing to its simplicity.

The Japanese refer to Kanban as a simple parts-movement system that depends on cards and boxes/containers to take parts from one workstation to another on a production line. Kanban stands for Kan- card, Ban-signal. The essence of the Kanban concept is that a supplier or the warehouse should only deliver components to the production line as and when they are needed, so that there is no storage in the production area. Within this system, workstations located along production lines only produce/deliver desired components when they receive a card and an empty container, indicating that more parts will be needed in production. In case of line interruptions, each workstation will only produce enough components to fill the container and then stop.

In addition, Kanban limits the amount of inventory in the process by acting as an authorization to produce more inventories. Since Kanban is a chain process in which orders flow from one process to another, the production or delivery of components are pulled to the production line. In contrast to the traditional forecast oriented method where parts are pushed to the line

There are two main types of Kanban (some other variations are also used):

(i) Production Kanban (P-Kanban): signals the need to produce more parts.

(ii) Conveyance Kanban (C-Kanban): signals the need to deliver more parts to the next work center (also called a “move Kanban” or a “withdrawal Kanban”).

1.6.2 SET UP TIME - the time it takes to change over a tool, die, mold, paint or resin in a process step. The time is calculated by starting at the end of the last good part made and stopping at the end of the next good part made. It affects the time to produce the goods & also the costing of the product. The total amount of time required to change the parts / spare parts / tools of the machine to set it up for the next operation / style is calculated. Higher the amount of set up time lower is the productivity.

As in case of toe lasting machine, the amount of time required to change the toe band for ladies footwear to gents footwear will be recorded in set up time. Similarly in insole molding machine, the time required to change a pair of mould will be the set up time for that machine. In closing section there are some operations which require fixing of some gadgets on the machine like thread trimmer, lining trimmers etc. , the time required to set up the machine is set up time .

STANDARD TIME - Standard time is the amount of time it should take a qualified worker to complete a specified task, working at sustainable rate, using given methods, tools and equipments, raw materials and work place arrangements.

Standard time is useful from the perspective of product costing as ultimately the time taken to complete a task will help to plan the production process & product costing will be derived from the same.

It also employs the following common types of work measurement techniques

1. Stopwatch time study
2. Historical times
3. Predetermined data
4. Work Sampling

Stopwatch time study is used to develop a time standard based on observations of one worker taken over number of cycles. That is then applied to work of others of the same organization who perform the same work. The basic steps in stop watch time study include

1. Define the task to be studied and inform the workers who be studied.
2. Determine the number of cycles to observe.
3. Time the job and rate the workers performance
4. Compute the standard time

The standard time for an element or a job is calculated as follows:

$$\text{Standard time} = \frac{(\text{observed time} \times \text{Rating}) \times \text{percent total allowance}}{100}$$

For example where the worker is observed to be working at greater than the standard rate, the three element times may bear a relationship to one another. The standard minute is the unit of measurement of work, consisting partly of work & partly of relaxation. It represents the output in one minute if the work is performed at a standard rate. By means of work measurement we can express the work content of jobs in terms of single units – standard minutes (SM's) irrespective of the differences between the job themselves. SM is a measure of work and not a measure of time . It is connected with time only in that one SM of work will take one minute of time at 100 performance . SM's can there be used in calculating wages & performance. Performance can be measured in

$$\frac{\text{Output of work in SM's}}{\text{Total labor time in minutes}}$$

Self-Check 3	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total Points: 20)**

1. State True & false **(5 points)**

1. Period required to prepare a device, machine, process or system for it to be ready to function or accept a job is set up time & it is subset of cycle time
2. Methods Study or Work study is the management technique to investigate all the factors defeating the efficiency and economy of an organization under review in order to improve it.
3. The time taken for doing the job by the best way can be measured and set as a standard time
4. Through observation and analysis, an industrial engineer or technician defines and documents the standard method and determines the time standard for performing the task, including nonproductive allowances
5. Stopwatch time study is used to develop a time standard based on observations of one worker taken over number of cycles

Short answers: **(15 points)**

1. Give one example of JIT (1 point)
2. What is operation time (2 points)
3. What is set up time (2 points)
4. How many types of Kanban systems are there in Toyota (2 points)
5. What are various results of applying JIT (2 points)
6. Explain standard time (2 points)

7. Give the formula to calculate the standard time for an element or a job

   i. (2 points)

8. What are the advantages of MTM (Methods time measurement) (2 points)

Note: **Satisfactory rating - 10 points and above Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-4	Recording details

Cost Sheet

A document that reflects the cost of the items and services required by a particular project or department for the performance of its business purposes. For example, a deparmental cost sheet might include the material costs, labor costs and overhead costs incurred over a given time frame by a department and it therefore provides a record of costs that are chargeable to that department.

Product Costing

The force behind the survival of any business is the policies implemented by the management. The process of establishment of a business itself is the biggest factor that leads to the success or failure of the same.

Offering right product at right price is vital to create demand. A lot of costs are involved before, during and after the process of manufacturing which affect the cost of the end product. No matter how so ever small the expenditures, their involvement in the cost of the end product can be phenomenal. Therefore, no cost incurred during production should go unaccounted.

The manufacturing process of the footwear involves a number of different materials in common. The involvement of manpower is also characterised by the fact that some manpower is involved in production and the other supports them without getting involved into the process. The range of the product is generally quite large thus adding problems in deciding product cost.

Selling price of a product may be driven by various cost factors, market situation, policies of the state or other strategic factors but it must recover the Material Cost, Labour Cost and Over Heads incurred to produce the product. Hence, determination of the correct "Product Cost" is a vital issue for any successful business.

This handout aims to set forth a firsthand knowledge to a footwear manufacturer to estimate the cost element on his product on which the sale price could be based.

The foundation of the costing system depends on a proper understanding of the items to be included in total cost and nature of each element. Some costs vary directly in relation to the changes in the volume of the output and are called Variable costs others are anyhow involved with the firm irrespective of the volume of the output and are termed as fixed costs.

STYLE NO.	**LAST NO**	**MENS/ LADIES/ CHILDREN**			
001	**H 17774**	**MEN'S**			
TYPE OF SHOE	**CUSTOMER**	**COSTING SIZE**			
MEN'S OXFORD		**8**			
PRICE VALIDITY	**FROM**		**TO**		
CURRENCY RATE	**ETB**				
SHOE COMPONENTS	**AMOUNT**	**UNIT**	**PRICE**	**UNIT**	**COST (ETB)/PRS.**
Upper material(Cow F.G. 1.2-1.4)		Sq. Ft.		Sq. ft.	
Lining Material (Goat natural0.7-0.9)		Sq.Ft.		Sq. Ft.	
Socks half/Full		Sq.Ft.		Sq. Ft.	
Interlining Textile		Mtrs		Mtrs.	
Needles (34 LR &134 PCL)		Prs./Needle		Needle	
Thread (60/3)		Mtr/.prs.		Mtr	
Thread (40/3)		Mtr./prs		Mtr.	
Thread		Mtr/Prs.		Mtr.	
Tapes (Top line-2 mm)		Mtr/prs		Mtrs.	

Tapes (20mm wide)		Mtr/prs		Mtrs.	
Tapes		Mtr/prs.		Mtr.	
Laces		Prs.		Prs.	
Elastic		Mtrs/Prs		Mtrs.	
Eyelet (Brass Blend)		Pcs.		Pcs	
Metallic Trimms		/Prs.			
Consumables, thermo adhesive for folding, rubber sol. Etc.					
Counter		Sheet		Sheet	
Toe puff		Sheet		Sheet	
Unit sole of leather/TPR/TR/Rubber					
Insole					
Shoe consumables Tacks/Glue/Finish					
Shoe Box					
Shoe carton					
Strap/ labels					
Total Material Cost					
Provision for rejection (5%)					
Total Material Cost					
Provision for rejection (5%)					
Direct labour					
Overheads					
Total Cost					
Commission & sales expenditure(20%)					
Margin (10%)					
Price					
(Excluding commission & incl. Freight, advt, sales- 5%)					

Price	

There are following broad elements of Cost:

Material:

The Substance from which the product is made is known as material. It may be in a raw or a manufactured state. It can be direct as well as indirect.

Direct Material: All materials which become integral parts of the finished product and which can be conveniently assigned to specific physical units are termed as direct materials and are variable in nature.

Indirect Material: All materials which are used for purposes ancillary to the business and which cannot be conveniently assigned to specific physical units is termed as Indirect Material and are fixed in nature.

SR.NO	MATERIAL CODE	Material Name	CATEGORY	UOM	REMARKS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

Labour:

For conversion of materials into finished goods, human effort is needed; such human factor is called Labour. Labour can also be direct or indirect.

Direct Labour: Labour which takes an active and direct part on production of a particular commodity is called direct Labour. Direct labour costs are, therefore, specifically ands conveniently traceable to specific products and are variable in nature.

Indirect Labour: Labour employed for the purpose of carrying out tasks incidental to goods or services provided, is indirect labour. Such labour does not alter the construction, composition or condition of the product. It cannot be practically traced to

specific units of output. Wages of storekeepers, foremen, timekeepers, salaries of supervisors, designers etc. come under this category and are fixed in nature.

Labour cost can be calculated by following ways:

Formula for calculating the piece rate:

Rate paid per unit of production × Number of units completed in the pay period

Method of calculating the monthly payment:

LABOR COST CALCULATION						
LINE ----------						
ARTICLE: ----------		**DAY/OUTPUT: ----------PAIR**				
ONE MONTH: ------- DAYS		**TOTAL PRODUCTION IN A MONTH: ---------- PAIRS**				
SR. NO	**OPERATION**	**PROPOSED MANPOWER**	**TYPE OF MANPOWER**	**SALARY/MONTH/MANPOWER**	**SALARY/MONTH/OPERATION**	**SALARY/PAIR/OPERATION**
1						
2						
3						
4						
5						
6						
7						
8						
9						

10						
11						
12						
13						
14						
15						
16						
	TOTAL					

NOTE: It is assumed:
SKILLED OPERATIOR:---------- BIRR
SEMI-SKILLED: ---------- BIRR
UNSKILLED: ---------- BIRR

Tooling

Tooling: Under this head we include the items which are used for making shoe like shoe designer's tool kit, shoe making tool kit, machine maintenance & electricians tool kit, clicking dies, pvc lasts, clicking pads, spray gun, testing equipments, thickness gauge, measuring scale, workshop tables, racks, other furniture and equipments etc.

Cost calculation of tools & equipments:

Sr.No.	Description	Ind/Imp.	Qty.	Price	Total Value
				ETB	ETB
1	Shoe designer tool kit	-----	-----	-----	-----
2	Shoe making tool kits	-----	-----	-----	-----
3	Machine maintenenance & Electricians tool kit	-----	-----	-----	-----

4	Clicking dies-1 set each	-----	-----	-----	-----
5	PVC last	-----	-----	-----	-----
6	Clicking pads, Spray gun & other equip.	-----	-----	-----	-----
7	Testing equipments, thickness gauge, measuring scale etc.	-----	-----	-----	-----
8	Workshop tables racks etc.	-----	-----	-----	-----
9	Other furniture and equipments	-----	-----	-----	-----
Total					-----

OVERHEADS (O/H):

Overheads include the Cost of Indirect Materials, Indirect Labour, and indirect expenses such as;

a) Manufacturing expenses: Expenses incurred to run the factory are called manufacturing expenses. Expenses relating to production management and administration are included therein. Examples: Rent, Insurance, Power, Water, Depreciation etc

b) Office and Administrative expenses: These expenses are not related to factory but they pertain to the management and administration of business. Such expenses are incurred on the direction and control of a firm. Examples: Postage, Telephone, and fax, bank Charges, legal charges, furniture and equipment etc.

c) Selling and Distribution expenses. : Expenses incurred for marketing of a commodity, for securing orders for the articles, despatching goods sold, advertising, travelling, preparing tenders etc. come to this category.

(i) Salary (per month)				
A. Personal for workshop				
Sr.No.	**Description**	**No.**	**Salary (ETB)**	**Total Value (ETB)**
1	Production Manager (Tech.)	-----	-----	-----

2	Designer	-----	-----	-----
3	Supervisors (Tech.)	-----	-----	-----
4	Electrician and mechanic	-----	-----	-----
TOTAL				-----
B. Personal for administration				
1	Accountant cum Cashier	-----	-----	-----
2	Store Keeper	-----	-----	-----
3	Watchmen	-----	-----	-----
4	Sweeper	-----	-----	-----
TOTAL				-----
TOTAL SALARY PER MONTH (A+B)				-----
Add 20% Perquisites				-----
TOAL				-----
TOTAL (ROUND OFF)				-----
(ii) Utilities (per month)				
1	Power			-----
2	Fuel & water			-----
TOTAL				-----
(iii) Other Contingent Expenses (per month)				
1	Rent			-----
2	Repair and Maintenance			-----
3	Other Consumables store			-----
4	Insurance			-----
5	Postage and Telephones expenses			-----
6	Stationery & Printing			-----
7	Traveling expenses			-----
8	Other miscellaneous expenses			-----
TOTAL				-----

Purchase/procurement:

Procurement is the acquisition of goods, services or works from an outside external source. It is favorable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Corporations and public bodies often define processes intended to promote fair and open competition for their business while minimizing exposure to fraud and collusion.

Almost all purchasing decisions include factors such as delivery and handling, marginal benefit, and price fluctuations. Procurement generally involves making buying decisions under conditions of scarcity. If good data is available, it is good practice to make use of economic analysis methods such as cost-benefit analysis or cost-utility analysis.

An important distinction should be made between analyses without risk and those with risk. Where risk is involved, either in the costs or the benefits, the concept of expected value may be employed.

Direct procurement and indirect procurement				
		TYPES		
		Direct procurement	**Indirect procurement**	
		Raw material and production goods	**Maintenance, repair, and operating supplies**	**Capital goods and services**
FEATURES	**Quantity**	Large	Low	Low
	Frequency	High	Relatively	Low

			high	
	Value	Industry specific	Low	High
	Nature	Operational	Tactical	Strategic
	Examples	Crude oil in petroleum industry	Lubricants, spare parts	Crude oil storage facilities

Based on the consumption purposes of the acquired goods and services, procurement activities are often split into two distinct categories. The first category being direct, production-related procurement and the second being indirect, non-production-related procurement.

Direct procurement occurs in manufacturing settings only. It encompasses all items that are part of finished products, such as raw material, components and parts. Direct procurement, which is the focus in supply chain management, directly affects the production process of manufacturing firms. In contrast, indirect procurement activities concern “operating resources” that a company purchases to enable its operations. It comprises a wide variety of goods and services, from standardized low value items like office supplies and machine lubricants to complex and costly products and services; like heavy equipment and consulting services.

Procurement steps

Procurement life cycle in modern businesses usually consists of seven steps:

- **Identification of need**: This is an internal step for a company that involves understanding of the company needs by establishing a short term strategy (three to five years) followed by defining the technical direction and requirements.
- **Supplier Identification**: Once the company has answered important questions like: Make-buy, multiple vs. single suppliers, then it needs to identify who can provide the

required product/service. There are many sources to search for supplier; more popular ones being Ariba, Alibaba, other suppliers and trade shows.

- **Supplier Communication**: When one or more suitable suppliers have been identified, requests for quotation, requests for proposals, requests for information or requests for tender may be advertised, or direct contact may be made with the suppliers. References for product/service quality are consulted, and any requirements for follow-up services including installation, maintenance, and warranty are investigated. Samples of the P/S being considered may be examined, or trials undertaken.
- **Negotiation**: Negotiations are undertaken, and price, availability, and customization possibilities are established. Delivery schedules are negotiated, and a contract to acquire the P/S is completed.
- **Supplier Liaison**: During this phase, the company evaluates the performance of the P/S and any accompanying service support, as they are consumed. Supplier scorecard is a popular tool for this purpose. When the P/S has been consumed or disposed of, the contract expires, or the product or service is to be re-ordered, company experience with the P/S is reviewed. If the P/S is to be re-ordered, the company determines whether to consider other suppliers or to continue with the same supplier.
- **Logistics Management**: Supplier preparation, expediting, shipment, delivery, and payment for the P/S are completed, based on contract terms. Installation and training may also be included.
- **Additional Step - Tender Notification**: Some institutions choose to use a notification service in order to raise the competition for the chosen opportunity. These systems can either be direct from their e-tendering software, or as a re-packaged notification from an external notification company.

Transportation:

The expenses involved in moving products or assets to a different place, which is often passed on to consumers. For example, a business would generally incur a

transportation cost if it needs to bring its products to retailers in order to have them offered for sale to consumers.

Transportation costs formula

Transportation costs are reported in the Cost Per Unit field on each tab of the Transportation Reports.

Transportation costs are calculated for each Lane based on a per-unit cost for each Product. This cost is multiplied by the number of units of the Product that move on that Lane.

Example of transportation costs

There is a vehicle carrying units weighing five pounds each between Addis Ababa and Bahirdar. The total vehicle load is 40,000 pounds at a per-mile cost of 17 birr and utilization of 90%.

Transportation cost per unit = (per mile cost * distance * unit weight) divided by (utilization * vehicle capacity)

Transportation cost per unit = (17 * 600 * 5) divided by (0.9 * 40,000) = 1.42 Birr

Self-Check 4	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total points: 20)**

Section A: **(5 Points)**

Fill in the blanks:

1. ----------is the acquisition of goods, services or works from an outside external source.
2. Procurement life cycle in modern businesses usually consists of ---------- steps.
3. Transportation cost per unit = (per mile cost * distance * unit weight) divided by ----------.
4. Under ---------- we include the items which are used for making shoe like shoe designer's tool kit, shoe making tool kit.
5. Expenses incurred to run the factory are called ---------- expenses.

Section B **(10 points)**

Short Answers:

1. Write down about the cost sheet. (2 points)
2. Explain briefly about the procurement cost. (2 points)
3. Explain briefly about the transportation cost. (2 points)
4. Write down about the overheads. (2 points)
5. Write down about the material. (2 points)

Note: **Satisfactory rating - 10 points and above** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

LG #38	LO #2- Estimate materials and labor

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Requiring types and quantities of materials for the production
- Identifying material requirements and economic batch sizes
- Estimating labor requirements to achieve production /services outcomes
- Identifying labor hours and other statistics

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Estimate the types and quantities of materials required for the production
- Estimate the labor requirements to achieve production outcomes and required services with cost calculation
- Estimate the time requirements to complete production and perform required services

Learning Instructions:

9. Read the specific objectives of this Learning Guide.
10. Follow the instructions described below.
11. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
12. Accomplish the “Self-checks” which are placed following all information sheets.
13. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
14. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,

15. If your performance is satisfactory proceed to the next learning guide,
16. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet-1	Requiring types and quantities of materials for the production

MATERIAL REQUIREMENT

Materials are required to be estimated in the production processes as the costing of a product depends on the raw materials, & in case of leather footwear, the raw material leather itself has 60% of the cost involved in the product cost. The materials include all raw materials like leather , synthetic materials , lining , interlining , sole , insole , heel , tacks , adhesives & small but crucial materials because of which the production line gets effected.

Demand for tires and radiators depend on the number of cars to be produced. For each car to be manufactured, five tires (four plus one standby) are needed. These are situations with 'dependent demand items'. Materials requirement planning (MRP) deals with this kind of situation effectively.

MRP has become a centerpiece for all manufacturing systems. The key to successful production and operations management in a manufacturing company is the balancing of requirements and capacities. It's that simple and yet very challenging.

MRP is a computer based technique to determine the quantity and timing for the acquisition of dependent demand items needed to satisfy the master production schedule (MPS) requirement. It is used for lumpy or erratic demands. Since the control of purchasing depends on the order for the finished products, the technique is said to be one of 'dependent demand'.

2.1. Purpose of Material Requirement

An MRP system is designed to provide the following:

Material requirements planning (MRP) is a production planning and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, while it is possible to conduct MRP by hand as well.

An MRP system is intended to simultaneously meet three objectives:

- Ensure materials are available for production and products are available for delivery to customers.
- Maintain the lowest possible level of inventory.
- Plan manufacturing activities, delivery schedules and purchasing activities.

The scope of MRP in manufacturing

The basic function of MRP system includes inventory control, bill of material processing and elementary scheduling. MRP helps organizations to maintain low inventory levels. It is used to plan manufacturing, purchasing and delivering activities.

"Manufacturing organizations, whatever their products, face the same daily practical problem - that customers want products to be available in a shorter time than it takes to make them. This means that some level of planning is required."

Companies need to control the types and quantities of materials they purchase, plan which products are to be produced and in what quantities and ensure that they are able to meet current and future customer demand, all at the lowest possible cost. Making a bad decision in any of these areas will make the company lose money. A few examples are given below:

- If company purchases insufficient quantities of an item used in manufacturing (or the wrong item) it may be unable to meet contract obligations to supply products on time.
- If a company purchases excessive quantities of an item, money is wasted - the excess quantity ties up cash while it remains as stock and may never even be used at all.
- Beginning production of an order at the wrong time can cause customer deadlines to be missed.

MRP is a tool to deal with these problems. It provides answers for several questions:

- *What* items are required?

- *How many* are required?
- *When* are they required?...

MRP can be applied both to items that are purchased from outside suppliers and to sub-assemblies, produced internally, that are components of more complex items.

The data that must be considered include:

- The *end item* (or items) being created. This is sometimes called Independent Demand or Level “0 on BOM (Bill of materials).
- How much is required at a time.
- When the quantities are required to meet demand.
- Shelf life of stored materials.
- Inventory status records. Records of *net* materials *available* for use already in stock (on hand) and materials on order from suppliers.
- Bills of materials. Details of the materials, components and sub-assemblies required to make each product.
- Planning Data. This includes all the restraints and directions to produce the end items. This includes such items as: Routing, Labor and Machine Standards, Quality and Testing Standards, Pull/Work Cell and Push commands, Lot sizing techniques (i.e. Fixed Lot Size, Lot-For-Lot, Economic Order Quantity), Scrap Percentages, and other inputs.

2.1.2 BILL OF MATERIALS - (BOM)

A **bill of materials** (sometimes **bill of material** or **BOM**) is a list of the raw materials, sub-assemblies, intermediate assemblies, sub-components, parts and the quantities of each needed to manufacture an end product. A BOM may be used for communication between manufacturing partners, or confined to a single manufacturing plant.
Computation of the raw material and component requirements for end products listed in the master schedule is done by the product structure. The product structure is specified by the bill of materials, which is a listing of component parts and subassemblies that

make up each product. A file which lists all assemblies together is the bill-of-materials file. The structure of an assembled product can be pictured by taking a simple product in which a group of individual components make up two subassemblies, which in turn make up the product.

The product structure is in the form of a pyramid in which lower level feeding into the levels above the items at each successively higher level are called the parents of the items in the level directly below.

Users of MRP system can be classified by the type of BOM as under:

- Process industry
- Assembly only
- Assembly and fabrication

Example of BOM:

XYZ Company Ltd.	STANDARD BOM			REV:00	
CUSTOMER -	**LOCAL**	**35**	**36**	**37**	**3**
STYLE NO/NAME -	**1234**				
COLOUR -	**BROWN**	**40**	**41**	**42**	**4**
GROUP -					
LAST -	**24777**	**45**	**46**	**47**	**4**
ORDER QTY	**0**				
MATERIAL DESCRIPTION	**SPECIFICATION**	**UOM**	**MEASUREMENT**	**NORMS**	**CONSUMPTIO**
LEATHER MATERIAL'S					
COW D/BROWN 1.8.2.0 (TR)		Sqft			
BUFF HIDE UPPER COL.YELLOW (TR)		Sqft			
NON LEATHER & CUTTING					

MATERIALS					
COUNTER STIFFNER DOUBLE SIDED ADHESIVES		MT		0.360	
THREADS					
THREAD 13/3 913		MT			
STITCHING MATERIAL'S					
NEEDLE 110/18		Pcs		**0.004**	
BOTTOM GRIENDRIES					
SHANK STEEL		Pair		1.000	
ADHESIVES & CHEMICAL					
SPRAY MASK		Jerican			
TOOLING					
.					
PACKING MATERIALS					
TISSUE PAPER WHITE		KG		0.013	
MISC ITEMS					
YEFIREZA BRUSH 170*80		Pcs			
Prepared By:			**APPROVED BY:**		

NOTE:- TESTING REQUIRED.

2.1.3 Material Shortage Note

Date: _____

From:_____

ABC, Store in charge

XYZ, Company Ltd., Addis Ababa,

Ethiopia

To: _____

The Purchase Manager

XYZ, Company Ltd., Addis Ababa,

Ethiopia

Subject: Shortage of Cow full grin leather in black color

Dear Sir,

We are in shortage of cow full grain leather ordered for the order no. 1234. Now we have only 500 sq.feet of leather. But this order needs more 2000 sq.feet of leather. So I request you please order the same otherwise our production will be hampered.

Your prompt attention is requested.

Thanking you.

Yours Faithfully,

ABC
Manager, store
For XYZ company ltd.

2.1.4. MATERIAL REQUISITION - Material Requisition or Purchase Request is a precise document generated by an internal or external organization to notify the purchasing department of items it needs to order, their quantity, and the time frame that

will be given in the future. It may also contain the authorization to proceed with the purchase. It is also called Purchase Order Request.

As part of an organization's internal financial controls, the accounting department may institute a purchase requisition process to help manage requests for purchases. Requests for the creation of purchase of goods and services are documented and routed for approval within the organization and then delivered to the accounting group.

Typically an account staff member is assigned responsibility for purchase order management, referred to commonly as the PO (purchase order) Coordinator.

Purchase requests are tracked against both internal departmental budgets as well as general ledger (GL) categories.

A purchase requisition is a request sent to the purchasing department to procure goods or services. It is originated and approved by the department requiring the goods or services. Typically, it contains a description and quantity of the goods or services to be purchased, preferred make, a required delivery date, account number and the amount of money that the purchasing department is authorized to spend for the goods or services. Often, the names of suggested supply sources are also included.

A purchase requisition is owned by the originating department and should not be changed by the purchasing department without obtaining approval from the originating department. This important distinction (e.g. essential control) is not clearly defined in some of the more popular integrated procurement software systems on the market today.

A purchase from a taxation point of view is also a cost that depletes profits that reduces a tax liability, the onus lies with the originator to prove the cost incurred is for generating income or to better a service to promote sale that fulfills an objective, whilst ensuring valuable resources are best used and not wasted in the interest of the company.

In some industrial (e.g. production line) environments, the purchasing department may be assigned responsibility for requesting and purchasing goods. This is especially true

for raw material purchases where the purchasing department is also responsible for inventory management.

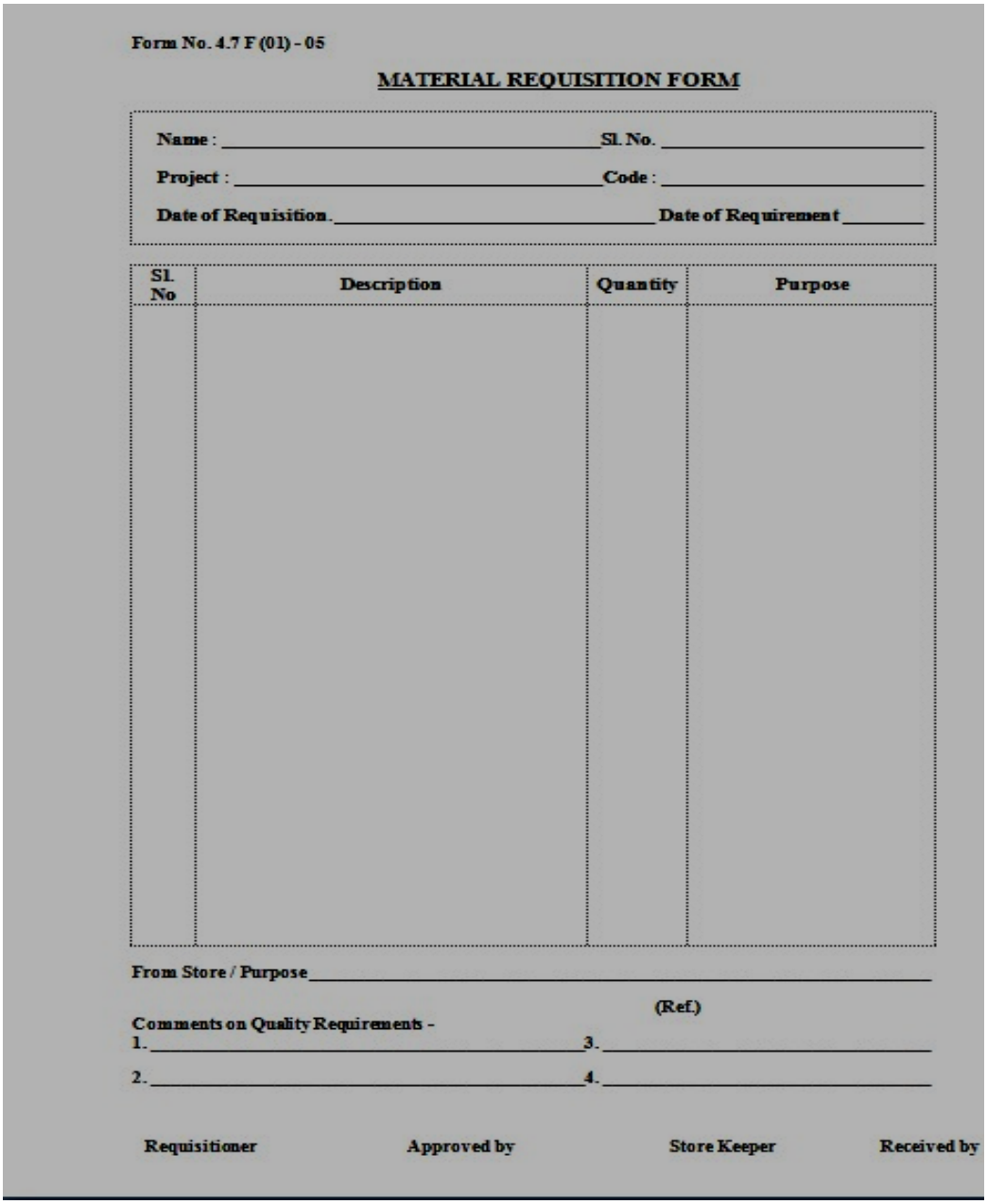
A purchase requisition is not a purchase order and therefore should never be used to purchase goods or services or be used as an authorization to pay an invoice from a supplier or service provider.

An example for material planning for requisition is as follows:

XYZ Company Ltd.									
ABC Company LTd.									
ADDIS ABABA									
STOCK IN HAND AGAINST ORDER.									
CATEGORY- (MATERIAL PLANING)									
Material Description		**Article No**	**Article No**	**Article No**	**Article No**	**Article No**	**Total Qty**	**Stock In Hand**	**Balance Qty To be order**
		A	**B**	**C**	**D**				
		Ord Qty	**Ord Qty**	**Ord Qty**	**Ord Qty**	**Ord Qty**			
	UOM	**-**	**-**	**-**	**-**	**-**			
		Bom Qty	**Bom Qty**	**Bom Qty**	**Bom Qty**	**Bom Qty**			
LEATHER MATERIAL'S									
COW D/BROWN 1.8.2.0 (TR)	Sqft	-	-	-	-	-	-		-
NON LEATHER & CUTTING MATERIALS									
COUNTER STIFFNER DOUBLE SIDED	MT	-	-	-	-	-	-		-

ADHESIVES									
THREADS									-
THREAD 13/3 913	MT	-	-	-	-	-	-		-
STITCHING MATERIAL'S									
NEEDLE 110/18	Pcs	-	-	-	-	-	-		-
BOTTOM GRIENDRIES									
SHANK STEEL	Pair	-	-	-	-	-	-		-
SHOE LACE BROWN (SEMKIR)	Pair	-	-	-	-	-	-		-
ADHESIVES & CHEMICAL									
SPRAY MASK	Jeri can	-	-	-	-	-	-		-
TOOLING									
		-	-	-	-	-	-		-
PACKING MATERIALS									
TISSUE PAPER WHITE	KG	-	-	-	-	-	-		-
MISC ITEMS									
YEFIREZA BRUSH 170*80	Pcs	-	-	-	-	-	-		-
Prepared By:									
NOTE:- TESTING REQUIRED.									

Material requisition format:



Form No. 4.7 F (01) - 05

MATERIAL REQUISITION FORM

Name : _____ Sl. No. _____

Project : _____ Code : _____

Date of Requisition. _____ Date of Requirement _____

Sl. No	Description	Quantity	Purpose

From Store / Purpose _____

(Ref.)

Comments on Quality Requirements -

1. _____ 3. _____

2. _____ 4. _____

Requisitioner Approved by Store Keeper Received by

2.1.5 PURCHASE INDENT - An internal company document used in the process to authorize the requisition of materials prior to initiating a purchase order. Purchase indents are audit documents used to track the movement of materials prior to their receipt by the buyer

PURCHASE INDENT FORM

S.N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES

BLOCK JD, SECTOR III, SALT LAKE, KOLKATA – 700098

Indent Date: .....

Name of the indentor with designation: .....

Consumable: ..... Budget Head: .....

Non Consumable: ..... Financial Year: .....

Sl. No.	Details of items with all specification	Qty. Reqd.	Qty. in Stock	Approx. Unit Price	Total Cost

JUSTIFICATION FOR PROCUREMENT OF THE ABOVE ITEMS.

.....

.....

Suggested name of the firm:

M/s	M/s	M/s

Signature of the indentor with Telephone Number | Signature of Head Section/Unit I/C | Finance Officer/ Accounts Officer | Director/ Registrar

Note-1: Separate indent forms should be used for different type of items.
Note-2: This indent form duly filled up should be sent to email: santosh@bose.res.in

2.1.6. GOODS RECEIPT NOTE: Record of goods received at the point of receipt. This record is used to confirm all goods have been received and often compared to a purchase order before payment is issued. In case of any loss or damage the debit note is also raised against the manufacturer or supplier as the case may be.

Sample of goods receipt note in one of the company

Sample Goods Received Note GRN Number:

Goods Received Note

Supplier .....Date..... Advice note number .....

Order Number.....Delivery Location.....Cost-Centre.....

	Goods	Pack Size	Price	Order Quantity	Delivered Quantity	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Received by..... Checked by.....

1. Accounts/Finance dept. copy
2. Supplier Copy
3. Stores/Goods Inwards copy

Figure 7: Format for Goods received note

In order to control the activities of the business and have operations running effectively management is responsible to have controls in place. Without controls accountability will not be possible. One of the ways by which controls can be implemented is by using control documents (sometimes known as source documents as some are used to

initiate accounting process so act as a “source”). For examples purchase orders, invoices, cash receipts, goods received note, goods dispatch note etc.

Goods Dispatch Note (GDN) or Goods Dispatch Note is a document that is raised by the supplier’s dispatch department responsible of sending goods out to customers. A copy of the GDN is retained by the dispatch department and one copy is sent to accounts department to process invoice to the customer. Without GDN sent to accounts department no invoice can be raised. In other words goods dispatch note acts as a source to generate invoice. These notes are usually sequentially numbered that helps identify any missing notes from the record.

Goods Delivery Note**:** If the same note i.e. goods dispatch note is sent with the goods to the customers and customer sign the documents as an evidence of the receipt by the customer then the same note will be named as Goods Delivery Note. So if we are really intended to differentiate between two types of documents then dispatch note only authorizes the dispatch whereas delivery note serves an additional purpose and acts as evidence that goods have been delivered to the customer and customer acknowledges the receipt. Business, however, might raise goods delivery note and goods dispatch note separately to keep the documents meant for internal and external purposes remain distinct**.**

Goods Received Note (GRN) is raised by a store manager of the customer (buyer) on receiving goods from supplier. This document is for internal usage. Just like goods delivery/dispatch note that are in triplicates, goods received note are also prepared in three or more copies where one is retained by the store department and another is sent to accounts department. Accounts department uses GRN to verify the invoice sent by the supplier. No invoice will be processed by the accounts department for payment purposes unless a GRN is sent by stores manager as GRN evidences the receipt of goods.

2.1.7 MATERIAL CONTROL CARD

Material control involves planning, organizing and controlling the procurement, storage and usage of material for achieving the objective of efficiency and economy. Material control ensures proper functioning of the following operations;

1. Purchasing of the material
2. Receiving of the material
3. Inspection of the material
4. Issuing of the material
5. Maintenance of inventory records
6. Stock control

Objective of material control:

1. To avoid the situation of under stocking- i.e, to provide continuous supply of required inventory so that the activities of production, service and sales departments may not be held up.
2. To avoid over stocking, i.e., to maintain optimum investment in inventory considering the operating requirements and financial resources so as to reduce carrying cost.
3. To ensure the procurement of materials and stores of the required quality at minimum cost from a reliable source.
4. To minimize the total cost (purchase cost, ordering cost, carrying cost).
5. To avoid wastage and losses due to defective or long storage or from obsolete.
6. To manage proper and up to date records of inventories.

Material control cards are used to records and control the quantity of material when store keeper receives and issues the material. Material control card is kept in each cabinet or tray of material. These are also called bin card.

Part number A 1234				Bin number/location A1284		
Description 30cm brackets						
Receipts			**Issues**			**Balance**
Date	*Goods received note number*	*Quantity*	*Date*	*Requisition number*	*Quantity*	
						b/f 100
15/1/2013	1235	200				300
			29/1/2013	1929	140	160
			3/2/2013	1955	120	20
10/2/2013	1384	500				520

2.1.8 ABC ANALYSIS TECHNIQUES (ABC PLAN) ON INVENTORY CONTROL

ABC plan is a systematic way of grouping materials into separate classification and determining the degree of control for each class or group. Material control for high volume items is different from that of low value item, and ABC plan is used in inventory control, when a company has a large number of individual items with each item having different value. ABC plan has been defined as “a selective method of inventory control; attempt to segregate and group materials according to total value”. It is a classification scheme for deciding what tools to use in inventory control.

ILLUSTRATION

The Soky Corporation groups its materials into separate classification for purposes of stock control. The following data is to be analyzed by management.

Stock Number	Yearly usage (units)	Unit cost N
126	7750	6.00
241	10900	0.50
250	7300	1.80
333	4500	60.00

401	3500	12.00
560	13500	1.00
817	1500	63.00
900	2000	14.00

Required:

Using the ABC method of control, arrange the materials into three classifications and prepare the chart that will be used in management's analysis.

SUGGESTED SOLUTION

Steps:

(1) Compute the total cost of materials;

(2) List the total usage costs in descending order;

(3) Compute:

(a) The percentage of each item's cost to total cost

(b) The percent of each item's unit to total units; and

(4) Divide them into three categories.

Stock No.	Cat-egory	Cost/Usage	Yearly Unit Cost		% Usage	Total Usage Cost	% Total Usage	Category
333	A	60	4500	8.83	11.77	270000	52.62	71.04
817		65	1500	2.94		94500	18.42	
126	B	6	7750	15.22	26.01	46500	9.06	22.71
401		12	3500	6.87		42000	8.19	
900		14	2000	3.92		28000	5.46	
560	C	1	13500	26.5	62.22	13500	2.63	6.25
250		1.8	7300	14.33		13140	2.56	
241		0.5	10900	21.39		5450	1.06	
			50950	**100**	**100**	**513090**		

11, 77% of the items = 71.04% of usage cost = A

26.01% of the items = 22.71% of usage cost = B

62.22% of the items = 6.25% of usage cost = C

	Classification	Control Characteristics
A	Needing individuals more elaborate analysis	Small quantity of safety stock, frequent review, frequent orders, detailed records, most capable personnel.
B	Reviewed quarterly	A bridge between A and C.
C	Essential lose and inexpensive control	Large quantity of safety stock, strict adherence, to predetermined order points with little review (one or more program) orders a year, no need for perpetual inventory, lower level personnel.

The ABC classification process is an analysis of a range of objects, such as finished products, items lying in inventory or customers into three categories. It's a system of categorization, with similarities to Pareto analysis, and the method usually categorizes inventory into three classes with each class having a different management control associated :

A - Outstandingly important; B - of average importance; C - relatively unimportant as a basis for a control scheme. Each category can and sometimes should be handled in a different way, with more attention being devoted to category A, less to B, and still less to C.

Popularly known as the "80/20" rule ABC concept is applied to inventory management as a rule-of-thumb. It says that about 80% of the Rupee value, consumption wise, of an inventory remains in about 20% of the items

Suggested policy guidelines for A B & C classes of items

A items (High cons. Val)	B items (Moderate cons.Val)	C item (Low cons. Val)
Very strict cons. control	Moderate control	Loose control
No or very low safety stock	Low safety stock	High safety stock
Phased delivery (Weekly)	Once in three months	Once in 6 months
Weekly control report	Monthly control report	Quarterly report
Maximum follow up	Periodic follow up	Exceptional
As many sources as possible	Two or more reliable	Two reliable
Accurate forecasts	Estimates on past data	Rough estimate
Central purchasing /storage	Combination purchasing	Decentralised
Max.efforts to control LT	Moderate	Min.clerical efforts
To be handled by Sr.officers	Middle level	Can be delegated

Finally, ABC analysis is an intrinsic part of Materials Management and is the categorization of products into groups sorted by their spend volume. Given Pareto analysis a typical ABC analysis might find that 20% of a products equate for 70% of the value, these are termed A's and are the more expensive group (often comprised of complex assets) . Cheap consumable (and often easily replaceable items) fall into the "C" class.

Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total Points: 26)**

1. Match the following section A with Section B each carry one mark (5 points)

Section A	Section B
1. Net Requirement	a. Demand of one item is unrelated to other item
2. Independent demand	b. NR
3. Dependent demand	c. Demand of an item is directly related to, or derived from the demand
4. Computation of the raw	d. Purchase request material and component requirements
5. Material requisition	e. BOM

2. Fill in the blanks (3 points)

1. A job shop process which is _____ and not repetitive must use MRP II to plan and control production
2. Purchase requests are tracked against both internal departmental budgets as well as _____ categories.

3. A purchase requisition is a request sent to the _____ to procure goods or services.

3. Short answer questions: (18 points)

1. What is the purpose of planning materials requirement (2 points)
2. What is scheduled receipt in material requirement (2 points)
3. What do you mean by planned order receipt (2 points)
4. When does an independent demand exists (2 points)
5. What do you mean by dependent demand (2 points)
6. Explain batch manufacturing in brief (2 point)
7. What information does material requisition consists of (2 points)
8. How does Goods receipt note helpful in production process (2 points)
9. Explain briefly about Kanban (3 points)

Note: **Satisfactory rating – 12.5 points and above** **Unsatisfactory - below 12.5 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-2	Identifying material requirements and economic batch sizes

ESTIMATION OF MATERIAL PROCUREMENT-

The planning & procurement of materials is very important for product costing as the material to be procured will decide the cost

of the product. Material procurement requires the vendor development, short listing of vendors according to the material specification & price.

An organizations process strategy would include make or buy Decisions. The beginning of the 21st century is proving to be an interesting time for the logistics industry. There has been a great deal of transformation in logistics outsourcing caused by the continued drive of manufacturers and retailers to cut costs and by a continued focus on core competencies.

Logistics and supply chain management have often been among the first functions to be outsourced. This has moved beyond the warehousing and trucking functions and spread to ancillary services. Usually, companies decide to outsource some or all of their logistics functions in order to reduce costs, make more effective use of the working capital and focus their energies creating differentiation and promoting revenue growth. In some cases, companies claim they can respond faster and more effectively to change when using a logistics service provider (LSP). Indeed, there are significant benefits to outsourcing logistics.

To maximize these benefits a review of make-or-buy decision must be implemented. The make-or-buy decision is the act of making a strategic choice between producing a product internally (in-house) or buying it externally (from an outside provider). Making the right choice can be the key factor in sustaining a company competitive advantage and is one of the most important tasks of a successful management.

Although the strategic implications of the make-or-buy decision have been discussed for many years these decisions are often made purely on the basis of costs. This paper aims to address this gap by developing a decision-making process that can provide managers with a way of managing the make-or-buy decisions more effectively. The key

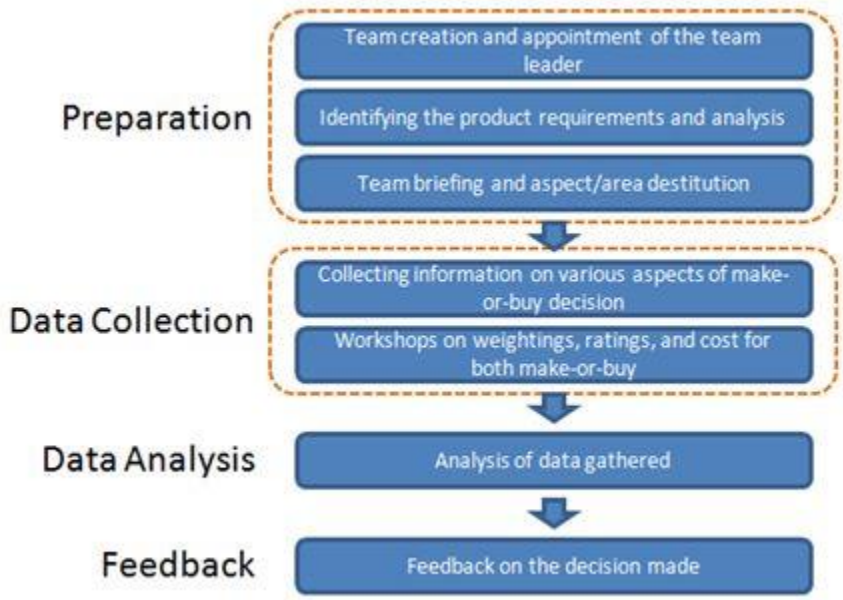
objectives that arise from the defined purpose are first to describe the set of factors which affect the make-or-buy process, second, to understand better the challenges and barriers that companies face when deciding whether or not to outsource a component or process and third, to suggest some tools and methods for addressing the make-or-buy decision process.

2.2.1 Make or buy decision

The act of choosing between manufacturing a product in-house or purchasing it from an external supplier is called make or buy decision. In a make-or-buy decision, the two most important factors to consider are cost and availability of production capacity.

An enterprise may decide to purchase the product rather than producing it, if is cheaper to buy than make or if it does not have sufficient production capacity to produce it in-house. With the phenomenal surge in global outsourcing over the past decades, the make-or-buy decision is one that managers have to grapple with very frequently.

Factors that may influence a firm's decision to buy a part rather than produce it internally include lack of in-house expertise, small volume requirements, desire for multiple sourcing, and the fact that the item may not be critical to its strategy. Similarly, factors that may tilt a firm towards making an item in-house include existing idle production capacity, better quality control or proprietary technology that needs to be protected.



2.2.2 Factors influencing the make or buy decisions:

The decision as to whether a business should make or buy a product is based on both tangible and intangible factors, which may shift over time. Making products in-house may save time and money, but it also may be more inconvenient than buying from a vendor that specializes in the necessary item. In addition, making a product from scratch can be a way to provide additional work for valued employees when business is otherwise slow.

Quality

If your company can create a product that is better than what you can buy from a vendor, then you should make that product in-house, assuming you can charge a price high enough to justify the materials and labor. However, if your company does not specialize in this type of product, then a specialty vendor may be able to do a better job. If your business makes a value-added food product, then you can usually provide better quality by making raw materials from scratch because they will be optimally fresh.

Quantity

The volume of product that your company needs will influence your decision of whether to make or buy it. If you only need one jar of hot sauce, then it doesn't usually make sense to fashion your hot sauce from scratch. However, sometimes a very large demand can also be a reason not to make a product in house. If your business uses tens of thousands of boxes to package products, then it is often cost-effective to contract to a company that can make them to a custom size.

Convenience

When your company is operating in high gear meeting ongoing demand, it can be more convenient to make products than to buy them. However, if the vendor who makes a product you need is in another country and can't deliver a necessary item on short notice, it may be more convenient to make that product. The convenience of making or buying products may change relative to the volume of business you are currently transacting, and the amount of surplus labor and space that you have.

Marketing

Making products in house can be an important marketing strategy. A clothes store that makes and sells its own line of dresses offers customers an added value and a strong brand. A restaurant that makes its own sauces and dressings can provide unique flavors. Savvy and discriminating customers often pay close attention to whether a business had made or bought the products it sells, and making your own inventory can help you build a loyal and educated clientele.

2.2.3 MATERIAL CREDIT NOTE - A credit note or credit memorandum (memo) is a commercial document issued by a seller to a buyer. The seller usually issues a credit memo for the same or lower amount than the invoice, and then repays the money to the buyer or sets it off against a balance due from other transactions.

It can also be a document from a bank to a depositor to indicate the depositor's balance is being in event other than a deposit, such as the collection by the bank of the depositor's note receivable.

Features: A credit note lists the products, quantities and agreed prices for products or services the seller provided the buyer, but the buyer returned or did not receive. It may be issued in the case of damaged goods, errors or allowances. In respect of the previously issued invoice, a Credit Memo will reduce or eliminate the amount the buyer has to pay.

Important to note is that a credit memo is not to be substituted as a formal document. The credit memo rarely contains: PO #, Date, Billing Address, Shipping Address, Terms of Payment, List of products with quantities and prices. Usually it references the original Invoice and sometimes states the reason for issue. This is received if the goods are incomplete, damaged, or incorrect; you may also receive one if you have paid too much money, or you have been under charged.

USES: To allow the buyer to purchase an item or service from that seller on a future date, i.e. a gift card or store card credit. Credit notes may be issued by a seller as a goodwill gesture to a buyer who wishes to return previously purchased merchandise (instead of cash repayment) in circumstances where the original sales agreement did not include an explicit refund policy for returned items. In such circumstances, a credit note of value equal to the price of the returned item is usually issued allowing the buyer to exchange his purchase for other items available with the sale.

To correct an invoice that has already been processed and sent to the buyer. If you have already sent an invoice to a buyer but now need to provide a credit for that invoice, you would send them a credit note or credit memo. You can think of a credit note as a "negative invoice." It can be used in some Enterprise Resource Planning software. For accounting purposes in the case of returned goods. After the sale, if the customer is not happy with the purchased goods for various reasons, such as damage, or if a product has expired (for example, food items), he would return the goods. This transaction has to be reversed for accounting purposes. From the point of view of a company, credit notes can be classified in two groups: Credit notes sent to clients, issued by the company Credit notes received from suppliers, issued by others credit note sent to clients is considered as a sales returned for accounting purposes. A credit note received from suppliers is considered as a purchase return. If any amount is

credited by any business firm against which no receipt is issued then Credit Note is issued. Credit note is a support document which shows that the account of the receiver of the credit note has been credited with the amount mentioned in the credit note. The Credit note is issued in following circumstances:-

1. When the material is returned by the customer to the supplier then the credit note is issued to the customers by the supplier.

2. The credit note can be issued by the firm for the transactions not relating to sales return. For example:- the interest payable by business firm for late payments, any special discount allowed etc.

3. Credit note can also be issued in response to debit note received by the business firm.

4. Credit note can be issued to the customer or supplier also if there is a mistake in sales invoice or purchase invoice.
5. Some time for certain adjustments or transactions for which bill can not be issued in that case credit note is issued by the firm.

Contents of a Credit Note

The credit note contains the following particular:-

- Date of credit note.
- Serial number of credit note.
- Name and address of the receiver.
- Particulars or brief description of the transaction.
- If the credit note relates to the material return then the detail of item sold, quantity, rate, sales tax and reference of invoice against which the material was sold, should be shown.
- Amount of credit note in words and figures.
- Signature of the concerned authorities for raising the credit notes.

Support documents for Credit Notes

- Delivery challan, in case of return of material by customers.
- Copy of purchase order or other letter in case, of rate differences.
- Copy of cheque leave, in case of any payment received from third party on behalf of any customer etc.
- Any detail which can prove the happening of the transaction.

Various credit notes can be made according to the requirements , few illustrations are as follows:

Illustration- 1(Credit Note for Return of Material by Customer)

M/s ABC, Kotla Mubarakpur, Delhi returned the material to M/s XYZ Limited on 8.1.14 as per details given below:-

Cost of Material Rs.6000/=(Local Sale Taxable @ 5%.)

Local Sales Tax @ 5% 300/=

Total amount Rs.6300/=

Prepare the necessary document for above transaction by M/s XYZ Limited.

Solution:

Since the material is being returned to M/s XYZ Limited, therefore, the Credit Note shall be issued by them to M/s ABC as under:-

M/S XYZ LIMITED	
CREDIT NOTE	
Credit Note No. 11	**Date:** 8.1.14
To,M/s ABC,New Delhi	

We have credited your account with Rs.6300/= (Rupees Six Thousand Three Hundred only) on account of material returned by you as per the details given below:-	
Particulars	**Amount** **In Rs.**
Cost of Goods	6000/=
Add: Local Sales Tax @ 5%	300/=
Total	**6300/=**
Amount in words: Rupees Six Thousand Three Hundred only.	
Manager **Accountant**	

Illustration-2

(Credit Note for Amount of Interest Payable to Customer on Their Deposit)

M/s ABC, New Delhi had deposited with M/s XYZ Limited Rs.100000/= as security deposit on 8.1.14 and an interest @ 10% per annum was supposed to be credited by M/s XYZ Limited.

Prepare a suitable document for the amount of interest payable by M/s XYZ Limited on 8/1/14.

Solution: The interest amount shall be Rs.10000/= i.e. 10% on Rs.100000/=

The interest is to be credited in account of M/s ABC. Therefore, Credit Note shall be prepared by M/s XYZ Limited as under:-

M/S XYZ LIMITED	
CREDIT NOTE	
Credit Note No.08 **Date:** 8.1.14	
To,M/s ABC,New Delhi	
We have credited your account with Rs.10000/= (Rupees Ten Thousand only) as per the details given below:-	
Particulars	**Amount In Rs.**
Interest amount on your security deposit amount for Rs.100000/= @ 10% per annum.	10000/=
Total	**10000/=**
Amount in words: Rupees Ten Thousand only.	
Manager **Accountant**	

2.2.4 MATERIAL SCRAP NOTE - There are a number of ways to tell if a production process is not operating as efficiently as it could. For example, labor hours are higher than expected, material usage exceeds the standard, or delivery times are chronically late. However, the accounting department does not do well in reporting on late deliveries, since this does not involve the database of financial information that the accounting staff normally accesses. Also, the direct labor pool tends to be relatively fixed in the short term, and so is surprisingly difficult to reduce. Thus, accounting reports showing excessive labor may not result in an immediate impact on this area. However, reporting on material scrap rates is well worth the effort. The reason is that a high scrap rate is the primary indicator of a host of potential problems in the production process. For example, scrap can be caused by poor operator training, bad machine maintenance, an excessive level of work-in-process inventory, and design flaws. By using material scrap as the prime indicator of problems in the production process, management can locate the reasons for it, target those problems, and eliminate them.

The problem for the accounting department is how to issue a valid material scrap rate report. If the report is inaccurate, management will not believe the numbers and will not use the information to improve the production process. It is vital to derive the most accurate information possible from the evidence at hand. All the scraps have some value which can be derived. Scrap value can be defined as the worth of a physical asset's individual components when the asset itself is deemed no longer usable. The individual components, known as "scrap," are worth something if they can be put to other uses. Sometimes scrap materials can be used as is; other times they must be processed before they can be reused. An item's scrap value is determined by the supply and demand for the materials it can be broken down into.

For example, John has a very old car with a transmission that is shot. Because the cost to replace the transmission ($2,000) is significantly more than what the car would be worth even with a working transmission ($1,000), John decides to sell the car for its scrap value. He takes it to a junkyard where the car's usable parts and metal are valued at $500. Therefore, $500 is the car's scrap value.

The difference between scrap and waste is that scrap is a loss connected with the output mostly an unforeseen loss of raw material in production process. While waste is a foreseen and calculated percentage of loss of raw materials or an output that does not have any sales or use.

An example of formal format & the steps to be followed for raising material scrap note.

Ref No: 26/air cond/12-13 Date: 5th July 2012

Tender notice for sale of old scraps material

Sealed tenders are invited from scrap buyers for disposal of Old scrap material on “AS IS WHERE IS BASIS” lying at basement go down at our Head Office, The New ABC Building, 2 RG Road, DELHI,
Tender form can be obtained from the office at above address during Office hours on any working day up to 12th July 2012, till 5.00 p.m.. Sealed tender is to be submitted in prescribed form before 2 p.m. on 13th July 2012 and to be dropped in Tender Box kept at XYZ Dept at the above mentioned address.

Terms & conditions of sale

Sale of old scrap material is on “as is where is basis” which is lying in basement godown.

Tenderer has to submit offer form alongwith demand draft/pay order for value of the offer and tax amount as mentioned in offer form. Without dd/po bid will be cancelled.

The company shall have the sole and absolute right and discretion to accept any offer or reject any or all offers without giving any clarification or assigning any reason.

However the bidder shall have no option to accept a lesser quantity than that offered for delivery or withdraw his offer once submitted.

The successful bidder wiil remove the scrap within 2 days from the acceptance date.
Removal of scrap shall be done in presence of department officoails.
Company's representative will facilitate inspection of saleable scrap items during inspection by tenderer.

(chief director)

Offer form

Ref No: 26/air cond/12-13 Date: 5th July 2012

Name of the tenderer :

Address of the tender :

Phone No. :
Mobile No. :
Fax No. :
PAN No: : (copy of PAN card attached)

Contact person:

Ref: Sale of old Scrap Material strictly on “AS IS WHEREIS BASIS”.

Dear Sirs,

We have inspected the old scrap material lying at godown on above address and confirm our acceptance of the same. We are pleased to submit our offer for purchase of said items of Old scrap material at the below mentioned price and Taxes.

A) PRICE BID

a) Tender price for whole lot: Rs _____

b) Add: VAT

(@ 12.5% ON PRICE BID) Rs. _____

Total (a+b): Rs. _____

We are enclosing herewith a Demand Drafts in favor of “The New ABC” drawn on Nationalized/schedule Bank.

Demand Draft No.._____ drawn on _____

date_____amount_____ for full value of tender amount plus tax.

DECLARATION: I/WE have read and acquainted myself/ourselves with the terms and Conditions of sale. I/WE unconditionally agree to the terms conditions. And have submitted this offer accordingly.

SIGNATURE OF TENDERER

(COMPANY / FIRM’S SEAL)

Please note:

The scrap including only scrap, broken pieces, ducting fragments, broken fans, old telephone instruments etc, etc.
And

Excluding: Any kind of furniture like chairs/ cupboards/cabinets

This tender is only meant for the proposed scrap materials to be disposed off which are lying in the basement godown. The bidders are requested to visit the site and physically verify the items (scrap materials) before quoting the rates.

2.2.5 COST ANALYSIS-

Cost–benefit analysis (CBA), sometimes called benefit–cost analysis (BCA), is a systematic process for calculating and comparing benefits and costs of a project, decision or **government policy** (hereafter, "project"). CBA has two purposes:

1. To determine if it is a sound investment/decision (justification/feasibility),
2. To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much.

CBA was later expanded to address both intangible and tangible benefits of public policies relating to mental illness, substance abuse, college education, and chemical waste policies. In the US, the National environmental policy act of 1969 first required the application of CBA for regulatory programs, and since then, other governments have enacted similar rules. Government guidebooks for the application of CBA to public policies include the Canadian guide for regulatory analysis, Australian guide for regulation and finance, US guide for health care programs, and US guide for emergency management programs.

CBA is related to, but distinct from cost – effectiveness analysis. In CBA, benefits and costs are expressed in monetary terms, and are adjusted for the time value of money, so that all flows of benefits and flows of project costs over time (which tend to occur at different points in time) are expressed on a common basis in terms of their "net present value."

Closely related, but slightly different, formal techniques include cost-effectiveness analysis, cost–utility analysis, economic impact analysis, fiscal impact analysis, and Social return on investment (SROI) analysis.

Cost–benefit analysis is often used by governments and other organizations, such as private sector businesses, to evaluate the desirability of a given policy. It is an analysis of the expected balance of benefits and costs, including an account of foregone alternatives and the status quo. CBA helps predict whether the benefits of a policy outweigh its costs, and by how much relative to other alternatives (i.e. one can rank alternate policies in terms of the cost–benefit ratio). Generally, accurate cost–benefit analysis identifies choices that increase welfare from a utilitarian perspective. Assuming an accurate CBA, changing the status quo by implementing the alternative with the lowest cost–benefit ratio can improve Pareto efficiency. An analyst using CBA should recognize that perfect evaluation of all present and future costs and benefits is difficult, and while CBA can offer a well-educated estimate of the best alternative, perfection in terms of economic efficiency and social welfare are not guaranteed.

The following is a list of steps that comprise a generic cost–benefit analysis.

1. List alternative projects/programs.
2. List stakeholders
3. Select measurement(s) and measure all cost/benefit elements.
4. Predict outcome of cost and benefits over relevant time period.
5. Convert all costs and benefits into a common currency.
6. Apply discount rate.
7. Calculate net present value of project options.
8. Perform sensitivity analysis.

9. Adopt recommended choice.

CBA attempts to measure the positive or negative consequences of a project, which may include:

1. Effects on users or participants
2. Effects on non-users or non-participants
3. Externality effects
4. Option value or other social benefits.

A similar breakdown is employed in environmental analysis of total economic value. Both costs and benefits can be diverse. Financial costs tend to be most thoroughly represented in cost-benefit analyses due to relatively abundant market data. The net benefits of a project may incorporate cost savings or public willingness to pay compensation (implying the public has no legal right to the benefits of the policy) or willingness to accept compensation (implying the public has a right to the benefits of the policy) for the welfare change resulting from the policy. The guiding principle of evaluating benefits is to list all (categories of) parties affected by an intervention and add the (positive or negative) value, usually monetary, that they ascribe to its effect on their welfare.

The actual compensation an individual would require to have their welfare unchanged by a policy is inexact at best. Surveys (stated preference techniques) or market behavior (revealed preference techniques) are often used to estimate the compensation associated with a policy; however, survey respondents often have strong incentives to misreport their true preferences and market behavior does not provide any information about important non-market welfare impacts.

One controversy is valuing a human life, e.g. when assessing road safety measures or life-saving medicines. However, this can sometimes be avoided by using the related technique of cost-utility analysis, in which benefits are expressed in non-monetary units such as quality-adjusted life years. For example, road safety can be measured in terms of cost per life saved, without formally placing a financial value on the life. However, such non-monetary metrics have limited usefulness for evaluating policies with

substantially different outcomes. Additionally, many other benefits may accrue from the policy, and metrics such as 'cost per life saved' may lead to a substantially different ranking of alternatives than traditional cost–benefit analysis.

Another controversy is valuing the environment, which in the 21st century is typically assessed by valuing ecosystem services to humans, such as air and water quality and pollution. Monetary values may also be assigned to other intangible effects such as business reputation, market penetration, or long-term enterprise strategy alignment.

CBA usually tries to put all relevant costs and benefits on a common temporal footing using time value of money calculations. This is often done by converting the future expected streams of costs and benefits into a present value amount using a discount rate. Empirical studies and a technical framework suggest that in reality, people do discount the future like this.

The choice of discount rate is subjective. A smaller rate values future generations equally with the current generation. Larger rates (e.g. a market rate of return) reflects humans' attraction to time inconsistency—valuing money that they receive today more than money they get in the future. The choice makes a large difference in assessing interventions with long-term effects, such as those affecting climate change. One issue is the equity premium puzzle, in which long-term returns on equities may be rather higher than they should be. If so then arguably market rates of return should not be used to determine a discount rate, as doing so would have the effect of undervaluing the distant future (e.g. climate change)

Risk associated with project outcomes is usually handled using probability theory. This can be factored into the discount rate (to have uncertainty increasing over time), but is usually considered separately. Particular consideration is often given to risk aversion irrational preference for avoiding loss over achieving gain. Expected return calculations does not account for the detrimental effect of uncertainty.

Uncertainty in CBA parameters (as opposed to risk of project failure etc.) can be evaluated using a sensitivity analysis, which shows how results respond to parameter changes.

The value of a cost–benefit analysis depends on the accuracy of the individual cost and benefit estimates. Comparative studies indicate that such estimates are often flawed, preventing improvements in Pareto and Kaldor – Hicks efficiency. Causes of these inaccuracies include:

1. Overreliance on data from past projects (often differing markedly in function or size and the skill levels of the team members)
2. Use of subjective impressions by assessment team members
3. Inappropriate use of heuristics to derive money cost of the intangible elements
4. Confirmation bias among project supporters (looking for reasons to proceed).

Interest groups may attempt to include or exclude significant costs from an analysis to influence the outcome.

In the case of the Ford Pinto (where, because of design flaws, the Pinto was liable to burst into flames in a rear-impact collision), the company's decision was not to issue a recall. Ford's cost–benefit analysis had estimated that based on the number of cars in use and the probable accident rate, deaths due to the design flaw would cost it about $49.5 million to settle wrongful death lawsuits versus recall costs of $137.5 million. Ford overlooked (or considered insignificant) the costs of the negative publicity that would result, which forced a recall and damaged sales.

In health economics, some analysts think cost–benefit analysis can be an inadequate measure because willingness-to-pay methods of determining the value of human life can be influenced by income level. They support use of variants such as cost – utility analysis and quality adjusted life year to analyze the effects of health policies.

The Clean Air Act has been cited in retrospective studies as a case where benefits exceeded costs, but the knowledge of the benefits (attributable largely to the benefits of reducing particulate pollution) was not available until many years later.

It takes into account both quantitative and qualitative factors for analysis of the value for money for a particular project or investment opportunity. Benefits to costs ratio and other indicators are used to conduct such analyses.

The objective is to ascertain the soundness of any investment opportunity and provide a basis for making comparisons with other such proposals. All positives and negatives of the project are first quantified in monetary terms and then adjusted for their time-value to obtain correct estimates for conduct of cost-benefit analysis. Most economists also account for opportunity costs of the investment in the project to get the costs involved.

What is benefit-cost analysis?

Benefit-cost analysis (BCA) is a technique for evaluating a project or investment by comparing the economic benefits with the economic costs of the activity. Benefit-cost analysis has several objectives. First, BCA can be used to evaluate the economic merit of a project. Second the results from a series of benefit-cost analyses can be used to compare competing projects. BCA can be used to assess business decisions, to examine the worth of public investments, or to assess the wisdom of using natural resources or altering environmental conditions. Ultimately, BCA aims to examine potential actions with the objective of increasing social welfare.

Regardless of the aim, all benefit-cost analyses have several properties in common. A BCA begins with a problem to be solved. For example, a community may have the goal of alleviating congestion on roads in an area. Various projects that might solve the particular problem are then identified. As an example, alternative projects to alleviate road congestion in an area might include a new highway, a public bus system, or a light rail system. The costs and benefits of these projects would be identified, calculated, and compared. Decisions are typically not made solely on the basis of BCA, but BCA is useful and sometimes required by law. Without a doubt, results from a BCA can be used to raise the level of public debate surrounding a project.

BCA examples

Explicitly or implicitly, nearly every public and private decision involves some comparison of benefits and costs. Although a formal BCA is not used for all decision making, the principles are applied in many settings. Here are a few brief examples.

Example 1: You must decide whether to go out with your friends to a local place on a Thursday night. Going out will have associated benefits and costs. The benefits include spending time with your friends and receiving free drinks from the bartender (who happens to be your best friend). The costs of the night include (at minimum) a cab ride home, missing class the next day (and possibly missing a surprise quiz), and waking up with a nasty hangover. Costs could run higher.

Example 2: Society must decide whether to open-up an old-growth forest for logging. Logging would provide a variety of benefits, but will also entail costs. The products and employment generated by logging are benefits. Some of the costs of cutting the old-growth forest include the cost of cutting, the loss of wildlife habitat, damages to local streams due to runoff, and the loss of an opportunity to cut the forest sometime in the future.

Self-Check 2	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total points: 20)**

1. Fill in the blanks: **(6 points)**

1. To maximize the benefits a review of make-or-buy decision must be implemented. The make-or-buy decision is the act of making a strategic choice between producing a product internally or _____
2. _____ has been defined as that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of raw materials.
3. _____ refers to the way an organization chooses to produce its good or services.
4. _____ the volume of product that your company needs will influence your decision of whether to make or buy it.
5. The seller usually issues _____ for the same or lower amount than the invoice, and then repays the money to the buyer or sets it off against a balance due from other transactions.
6. In CBA, _____ are expressed in monetary terms, and are adjusted for the time value of money, so that all flows of benefits and flows of project costs over time.

2. Short answers: **(14 points)**

1. How to define logistics management (1 point)

2. Distinguish between sourcing & outsourcing (1 point)

3. List down the activities carried out in - house logistics (2 points)

4. What do you mean by fourth party logistics (2 points)

5. How does process selection helps an organization (2 points)

6. Mention any three deciding reasons to develop a competence in house or hire an outside competent organization to supply that product. (2 points)

7. Distinguish between variable & fixed costs (2 points)

8. What is benefit-cost analysis? (2 points)

Note: **Satisfactory rating - 25 points and above** **Unsatisfactory - below 25 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-3	Estimating labor requirements to achieve production /services outcomes

Cost of Labor for purposes of labor cost statistics ILO has defined labor cost is the cost incurred by the employer in the employment of labor. The statistics concept of labor cost comprises remuneration for work performed, payments in respect of time paid for but not worked, bonuses and gratuities, the cost of food, drink and other payments in kind, cost of workers' housing borne by employers, employers' social security expenditures, cost to the employer for vocational training, welfare services and miscellaneous items, such as transport of workers, work clothes and recruitment, together with taxes regarded as labor cost. Taxes which are imposed on employment or on payrolls directly affect the cost to employers of employing labor. These taxes, in those countries where they are considered as labor cost, should be identified separately in order that they may be included or excluded for purposes of international comparisons. These taxes should be included on a net basis, i.e. after deduction of any rebates or allowances made by the State.

Some labor cost items, as a whole or in part, for example, social security and vocational training, in certain countries are not chargeable to employers, but represent expenditures by the State for social or other reasons. This must be taken into account in making international comparisons.

International Standard Classification of Labor Cost includes:

I. Direct wages and salaries:

(1) straight-time pay of time-rated workers1

(2) Incentive pay of time-rated workers;

(3) Earnings of piece-workers (excluding overtime premiums)1

(4) Premium pay for overtime, late shift and holiday work.

II. Remuneration for time not worked:

(1) Annual vacation, other paid leave, including long-service leave;

(2) Public holidays and other recognized holidays;

(3) Other time off granted with pay (e.g. birth or death of family member, marriage of employees, functions of titular office, union activities);

(4) Severance and termination pay where not regarded as social security expenditure

III. Bonuses and gratuities:

(1) Year-end and seasonal bonuses;

(2) profit-sharing bonuses;

(3) Additional payments in respect of vacation, supplementary to normal vacation pay and other bonuses and gratuities.

IV. Food, drink, fuel and other payments in kind

V. Cost of workers' housing borne by employers:

(1) Cost for establishment-owned dwellings

(2) Cost for dwelling not establishment-owned (allowances, grants, etc.);

(3) Other housing costs.

VI. Employers' social security expenditure:

(1) Statutory social security contributions (for schemes covering: old age, invalidity and survivors; sickness, maternity; employment injury; unemployment; and family allowances);

(2) Collectively agreed, contractual and non-obligatory contributions to private social security schemes and insurances (for schemes covering: old age, invalidity and survivors; sickness, maternity; employment injury; unemployment; and family allowances);

(3) (a) direct payments to employees in respect of absence from work due to sickness, maternity or employment injury, to compensate for loss of earnings;

(b) Other direct payments to employees regarded as social security benefits;

(4) Cost of medical care and health services

(5) Severance and termination pay where regarded as social security expenditure

VII Cost of vocational training - Including also fees and other payments for services of outside instructors, training institutions, teaching material, reimbursements of school fees to workers, etc. Cost of welfare services:

(1) Cost of canteens and other food services

(2) Cost of education, cultural, recreational and related facilities and services;

(3) Grants to credit unions and cost of related services for employees.

IX. Labor cost not elsewhere classified :(Such as costs of transport of workers to and from work undertaken by employer (including alsoreimbursement of fares, etc.), cost of work clothes, cost of recruitment and other labor costs.)

X. Taxes regarded as labor cost (For instance, taxes on employment or payrolls. Such taxes should be included on a net basis, i.e. after deduction of allowances or rebates made by the State.)

2.3.1 Direct Labor

For costing purposes, labor can be classified into two broad categories, i.e., direct labor and indirect labor. The distinction between direct and indirect labor is important because it helps:

(i) To determine accurate product cost,

(ii) To measure efficiency of performance,

(iii) To minimize error in overhead allocation, and

(iv) To ensure better cost analysis for decision-making and control.

Direct labor is also described as the labor which is engaged directly in manufacture of a product or in a particular job or service and which can be convenient allocated to the job, process or production unit. It is the labor engaged in changing composition, form or condition of a product manufactured.

Direct labor cost is a part of wage-bill or payroll that can be specifically and consistently assigned to or associated with the manufacture of a product, a particular work order, or provision of a service. Also, we can say it is the cost of the work done by those workers who actually make the product on the production line. It represents the labor when directly operates the manufacturing machinery and equipments. It handles the raw materials, work-in-process and finished goods on the production line. It can also called productive labor, process labor, operating labor and prime cost labor. Can be directly traced to a certain product or project. Examples: factory-worker salaries, accountant wages in an accounting firm.

The important features of direct labor are as follows:

1. It is conveniently identified and allocated to cost unit.

2. It varies directly with the volume of output.

3. It is engaged in the manufacture of goods or providing services.

4. It is engaged in altering the composition, form or condition of a product,

5. It is easily ascertained and controlled.

Some examples of direct labor are:

(i) Labor engaged in converting raw materials into finished product.

(ii) Labor engaged on a construction job.

(iii) Compositors engaged in a printing press.

(iv) Drivers and conductors engaged ^n a bus transport undertaking.

(v) Helper attending a machine operation.

Wages paid to direct labor are termed as direct labor cost, direct wages to manufacturing wages and form part of prime cost.

DETERMINANTS OF DIRECT COSTS

- Planning the work to be performed.
- Describing the job content of the work, by indicating the skill, knowledge, etc.
- Matching the jobs with the employees.

In the direct labor cost we need to have the job time and wage we will pay it to the worker to can calculate the direct labor cost as in this formulation: -

DIRECT LABOR COST = JOB TIME X WAGE

The standard direct labor cost per unit is calculated as follows:

Standard direct labor rate X standard direct labor hours = standard direct labor cost per unit

The wage is the payment rendered to the worker per hour as the compensation for the work done

Calculating job time : The job time needs to be measured by one of the following ways:

1. Time study
2. Work sampling

2.2.2 FIXED LABOR costs are typically broken down in one of two groups: variable or fixed. Variable labor usually includes hourly employees or individuals who are paid on a contract basis. Companies use variable labor to avoid paying higher wages or benefits to employees, which exponentially increase the company's operational costs. Fixed labor represents salaried employees who are paid certain wage amounts regardless of the amount of hours they work. Companies have different strategies for fixed labor by either paying for overtime or may be sometimes not even to pay for any overtime worked by employees.

Features

- Inside the two basic types of labor cost, variable or fixed, are three labor subgroups: skilled , semi skilled and unskilled. Skilled labor is usually the more expensive subgroup since individuals in this category have specific technical or analytical business skills labor e.g. for machine lasting toe lasting machine required a skilled operator. Companies usually have to pay a premium when hiring workers with these skills. Semi –skilled lab our can be appointed for the operations not requiring much of skills e.g. operations like trim fixing can be done by semi skilled operators. Unskilled labor usually represents individuals with no technical business skills; companies hire these individuals to complete manual tasks or processes in the business operations e.g. marking on the components , movement of raw materials from one place to another.

2.3.3 INDIRECT LABOR - Indirect labor is that labor which cannot be easily and conveniently allocated to the job, process or production unit. It represents labor which is not directly engaged in the manufacture of a product or in a job or service but indirectly

helps in production. In short, the labor which cannot be directly identified with a job, process or operation, is generally treated as indirect labor. Examples of indirect labor are as follows:

(i) Labor employed as supervisors, repair workmen, inspectors.

(ii) Maintenance workers such as workshop cleaner, mechanics, etc.

(iii) Labor engaged in purchasing, stores, factory office, time-keeping, canteen, etc.

Wages and salaries paid to such staff are treated as indirect labor cost which is included in overheads.

The distinction between direct and indirect labor in cost accounting is based not only on the nature of job done or the manufacturing system but also upon the circumstances in which labor costs are incurred. It also depends upon the organisation structure. Salary of a supervisor is direct if he supervises a particular job and it is indirect if he is engaged in supervision of different jobs.

The importance of distinction between direct and indirect labor costs is to provide a more accurate product cost and to exercise a strict control over labor cost. The direct labor cost is charged to jobs and forms part of the prime cost, whereas indirect labor cost becomes a part of overheads.

Indirect labor is the work and costs of those who don't directly produce or make anything. It is contrasted to direct labor, usually performed by those employees who make part or all of a product that can then be sold, installed or et cetera. This term is often used in manufacturing most, because it's easy to see the dividing line between the workers who produce something, and those people who support production.

It shouldn't be concluded that indirect labor is unimportant. In the average factory, it's clearly vital that direct laborers be able to do their work and create a product. Yet a company would not run well without staffing a number of support positions.

Laborers won't be particularly happy without someone there to work on payroll and to pay them, or without people who order products, keep machines running, create a weekly work schedule, and take care of employee conflicts or disputes. Depending on the company, people like supervisors, payroll experts, human resource specialists, salespeople, inventory experts, quality control inspectors, machinists, engineers and others need to contribute in the working environment too, in order to make the company run successfully. One of the reasons that indirect labor is distinct from direct labor is because many companies calculate costs and expenditures by dividing the two. If a business is giving a bill to someone for a specific job, they may separate indirect and direct labor to show comparative costs. The business also benefits from having this information as it tries to cut costs. A company that seems to have disproportionate indirect and direct labor costs might make plans to trim costs by eliminating some of the money paid out in indirect labor.

Indirect labor costs can include more than differences between employees who support and produce. Part of successful scheduling is to make certain employees have little idle time. Even if an employee is principally involved in production of goods, poor scheduling or things like poor machine maintenance can lead to employee idle time. This is when employees are paid but aren't producing any kind of work, and it is usually classed as indirect labor. Evaluating scheduling and making changes may reduce this cause and lead to producing employees being able to work more at production during each workday.

In any instance where a company considers how its money is being spent, a sense of balance is appropriate. Shaving too many indirect labor costs may cause producing employees to be less supported in the workplace. Disproportionately high indirect labor expenses may suggest that supportive employees are more valued than producers, which is equally problematic. Companies need to think hard on how to balance costs, allocating sufficient resources to all workers and departments.

Indirect labors are not directly traceable). Examples: janitors, supervisors, materials handlers, engineers, security guards, maintenance workers, etc. A further breakdown of

indirect labor costs include idle time, overtime premiums, and labor fringe benefits. These will be discussed below:

- Idle time: is the workers' time that accumulates during machine breakdowns, material shortages, power failures, receiving directions from superiors, etc. Idle time may not be assigned to one job, but as part of manufacturing overhead to be assigned to all production. Can idle time be prevented or reduced through good planning? How much idle time should be built into a plan?
- Overtime premium: If overtime can be directly identified with one project or product, it becomes a direct cost. Because jobs are completed in a random order, overtime becomes indirect labor costs instead of direct labor. Should we assign all the overhead costs to a job just because it was worked on at the end of the day when the overtime was put in? Should overtime be built into a management plan? What is more important -- meeting deadlines or incurring additional labor costs? Can a concern for human resources enter into this discussion?
- Labor fringe benefits: employment costs paid by the employer. These are hidden costs to the employee and the public. The cost of employing a person does not end at the amount of gross wage. The employer must match Canada Pension Plan (CPP), contribute to Employment Insurance (EI) and Workers' Compensation, and may contribute to company pensions, hospital plans, etc. Firms usually treat these costs as manufacturing overhead but may assign a portion to direct labor. Indirectly these costs are charged back to the consumer in the manufacturing overhead.

Labor and overhead combined are called the conversion costs of the firm. The conversion cost may be considered the cost of taking an original product and modifying it into a final product.

Standard Cost Per Unit - Standard cost per unit

Sum of the standard costs for direct materials, direct labor, and manufacturing overhead

Variances from Standards - Variances from standard are differences between total actual costs and total standard costs.

- Unfavorable variances occur when too much is paid for materials and labor or when there are inefficiencies in using materials and labor
- Favorable variances occur when there are efficiencies in incurring costs and in using materials and labor

VARIANCE RELATIONSHIPS

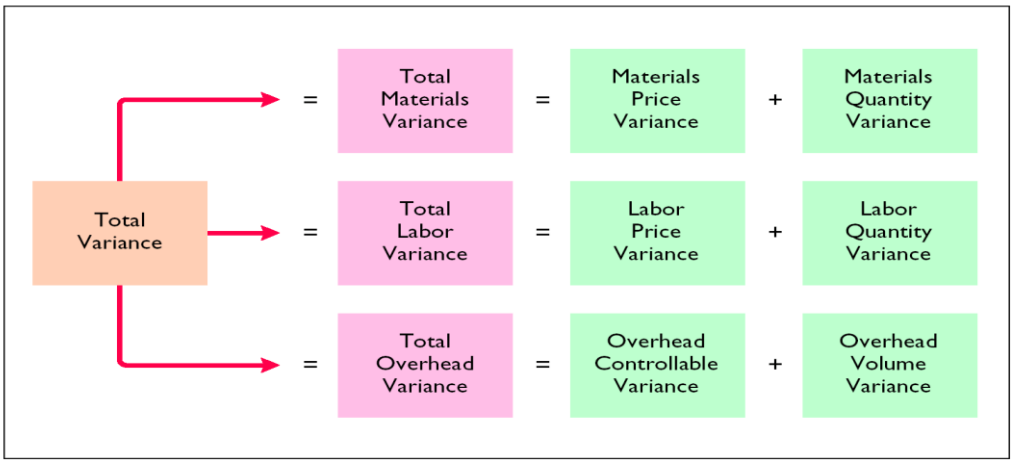


Figure 17: Variance relationship

- Formula for Materials Price Variance The materials price variance is determined from the following formula: MPV = (AP – SP)AQ
  Actual quantity x actual price (AQ) x (AP)- Actual quantity x standard price (AQ) x (SP) = Materials price variance (MPV)
- Formula for Materials Efficiency Variance The materials efficiency variance is determined from the following formula: MQV = (AQ – SQ)SP
  Actual quantity x standard price (AQ) x (SP)- Standard quantity x standard price (SQ)x(SP) = Material quantity variance (MQV)

- Formula for Labor Price Variance - The formula for the labor price variance is as follows: LPV = (AR – SR)AH *or* LPV = (AP – SP)AQ

Actual hours x actual rate (AH) x (AR) - actual hours x standard rate(AH)x (SR) = labor price variance (LPV)

- Formula for Labor Efficiency Variance The labor efficiency variance is derived from the following formula :LQV = (AH – SH)SR *or* LQV = (AQ - SQ)SP
- Actual hours x standard rate (AH)x(SR)- Standard hours x standard rate(SH)x (SR) = labor quantity variance (LQV)

Self-Check 3	Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total Points: 20)**

1. State true of false **(4 points)**

1. In the absence of international standard definitions, wage earners and salaried employees should be distinguished according to the criteria most suitable for statistical operations in the country concerned.
2. ._____ is a part of wage-bill or payroll that can be specifically and consistently assigned to or associated with the manufacture of a product, a particular work order, or provision of a service
3. ._____ usually represents individuals with no technical business skills
4. Part of successful _____ is to make certain employees have little idle time.

2. Short answers: **(16 points)**

1. Describe direct labor cost (2 points)
2. List 4 important features of direct labor (2 points)
3. Quote 3 examples of the direct labor engaged in various industries (2 points)
4. The formula for calculating standard direct labor cost per unit is (2 points)
5. Explain briefly about fixed labor (2 points)
6. What is the difference between direct & indirect labor (2 points)

7. In product costing , name few of the factors which contribute to indirect labor cost . (2 points)

8. What are the conversion costs of a firm (2 points)

Note: **Satisfactory rating - 10 points and above** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-4	Identifying labor hours and other statistics

One of the principles of effective planning involves how best to estimate the labor hours for a job plan. It turns out that the simple opinion of a skilled technician is preferred over complex methods such as using industrial engineering standards or methods such as averaging past job performance.

The chore of estimating labor hours for a job is a serious planning issue. It can consume so much time that planners can't keep up and leave unplanned work at the time of scheduling. We must have estimates of labor hours to support scheduling and promote productivity.

Planners struggle too much over developing an accurate estimate for each job. Many managers expect planners to develop perfect time estimates. They may even grade technicians and planners on actual field performance vs. the estimates. As a result, planners agonize over the estimates to the point where they don't get all the jobs planned; even the ones planned still aren't "accurate."

The nature of maintenance work in a large industrial complex is that planners can't say with certainty how long a job might take. Maintenance work isn't assembly line work. Job time depends on the actual condition of the equipment and the actual technician assigned. A planner doesn't know exactly what needs to be done. The planner doesn't have perfect vision knowing exactly how many bolts need to be burned off.

The planner doesn't know the actual condition of the equipment before disassembly. In addition, the person assigned to the job may or may not be a top technician. He or she might be the least-skilled technician on the crew. Experience shows that the best estimates are routinely off as much as 100 percent. A job estimated to take five labor hours might take as many as 10 hours or as few as two.

Some plants instruct planners to use industrial engineering standards for each tiny portion of a job. For example, planners figure how long each bolt should take to be

removed times the number of bolts and then add how fast a typical person walks times the distance the job is from the shop.

They add the job elements together for a total plan estimate. Not only does this type of estimate take forever, it's no more accurate than plus or minus 100 percent. This method is more appropriate for estimating an assembly line task. The execution of an assembly line task thousands of times in a week (or day) justifies the time spent on the estimate.

Specific maintenance tasks are usually unique in their actual conditions. Maintenance might service the same type of equipment but in different applications. Also, maintenance may perform the same task only once or twice each year for any specific application, so developing an engineered standard may not be worthwhile.

The past performance also can include activities such as time associated with interrupting the work. Second, we want a standard, even if not an engineered one. We want to know how long the job should take a qualified tech to perform, but we don't want an estimate to include lesser-skilled technician efforts or unusual past problems.

It turns out that a skilled technician can usually make just as accurate an estimate (plus or minus 100 percent) from a simple review of the job and a quick review of the equipment file (if any history exists). The planner with a skilled technician background should estimate labor hours for a smooth job by a qualified technician. This yields a standard, as accurate as any, for typical maintenance.

What good are "plus or minus 100 percent" estimates? They aren't dependable for individual jobs, but they are extremely useful for a grouping of jobs.

Schedulers can group a week's worth of work very accurately. Also, a supervisor can assign a day's worth of work with better control. A single job planned for five hours might run high or low, but a supervisor has more control in assigning a five-hour job, a two-hour job and a one-hour job to an eight-hour technician than if he didn't have any estimates.

The simple estimate of a planner with significant craft experience is preferred over other methods. It yields an estimate useful for scheduling, and the planners can also keep up with the backlog to support scheduling.

Calculating a standard direct labor cost per unit rate lets you set a tolerance range of direct labor variance costs. You can use this information to identity and investigate why your actual costs are higher or lower than your standard direct labor per unit costs. Knowing the direct labor cost per unit makes pricing and margin management much easier.

Calculate the Hourly Rate

The direct labor hourly rate, also known as the labor rate standard, includes the hourly pay rate, fringe benefits costs and your portion of employee payroll taxes. Calculate the hourly value of fringe benefits and employee taxes by dividing that amount by the number of hours worked in the pay period.

For example, your employee earns **10birr** an hour, works a 40-hour week and has payroll taxes of **60birr**. Divide **60 birr** by 40 to get the hourly rate of **1.50birr**. Add the **1.50birr** in employee payroll tax to the **10birr** hourly rate to get the total direct labor hourly rate of **11.50birr**.

Calculate Labor Hours

Direct labor hours, also known as the direct labor efficiency standard, is the number of direct labor hours it takes to produce one finished item, according to Accounting Coach. If you produce goods in batches, you must calculate per unit direct labor hours. To find this number, divide the number of items produced by the number of hours it takes to produce it. For example, if it takes 10 hours to produce 10 items, it takes one direct labor hour to produce one finished product.

Calculate Per Unit Cost

The direct standard labor rate is your direct labor cost per unit. To calculate the number, multiply the direct labor hourly rate by the number of direct labor hours required to complete one unit. As a labor cost example, if the direct labor hourly rate is 10birr and it takes five hours to complete one unit, the direct labor cost per unit is $10 multiplied by five hours, or 50 birr. It may be best to set up a labor cost calculator in excel to keep track of these figures over time.

Direct Labor Cost Variance

The direct labor cost variance lets you identify when costs exceed the tolerance range, according to Simple Studies. Calculate the actual direct labor cost per unit and compare it with the direct labor standard rate. The difference is your direct labor cost variance.

If the actual direct labor cost per unit is less than the direct labor standard rate, you have a favorable variance; it costs you less to produce the items than expected. If the actual direct labor cost per unit is more than the direct labor standard rate, you have an unfavorable variance; it costs you more to produce the items than expected.

Controlling direct labor costs is an important part of making sure that your business maintains its profitability.

Self-Check 4	Written Test

Name: _____ **Date:** _____

(Total marks:)

Instructions: Write all your answers in the provided answer sheet on page

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

2. Short answers: **(16 points)**

1. Describe direct labor cost (2 points)
2. List 4 important features of direct labor (2 points)
3. Quote 3 examples of the direct labor engaged in various industries (2 points)
4. The formula for calculating standard direct labor cost per unit is (2 points)
5. Explain briefly about fixed labor (2 points)
6. What is the difference between direct & indirect labor (2 points)
7. In product costing, name few of the factors which contribute to indirect labor cost . (2 points)
8. What are the conversion costs of a firm (2 points)

LG #39	LO #3- Calculate product costs and document

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying total materials, labor and overhead cost allowances
- Estimating available machine hours
- Calculating total job cost including overheads and mark-up percentages
- Finalizing overall cost and recording
- Verifying costs, calculations or other details and documenting for future reference

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Calculate costs of total materials, labor and overhead cost allowances are calculated in accordance with enterprise procedures
- Find total job cost including overheads and mark-up percentages is calculated
- Finally be able to finalize the cost is and recorded in accordance with enterprise standard

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.

5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet-1	Identifying total materials, labor and overhead cost allowances

Costing is the function – normally undertaken by administration and/or the management of manufacturing companies – to identify and compute occurring costs associated with production and related activities. It is part of a much wider subject called cost accountancy. The cost accounting system of any organization is the foundation of the internal financial information system providing reports/statements on profit and loss accounts (incomes and expenditures), the balance sheet (the financial position of the organization or firm), sources and application of funds (cash-flow).

Pricing is the act or decision when the offered price of a given product or service is determined by the supplier (manufacturer or trader = seller). In market economy conditions prices are set according to the assumed competitive market value of the product, i.e. in comparison with similar – in terms of their function and quality – products supplied by other manufacturers and/or traders. The competitive price is usually established at the retail level and deducting the estimated margins added by all parties involved in the factory–customer chain, derives the suggested exfactory price.

Profit is the prime objective of manufacturing and trading. In order to ensure positive financial results, costing and pricing should be based on a thorough analysis of the cost components. Analytical cost computations may be related to the entire production: it is primarily used in opportunity and (pre)feasibility studies, as well as by company management to find ways to reduce/eliminate expenses and increase the profitability of the operation; individual products (units): the objective is to compare their competitiveness, resources (material and labor/capacity) requirements, contribution to the overall profit or loss made.

An example of production costing for 400,000 pairs/year = 1,600 pairs/day men shoe manufacturing is shown in the following table:

Component US$

Materials	4,057,500
Labor	90,000
Electricity	60,000
Fuel	15,000
Repair and maintenance	50,000
Factory overheads	108,000
FACTORY COSTS	4,380,500
Administrative overheads	310,000
Sales costs	25,000
Distribution costs	324,000
OPERATING COSTS	5,039,500
Interests	192,000
Depreciation	128,000
PRODUCTION COSTS	**5,349,500**

3.1.1 Raw Material

A material or substance used in the primary production or manufacturing of a good. Raw materials are often natural resources such as oil, iron and wood. Before being used in the manufacturing process raw materials often are altered to be used in different processes. Raw materials are often referred to as commodities, which are bought and sold on commodities exchanges around the world.

Raw materials can be explained as substance or material used in the manufacturing or primary production of goods. Generally, raw materials are natural resources like oil, wood, and iron. Raw materials are often altered for use in various processes prior to being used in the manufacturing process. Raw materials are also referred to as commodities, which are purchased and sold on commodities exchanges throughout the world.

Raw materials are sold in what is known as the factor market. This is due to the reason of raw materials being factors of production in addition to labor and capital. Raw materials play an important role in the production process to a great extent as the

success of the economy of a country is determined by the amount of natural resources held by a country within its borders. A country holding ample amount of natural resources does not require importing of as many raw materials.

There are several raw materials used in footwear industry. To name a few for raw material are leather , synthetic, poromerics , interlining , lining , insole , sole , sock, in-sock , heel grip , heel , unit sole , synthetic soles like PU , TPR , PVC , toe puff stiffener , counter stiffener , packing material , finishes like top coat , fillers , lasts, Needles, thread, cutting blades, die, reinforcement, tacks, nails, adhesives (latex, neoprene, polyurethane etc.)

Material costing - Materials are direct inputs mainly procured for the production, so the cost of each component or their groups (e.g. upper, lining) is computed as a product of the requirements and the corresponding unit prices. Cost of components cut from sheet materials such as genuine or simulated leather, textile/canvas, rubber, card or leather-board should also include waste occurring due to the configuration of patterns (first waste), the differences in edges of components and materials (side or second waste) and imperfections in the genuine leather (fault or third waste).

Assessing the required genuine leather for a specific style is normally done by determining the so-called parallelogram area (see examples below) comprising the net pattern area and the unavoidable waste among the patterns which is called first waste. Special algorithms (e.g. SLM – Scientific Leather Measurement, Shusterovich's method) exist for computing side waste for genuine leather, while standard percentages are used for estimating side waste in the case of man-made materials. Fault wastes depend on the quality (grade) of the genuine leather.

Some components (e.g. buckles, eyelets, heels, unit soles) are built into footwear construction without any (substantial) modification. Nevertheless, the rate of rejects in supply should be taken into consideration when their costs are added to direct materials.

STYLE NO.	LAST NO	MENS/ LADIES/ CHILDREN

001	H 17774	MEN'S			
TYPE OF SHOE	CUSTOMER	COSTING SIZE			
MEN'S OXFORD		8			
PRICE VALIDITY	FROM		TO		
CURRENCY RATE	ETB				
SHOE COMPONENTS	AMOUNT	UNIT	PRICE	UNIT	COST (ETB)/PRS.
Upper material(Cow F.G. 1.2-1.4)	2.05	Sq. Ft.	30.00	Sq. ft.	61.50
Lining Material (Goat natural0.7-0.9)	1.4	Sq.Ft.	19	Sq. Ft.	26.60
Socks half/Full	0.4	Sq.Ft.	14	Sq. Ft.	5.60
Interlining Textile	0.0625	Mtrs	12	Mtrs.	0.75
Needles (34 LR &134 PCL)	50	Prs./Needle	3	Needle	0.06
Thread (60/3)	20	Mtr/.prs.	0.011	Mtr	0.22
Thread (40/3)	4	Mtr./prs	0.009	Mtr.	0.04
Thread		Mtr/Prs.		Mtr.	
Tapes (Top line-2 mm)	0.5	Mtr/prs	0.06	Mtrs.	0.03
Tapes (20mm wide)	0.125	Mtr/prs	0.06	Mtrs.	0.0075
Tapes		Mtr/prs.		Mtr.	
Laces	1	Prs.	1.0	Prs.	1.00
Elastic		Mtrs/Prs		Mtrs.	
Eyelet (Brass Blend)	210	Pcs.	0.03	Pcs	0.33
Metallic Trimms		/Prs.			
Consumables, thermo adhesive for folding, rubber sol. Etc.					4.00
Counter	32 Prs	Sheet	75	Sheet	2.34
Toe puff	68 Prs.	Sheet	45	Sheet	0.66

Unit sole of leather/TPR/TR/Rubber		70.00
Insole		7.00
Shoe consumables Tacks/Glue/Finish		5.00
Shoe Box		3.00
Shoe carton		7.00
Strap/ labels		1.00
Total Material Cost		196.14
	Provision for rejection (5%)	9.81
Total Material Cost		205.95

Note: For material costing please refer to the unit of competency no. IND FWP2 M02 0212: Estimating Upper Material Requirement for Footwear.

3.1.2 Labor costing

It includes the HR rules & regulations for the specific country & the organizations specified in a particular format which can have cost like pensions, allowances, hospitalization, prevention, first aid, transportation, administration etc.

Direct labor costs are proportional to the time used to perform all operations of the entire technological process. Usually standard times (norms) are allocated for each operation on the basis of time studies (industrial engineering). The total time needed to produce a given style multiplied by average wages paid to operators in the company (plant) gives direct labor costs.

Labor costs are the total amount of money paid to employees for a period, such as a week or a month. In manufacturing businesses, often management will break down labor costs into direct costs and indirect costs. These terms just refer to if the labor went to direct production of material or if the cost was indirectly related to the production of

the material. Larger companies should try to utilize computer software to calculate these costs due to the large volume of employees.

Piece Rate Pay Calculation

A *piece rate pay* plan can be used by a business that wants to pay its employees based on the number of units of production that they complete. Using this type of pay plan converts compensation into a cost that directly varies with sales, assuming that all produced goods are immediately sold. If goods are instead stored in inventory for a time and then sold at a later date, there is not such a perfect linkage in the financial statements between sales generated and piece rate labor costs incurred.

Use the following method to calculate wages under the piece rate method:

Rate paid per unit of production × Number of units completed in the pay period

If a company uses the piece rate method, it must still pay its employees for overtime hours worked. There are two methods available for calculating the amount of this overtime, which are:

Multiply the regular piece rate by at least 1.5 to arrive at the overtime piece rate, and multiply it by the hours worked during an overtime period. You can only use this method when both the company and the employee have agreed to use it prior to the overtime being worked.

Divide hours worked into the total piece rate pay, and then add the overtime premium (if any) to the excess number of hours worked.

Example 1:

Piece Rate Pay Example

October Systems manufactures gents shoes, and pays its staff a piece rate of 0.3 birr for each pair cut. Employee Seth Jones cuts 10 pairs in a standard 8-hour work/day, for which he is paid 30 birr (100 pair's × 0.3 birr piece rate).

Mr. Jones works an additional 2 hours, and cut another 20 pairs during that time. To determine his pay for this extra time period, October Systems first calculates his pay during the normal work day. Overtime payment will be 6 birr (20 pairs X 0.3 birr/pair).

Step-1

We can show it like this:

Total no. of pair's cut/day:	600
Paris cut/ day/worker (8 hrs shift):	100 pairs
No. of cutter's required:	600/100 = 6 cutter
Per pair wages:	0.3 birr
Total wages/ day	100 X 0.3 X 6 = 180 birr/day
No. of days in a month:	25 day
Total wage for a month:	180 X 25 = 4500 birr

(i) Wages per pair: 0.3 birr

Step-2

Closing Department Labor Cost:

Example 2:

LABOR COST CALCULATION IN CLOSING						
LINE 1						
ARTICLE: 1234		**PAIRS515 :DAY/OUTPUT**				
ONE MONTH: 25 DAYS		**TOTAL PRODUCTION IN A MONTH: 12875 PAIRS**				
SR.NO	**OPERATION**	**PROPOSED MANPOWER**	**TYPE OF MANPOWER**	**SALARY/MONTH/MANPOWER**	**SALARY/ MONTH/ OPERATION**	**SALARY/PAIR/ OPERATION**
1	Stamping	1	SKILLED	1500	1500	0.116505
2	Edge fiber burning	2	UN-SKILLED	1000	2000	0.15534
3	quarter back seaming	1	SKILLED	1500	1500	0.116505

4	Seam rubbing and tapping	1	SEMI-SKILLED	1200	1200	0.093204
5	Heelgrip Stitching	1	UNSKILLED	1000	1000	0.07767
6	Toe cap gluing & attaching	1	UNSKILLED	1000	1000	0.07767
7	toe cap stitching	1	SKILLED	1500	1500	0.116505
8	Tongue stitchng	1	SKILLED	1500	1500	0.116505
9	Quarter Zigzag stitching	1	SKILLED	1500	1500	0.116505
10	Eyelet face stitching	2	SKILLED	1500	3000	0.23301
11	Back counter gluing and attaching	1	SEMI-SKILLED	1200	1200	0.093204
12 (1)	Back counter stitching	1	SKILLED	1500	1500	0.116505
12(2)	Back counter stitching(double needle)	2	SKILLED	1500	3000	0.23301
13	Back strap gluing and attaching	1	SEMI-SKILLED	1200	1200	0.093204
14	Back strap Stitching	1	SKILLED	1500	1500	0.116505
15	Elasting gluing and attaching	2	SEMI-SKILLED	1200	2400	0.186408
16	lining gluing & attaching	3	UNSKILLED	1000	3000	0.23301
17	Quarter top edge decoration	3	SKILLED	1500	4500	0.349515

	Stitching					
18(1)	Vamp reinforcement attaching	1	UNSKILLED	1000	1000	0.07767
18(2)	Sttiffner attaching	1	UNSKILLED	1000	1000	0.07767
19	vamp Textile and tongue lining, glueing and attaching	2	UNSKILLED	1000	2000	0.15534
20	Tongue top edge stitching	2	SKILLED	1500	3000	0.23301
21	Trimming quarter top edge	1	SEMI-SKILLED	1200	1200	0.093204
22	Trimming tongue top edge	1	SEMI-SKILLED	1200	1200	0.093204
23	Trimming elastic & tongue side	1	UNSKILLED	1000	1000	0.07767
24	Cementing quarter and vamp	1	UNSKILLED	1000	1000	0.07767
25	Attaching quarter on vamp and glueing	4	SEMI-SKILLED	1200	4800	0.372816
26	Quarter lower edge double needle stitching	2	SKILLED	1500	3000	0.23301
27	eyelet face Stitching /Lock Stitching	3	SKILLED	1500	4500	0.349515
28	Thread Trimming and thread burning	2	SKILLED	1500	1500	0.116505
29	Cementing counter	1	UNSKILLE	1000	1000	0.07767

	stiffner and counter area		D			
30	Counter Stiffner attaching	2	UNSKILLED	1000	2000	0.15534
31	Counter Molding	1	SEMI-SKILLED	1200	1200	0.093204
32	Vamp Top edge Stitching for lasting	1	SKILLED	1500	1500	0.116505
34	Eyelet Punching	1	SEMI-SKILLED	1200	1200	0.093204
35	Eyelet Putting	1	SEMI-SKILLED	1200	1200	0.093204
36	Eyeleting	1	SEMI-SKILLED	1200	1200	0.093204
37	Checking & cleaning	1	SKILLED	1500	1500	0.093204
	TOTAL	**55**			**70000**	**5.413599**

NOTE: It is assumed:
SKILLED OPERATIOR: 1500 BIRR
SEMI-SKILLED: 1200 BIRR
UNSKILLED: 1000 BIRR

(ii) Total labor cost/pair of stitching: 5.41 Birr

LABOR COST CALCULATION IN LASTING	
LINE 1	
ARTICLE: 1234	**PAIRS515 :DAY/OUTPUT**

ONE MONTH: 25 DAYS		TOTAL PRODUCTION IN A MONTH: 12875 PAIRS				
SR .NO	OPERATION	PROPOSED MANPOWER	TYPE OF MANPOWER	SALARY/MONTH/MANPOWER	SALARY/MONTH/OPERATION	SALARY/PAIR/OPERATION
1	Insole tacking	1	SEMI-SKILLED	1200	1200	0.093
2	Halogenations	2	UN-SKILLED	1000	2000	0.155
3	Feeding or loading (upper & sole)	1	SEMI-SKILLED	1200	1200	0.093
4	Toe conditioning	1	SEMI-SKILLED	1200	1200	0.093
5	Toe lasting	1	SKILLED	1500	1500	0.117
6	Heel height setting	2	SEMI-SKILLED	1200	1200	0.093
7	Glue application (for side & seat part)	2	UNSKILLED	1000	2000	0.155
8	Heat reactivation	1	UNSKILLED	1000	1000	0.078
9	Side & seat lasting	1	SKILLED	1500	1500	0.117
10	Nail removal	2	UNSKILLED	1000	1000	0.078
11	Heat setting application	1	UNSKILLED	1000	1000	0.078
12	Ironing	1	SEMI-SKILLED	1200	1200	0.093
13	Pounding	1	SKILLED	1500	1500	0.117
14	Pigment application	2	SEMI-SKILLED	1200	1200	0.093
15	Brushing	1	SKILLED	1500	1500	0.117
16	Scouring &	1	SKILLED	1500	1500	0.117

	roughing					
17	1st coat adhesive application for sole	2	SEMI-SKILLED	1200	2400	0.186
18	1st coat adhesive application for upper	2	SEMI-SKILLED	1200	2400	0.186
19	2nd coat adhesive application for upper	2	SEMI-SKILLED	1200	2400	0.186
20	Heat reactivation for sole and upper	1	SEMI-SKILLED	1200	1200	0.093
21	Sole pressing	1	SKILLED	1500	1500	0.117
22	Brushing (for removal of glue)	1	SEMI-SKILLED	1200	1200	0.093
23	Delasting	2	SEMI-SKILLED	1200	2400	0.186
24	Sock lining cementing & attaching	2	SEMI-SKILLED	1200	2400	0.186
25	Finishing	1	UNSKILLED	1000	1000	0.078
26	Shoe lacing	1	UNSKILLED	1000	1000	0.078
27	Finishing brushing (polishing)	1	SKILLED	1500	1500	0.117
28	Checking & packing	1	SKILLED	1500	1500	0.117
	TOTAL	**38**				**3.309**

(iii) Labor cost/pair in lasting: 3.309 Birr/pair

Total labor cost:

(i)	**Cutting Department:**	**0.30 Birr**
(ii)	**Stitching Department:**	**5.41 Birr**
(iii)	**Lasting Department:**	**3.31 Birr**
		9.02 Birr

Step-3

3.1.3 Tooling: Under this head we include the items which are used for making shoe like shoe designer's tool kit, shoe making tool kit, machine maintenance & electricians tool kit, clicking dies, pvc lasts, clicking pads, spray gun, testing equipments, thickness gauge, measuring scale, workshop tables, racks, other furniture and equipments etc.

Cost calculation of tools & equipments:

Sr.No.	Description	Ind/Imp.	Qty.	Price	Total Value
				ETB	**ETB**
1	Shoe designer tool kit	Imp.	1 set	3000	3,000
2	Shoe making tool kits	Imp.	10 sets	2,000	20,000
3	Machine maintenenance & Electricians tool kit	Imp.	1 set	2,000	2,000
4	Clicking dies-1 set each	do	12 sets	7,500	90,000
5	PVC last	do	200 pairs	600	120,000
6	Clicking pads, Spray gun & other equip.	do	-----	-----	20,000

7	Testing equipments, thickness gauge, measuring scale etc.	do	-----	-----	20,000
8	Workshop tables racks etc.	do	-----	-----	50,000
9	Other furniture and equipments	do	-----	-----	50,000
Total					**5,95,000**

Let us assume tools & equipment life is for 1 years

Total investment/month on tools & equipments: 595000/12 =49583.33 Birr

Cost/pair on tools & equipments: 49583.33/12875 =3.85 Birr

Step-4

3.1.4 OVERHEADS

An accounting term that refers to all ongoing business expenses not including or related to direct labor, direct materials or third-party expenses that are billed directly to customers. Overhead must be paid for on an ongoing basis, regardless of whether a company is doing a high or low volume of business. It is important not just for budgeting purposes, but for determining how much a company must charge for its products or services to make a profit. For example, a service-based business that operates in a traditional white-collar office setting would have overhead expenses such as rent, utilities and insurance.

Overhead expenses can be fixed, meaning they are the same from month to month, or variable, meaning they increase or decrease depending on the business's activity level. They can also be semi-variable, meaning that some portion of the expense will be incurred no matter what, and some portion depends on the level of business activity. Overhead can also be general, meaning that it applies to the company's operations as a whole, or applied, meaning that it can be allocated to a specific project or department. These expenses are typically found on a company's income statement.

Overhead refers to all non-labor expenses required to operate your business. These expenses are either fixed or variable:

Fixed expenses: No matter what your sales volume is, fixed costs must be met every month. Fixed expenses include rent or mortgage payments, depreciation on fixed assets (such as cars and office equipment), salaries and associated payroll costs, liability and other insurance, utilities, membership dues and subscriptions (which can sometimes be affected by sales volume), and legal and accounting costs. These expenses don't change, regardless of whether a company's revenue goes up or down.

Variable expenses: Most so-called variable expenses are really semi variable expenses that fluctuate from month to month in relation to sales and other factors, such as promotional efforts, change of season, and variations in the prices of supplies and services. Fitting into this category are expenses for telephone, office supplies (the more business, the greater the use of these items), printing, packaging, mailing, advertising, and promotion. When estimating variable expenses, use an average figure based on an estimate of the yearly total.

Few authors also analyze the costs in following ways:

In the world of manufacturing—as competition becomes more intense and customers demand more services—it is important that management not only control its overhead but also understand how it is assigned to products and ultimately reported on the company's financial statements. We view overhead as two types of costs and define them as follows:

1. **Manufacturing overhead** (also referred to as factory overhead, factory burden, and manufacturing support costs) refers to indirect factory-related costs that are incurred when a product is manufactured. Along with costs such as direct material and direct labor, the cost of manufacturing overhead must be assigned to each unit produced so that inventory and cost of goods sold are valued and reported according to generally accepted accounting principles (GAAP).

Manufacturing overhead includes such things as the electricity used to operate the factory equipment, depreciation on the factory equipment and building, factory supplies and factory personnel (other than direct labor). How these costs are assigned to products has an impact on the measurement of an individual product's profitability.

2. **Nonmanufacturing costs** (sometimes referred to as "administrative overhead") represent a manufacturer's expenses that occur apart from the actual manufacturing function. In accounting and financial terminology, the nonmanufacturing costs include selling, general and administrative (SG&A) expenses, and interest expense. Since accounting principles do not consider these expenses as product costs, they are not assigned to inventory or to the cost of goods sold. Instead, nonmanufacturing costs are simply reported as expenses on the income statement at the time they are incurred.

Nonmanufacturing costs include activities associated with the Selling and General Administrative functions. Examples include the compensation of nonmanufacturing personnel; occupancy expenses for nonmanufacturing facilities (rent, light, heat, property taxes, maintenance, etc.); depreciation of nonmanufacturing equipment; expenses for automobiles and trucks used to sell and deliver products; and interest expenses. (Note that factory administration expenses are considered part of manufacturing overhead.)

Although nonmanufacturing costs are not assigned to products for purposes of reporting inventory and the cost of goods sold on a company's financial statements, they should always be considered as part of the total cost of providing a specific product to a specific customer. For a product to be profitable, its selling price must be greater than the sum of the product cost (direct material, direct labor, and manufacturing overhead) plus the nonmanufacturing costs and expenses. Manufacturing Overhead Costs

On financial statements, each product must include the costs of the following:

1. Direct material
2. Direct labor

3. Manufacturing (or factory) overhead

According to generally accepted accounting principles (GAAP), manufacturing overhead must be included in the cost of work in process inventory and finished goods inventory on a manufacturer's balance sheet, as well as in the Cost of Goods Sold on its income statement.

As their names indicate, direct material and direct labor costs are directly traceable to the products being manufactured. Manufacturing overhead, however, consists of indirect factory-related costs and as such must be divided up and allocated to each unit produced. For example, the property tax on a factory building is part of manufacturing overhead. Although the property tax covers an entire year and appears as one large amount on just one tax bill, GAAP requires that a portion of this amount be allocated or assigned to each product manufactured during that year.

Some of the costs that would typically be included in manufacturing overhead include:

1. Material handlers (forklift operators who move materials and units).
2. People who set up the manufacturing equipment to the required specifications.
3. People who inspect products as they are being produced.
4. People who perform maintenance on the equipment.
5. People who clean the manufacturing area.
6. People who perform record keeping for the manufacturing processes.
7. Factory management team.

Note: For the seven items above, the company will incur costs for salaries, wages, Social Security and Medicare taxes, unemployment compensation tax, worker compensation insurance, health insurance, holiday pay, vacation pay, sick pay, pension or retirement plan, seminars and training, and perhaps more.)

1. Electricity, natural gas, water, and sewer for operating the manufacturing facilities and equipment.
2. Computer and communication systems for the manufacturing function.
3. Repair parts for the manufacturing equipment and facilities.
4. Supplies for operating the manufacturing process.

5. Depreciation on the manufacturing equipment and facilities.
6. Insurance and property taxes on the manufacturing equipment and facilities.
7. Safety and environmental costs.

Note that all of the items in the list above pertain to the manufacturing function of the business. Since the costs and expenses relating to a company's administrative, selling, and financing functions are not considered to be part of manufacturing overhead, they are not reported as part of the final product cost on financial statements. Rather, nonmanufacturing expenses are reported separately (as SG&A and interest expense) on the income statement during the accounting period in which they are incurred.

As mentioned above, in order for a manufacturer's financial statements to be in compliance with GAAP overhead must be allocated to each item produced. Even when allocations are arbitrary and inaccurate, the totals of the amounts reported as inventory and cost of goods sold on the financial statements can still be reasonably correct. For example, if a manufacturer's inventory is minimal or if the beginning and ending inventories are similar in amount, this indicates that the company is selling nearly all of the units it produced in a given year. If that is the case, then as long as most of the manufacturing overhead appears on the income statement as part of the cost of goods sold, the financial statements will be correct—even if the amounts allocated to the individual products are inaccurate. The message here is this: Even if each product's costs are wrong due to inaccurate allocations of manufacturing overhead, it is still possible that the financial statements will be accurate and receive a clean audit report.

However, if management wants to know the true cost of manufacturing an individual item, it is essential that the manufacturing overhead be allocated in a precise and logical manner. In addition to knowing the true cost of manufacturing each item, management needs to know the true expense of all of the other business functions involved with an individual item. In this way, management will know if each product and each customer is generating enough sales revenue to cover not only manufacturing costs but also selling, general and administrative, interest expense, and some profit. This means that management will need to allocate or assign nonmanufacturing costs to

individual products and customers (even though this type of allocation is not allowed for financial reporting).

In short, the financial statements can be considered as accurate even with improper allocation to individual products, but management's needs dictate that (1) the allocations of manufacturing overhead be truly accurate and (2) that the nonmanufacturing costs be accurately assigned to individual products and customers. For example, if an inaccurate allocation results in too much cost assigned to some products, management might seek price increases on those products when in reality such price increases are not necessary. If customers react to the proposed unnecessary price increases by seeking bids from other manufacturers, the company may end up losing sales, profits, and customers. Conversely, if inaccurate allocations result in *too* fewcosts assigned to some products, a company may not realize that a specific product's selling price is inadequate to cover the true costs needed to produce and sell that product. If the company does not pursue a price increase or improvements in efficiency, the company might be selling that product at a loss.

Although one doesn't necessarily need accurate allocations for purposes of preparing company's financial statements, the odds are that at some point down the road those inaccurate allocations may result in poor pricing decisions, and that's something you can't afford to do in an increasingly competitive global market.

Overheads Calculation:

(i) Salary (per month)				
A. Personal for workshop				
Sr.No.	**Description**	**No.**	**Salary (ETB)**	**Total Value (ETB)**
1	Production Manager (Tech.)	1	5,500	5,500
2	Designer	1	2,500	2,500
3	Supervisors (Tech.)	1	2,000	2,000
4	Electrician and mechanic	1	2,000	2,000

TOTAL				**12,000**
B. Personal for administration				
1	Accountant cum Cashier	1	3,000	3,000
2	Store Keeper	1	2,000	2,000
3	Watchmen	2	1,200	2,400
4	Sweeper	1	1,000	1,000
TOTAL				**8400**
TOTAL SALARY PER MONTH (A+B)				**20400**
Add 20% Perquisites				**4080**
TOAL				**24480**
TOTAL (ROUND OFF)				**24400**
(ii) Utilities (per month)				
1	Power			5,000
2	Fuel & water			2,000
TOTAL				**7,000**
(iii) Other Contingent Expenses (per month)				
1	Rent			20,000
2	Repair and Maintenance			2,000
3	Other Consumables store			1,000
4	Insurance			2,000
5	Postage and Telephones expenses			2,000
6	Stationery & Printing			1,000
7	Traveling expenses			3,000
8	Other miscellaneous expenses			2,000
TOTAL				**33,000**

Total Overheads: (i) + (ii) + (iii) =	**24,400 + 7000 + 33000 = 64,400 Birr**
Per month production:	**12875 pairs**
Overheads cost per pair:	**64400/12875=5.00 Birr/pair**

STEP-4

3.1.5 **RECOUPMENT** – Recoupment cost implies the set – up costs, if the product is to be manufactured at the home plant or the procurement cost, if the item is to be purchased. Set-up cost is the “preparation cost” of the machines & it varies depending upon the number of production runs in a year .The procurement cost is the cost of raising a purchase order and processing the deliveries from the vendor and it varies depending on the frequency of receipts of the item from the vendor (s).

Plant and Machinery:-

SR. NO.	Description	Ind/Imp.	Qty.	Price	Total Value
				ETB.	ETB.
1	Swing arm hydraulic clicking press	Imp.	1	2, 00,000	2, 00,000
2	Stamping machine	Imp.	1	40,000	40,000
3	Upper skiving machine	do	1	35,000	35,000
4	Flat bed single needle sewing machine	do	3	12,000	36,000
5	Post bed single needle sewing machine	do	2	45,000	90,000
6	Roughing and Scouring machine	do	2	35,000	70,000
7	Reactivation chamber	do	1	10,000	10,000
8	Pneumatic sole attachment machine	do	1	1, 50,000	1, 50,000
9	Combined finishing machine	do	1	35,000	35,000

10	Spray booth and spray gun	do	1	15,000	15,000
11	Air compressor & distribution system	do	1	20,000	20,000
12	Electrification and erection of machine @ 10% on machinery cost				70,100
13	Computer, printer, Laptop etc.	do	----	----	1,00,000
14	Generator (10 kva)	do	---	---	1, 20,000
TOTAL					**7,71,100**

Let us assume plant & machinery life is for 7 years:

Total investment/month on plant & machinery: 771100/84 =9179.76 Birr

(i) Cost/pair on plant & machinery: 9179.76/12875 =0.71299 Birr

Pre-operative expenses:

Sr.No.	Description	Total Value
1	Preparation of project report and consultancy	30,000
2	Administrative expenses	10,000
3	Travelling, market development and tie-up	20,000
4	Other formalities and expenses prior to production	10,000
TOTAL		**70,000**

Let us assume pre-operative expenses will be recovered in 3 years

Total investment/month on pre-operative expenses: 70000/36 =1944.44 Birr

(ii)Cost/pair on pre-operative expenses: 1944.44/12875 =0.15102 Birr

Total recoupment cost/pair:	
(i) Cost/pair on plant & machinery:	0.7129 Birr
(ii) Cost/pair on pre-operative expenses:	0.1510 Birr
Total Cost/pair	**0.8639 Birr**

3.1.6 OUTSIDE OPEARTION COSTS – The item manufactured at the home plant may require sub-contracting of certain operations such as insole manufacturing, sole manufacturing, components like shank manufacturing in footwear & rough blanking, heat treatment, plating etc. The cost of such operations requires to be considered separately towards “cost to make”

3.1.7 PURCAHSE COST –

The price that an investor pays for a security. This price is important as it is the main component in calculating the returns achieved by the investor.

Essentially, it can be thought of as the price that is paid for anything that is bought.

Purchase cost includes the price given to the vendor, transport cost, excise, sales tax, octroi etc. It also includes the price that an investor pays for a security. This price is important as it is the main component in calculating the returns achieved by the investor.

Essentially, it can be thought of as the price that is paid for anything that is bought. For example, if an investor buys Ford stock at $15, then this would be the purchase price. When looking at the return on the investment, the investor would compare the purchase price of $15 to the price the investment was sold at or the current market price for Ford.

Purchase price can also refer to the price that a company pays for an item, such as another company. For example, if Ford bought Kia for $3.5 billion, this would be Ford's purchase price.

A business can make a profit by selling goods and/or services. If the business sells goods, it may also need to carry inventory. As such, it may be necessary for those in charge to calculate purchases of inventory to determine the cost of goods sold, the ending inventory amount or even the amount of inventory on hand at the beginning of the period.

Step 1							
Enter Estimated Sales and Beginning Inventory							
Estimated Sales From Sales Forecast Worksheet	**109,564**	**32,756**	**36,145**	**40,663**	34,450	43,487	
Beginning Inventory		21000					
Purchases							
Cost Of Sales							
Ending Inventory							
We begin this worksheet by entering our							
estimated sales and the actual beginng inventory							
as of the end of the prior period.							
Step 2							
Calculate Cost Of Sales							
In Step 2 we're going to calculate our estimated							

Cost Of Sales Amounts Using the Percentage							
Rate we calculated from our Prior Year Analysis.							
The rate used in this example is 55.77 %							
Estimated Sales From Sales Forecast Worksheet	**109,564**	**32,756**	**36,145**	**40,663**	34,450	43,487	
Beginning Inventory		21000					
Purchases							
Cost Of Sales		18268	20158	22678			
Ending Inventory							
Cost Of Sales Calculation							
Sales		32756	36415	40663			
Multiplied By 55.77 %		0.5577	0.5577	0.5577			
Calculated Cost Of Sales		18268	20158	22678			
Step 3							
Calculate Ending and Beginning Inventories							
In our example were going to calculate							

our estimated ending							
inventory based on our calculated inventory turnover							
and the number of month's supply that we normally							
maintain for future sales normal (inventory levels).							
Our assumed Inventory Turnover is 1.01 which means							
that on the average we convert our average inventory							
into sales once a month.							
We convert this calculation into number of months							
supply on hand by dividing 12 by our Inventory Turnover.							
Next we develop our assumptions regarding what							
Cost of Sales Amount and Period where going to use							
as an estimate for a Months Cost Of Inventory Sold.							
Our Example uses the following assumptions:							
If our calculated Months Supply is <=1							

Cost Of Sales For Next Period X Number Of Months Supply							
If our calculated Months Supply is >1 and <= 2							
Average Cost Of Sales For Next Two Periods							
X Number Of Months Supply							
If our calculated Months Supply is >2 and <=3							
Average Cost Of Sales For Next Three Periods							
X Number Of Months Supply							
If our calculated Months Supply >3							
Average Cost Of Sales For Number Of Periods Estimated							
X Number Of Months Supply							
Our Calculated Months Supply is 1.01 so our							
Calculation will Use The Following							
Two Months Cost Of Sales							
Note how we also carry our calculated inventory forward							
to the next month as the Beginning Inventory for That Month							

Estimated Sales From Sales Forecast Worksheet	**109,564**	**32,756**	**36,145**	**40,663**	34,450	43,487	
Beginning Inventory		21000	21650	21172			
Purchases							
Cost Of Sales		18268	20158	22678	19213	24253	
Ending Inventory		21632	21155	21950			
Formula To Calculate Ending Inventory =							
Average Cost Of Sales For Next Two Months							
X Months Supply							
Average Cost Of Salses							
Next Month		20158	22678	19213			
Second Following Month		22678	19213	24253			
Average		21418	20946	21733			
Average Cost Of Sales X Months Supply							
Average Cost Of Sales		21418	20946	21733			
Months Supply Factor		1.01	1.01	1.01			
Calculated Ending Inventory		21632	21155	21950			
Average Cost Of Sales X Months Supply Factor							

Step 4							
Calculate Needed Purchases							
Step 4 is just a simple matter of doing some							
math.							
If you recall, we earlier discussed the simple inventory							
formula and how that if you knew three of the variables							
you can easily calculate the fourth.							
You do recall this don't you ?							
If not,							
Ending Inventory =							
Beginning Inventory + Purchases - Cost Of Sales							
In this case we want to calculate the amount of our							
Purchases By Period.							
Estimated Sales From Sales Forecast Worksheet	**109,564**	**32,756**	**36,145**	**40,663**	34,450	43,487	34,450
Beginning Inventory		21000	21632	21155			
Purchases		18900	19681	23473			

Cost Of Sales (rounded to whole dollars)		18268	20158	22678			
Ending Inventory		21632	21155	21950			
Our Formula For Calculating Purchases:							
Note that the values we now know are:							
Beginning Inventory							
Ending Inventory							
Cost Of Sales							
So to calculate Purchases we use the following formula:							
Purchases =							
Ending Inventory - Beginning Inventory + Cost Of Sales							
Ending Inventory		21632	21155	21950			
Less: Beginning Inventory		21000	21632	21155			
Plus: Cost Of Sales		18268	20158	22678			
Calculated Purchases		18900	19681	23473			

STEP-5

3.1.8 CAPACITY COST

Definition: An expenditure or cost incurred by a company in order to expand its business operations. In other words, these are expenses incurred by an organization to increase its capacity to conduct business operations.

Description: Capacity costs are fixed in nature. They remain constant even when the level of output varies. This part of a company's expenditure is intended to help expansion and increase activities, or for establishment of premises from where the business operations can be conducted. This expense remains fixed irrespective of the level of business activity.

For any business, it is difficult to avoid costs like insurance, rent payments, property taxes, depreciation on equipment, etc. These are examples of capacity costs. These can be avoided or minimized only by shutting down the business or outsourcing the services.

Capacity cost calculation:

Sr.No.	Description	Total Value
		ETB
1	Depreciation on Machinery @ 10%	70,100
2	Depreciation on office and Furniture etc. @ 20%	30,000
3	Insurance	24,000
4	Interest on Total Capital Investment @ 15%	2, 37,500
TOTAL		**361600**

Capacity cost/month:	**3, 61,600/12= 30133.33 Birr**
Capacity cost/ pair	**30133.33/12875 = 2.34 Birr**

Calculation of cost per pair:

Sr. No.	Description	Price(ETB)
1	Step 1: Material Cost	205.95
2	Step 2: Direct Labor Cost	9.02
3	Step 3: Overhead Cost	5.00
4	Step 4: Recoupment Cost	0.86
5	Step 5: Capicity Cost	2.34
	Total Cost	223.17
6	Commission & Sales Expenditure (20%)	44.63
	Margin (10%)	22.32
	Price/ Pair	**290.13**

Self-Check 1	Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total points: 20)**

Section A: Fill In the Blanks **(10 points)**

1. Raw material can be defined as ---------- (1 points)
2. Manufacturing overhead is also referred as ---------- (2 points)
3. Nonmanufacturing costs are also referred as ---------- (2 points)
4. Labor costs are the ---------- (2 points)
5. Overhead expenses can be----------, meaning they are the same from month to month, or variable, meaning they increase or decrease depending on the business's activity level.(1 point)
6. Capacity cost implies---------- (2 points)

Section B: Short Answers **(10 points)**

1. What is costing (2 points)
2. Explain briefly about overhead costs. (2 points)
3. What is recoupment cost? (2 points)
4. Explain briefly about the capacity cost. (2 points)
5. Explain briefly about the purchase cost. (2 points)

Note: **Satisfactory rating - 10 points and above** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Information Sheet-2	Estimating available machine hours

Companies whose sole mission is product production on a massive scale are heavily reliant upon the machinery that is used in this production. That company's bottom line is directly impacted by how consistently and efficiently its machinery performs the required tasks throughout the product creation process. Consequently, every measure must be taken to maximize the machinery's output, if the company that relies on it is to not only survive but grow and prosper. Poorly performing machinery can prove to be the Achilles' heel of any company. Calculating availability of machinery is one of the crucial considerations for ensuring a company's stellar performance.

Calculate availability of machinery as one component of overall machinery productivity performance. Establish the total available hours for the machine. This can be represented by the total number of hours the machinery can be used in a day or shift--normally 8, 10 or 12 hours.

Total the number of hours the machine is not available for use within that day or shift. This includes the number of hours the machine requires for servicing and/or repairs. Review machinery records and service/repair totals to get this figure.

Divide the service/repair total first by 12, since there are 12 months in a year. To get the daily figure, divide the monthly totals by 22, the average number of weekday workdays in any given month.

Subtract the total service/repair hours of Step 3 from the total availability hours of Step 2. For instance, if the shift length is 10 hours, and the service/repair time per shift averages one hour, the total availability of that piece of machinery is 9 hours, or 90 percent. Ninety percent establishes this particular piece of machinery as world class. Eight-five and above is considered world class since worldwide availability averages between 45 and 60 percent.

Complete two other equipment checks in order to get a more complete picture of machine utilization. Confirm performance that is listed on the nameplate of the machine by its makers.

Observe and measure the machine's performance for a performance cycle to see if the nameplate promise is met by the machine. Keep in mind that the nameplate figure is akin to your car's speedometer, in that it is an estimation of the machine's performance and not an exact measure. Trust your own numbers if they are different from what the maker claims is the machine's capability.

Include also in your evaluation of machinery the measurement of its quality. Count the number of correct, quality pieces the machine produces within any given cycle. Next, count the number of faulty or flawed pieces produced within the same cycle. Deduct the number of bad pieces from the number of good pieces. For instance, if the total of produced pieces is 100 and 15 of the total is no good, your machine quality is rated at 85 percent.

The machine hour rate is similar to the labour hour rate method and is used where the work is performed primarily on machines.

Formula:

The formula used in computing the rate is:

Factory overhead/Machine hours

If factory overhead is Birr 3, 00,000 and total machine hours are 1,500, the machine hour rate is Birr 200 per machine hour (Birr 3, 00,000 ÷ 1500 hours).

(1) Machine hour data have to be collected; therefore it requires additional clerical work. The cost of collection and accounting activities goes up and therefore, is not workable for small business firms.

(2) The method cannot be used universally by all business concerns. It can be used where production is mainly through machine. Comparatively, direct labour hours can be used widely by the organizations.

Calculation of Machine Hour Rate:

For the purpose of computing the machine hour rate, each machine (or a group of similar machines) becomes a cost centre and all overheads are charged to a machine cost centre or to different machine cost centres if many such centres have been created

within the department. A machine hour rate for a specific machine cost centre is computed by dividing the total overhead estimated or incurred for that machine divided by actual or estimated machine ho the machine hour rate may have different concepts such as:

(1) Ordinary Machine Hour Rate:

This rate takes into account only those overhead expenses which are variable and directly attributed to the running of a machine. Such expenses are power, fuel, repair, maintenance and depreciation. The total of all these expenses is divided by the total machine hours.

(2) Composite Machine Hour Rate:

This method takes into account not only expenses directly connected with the machine as mentioned above, but also other expenses which are known as stand-ing or fixed charges. Such expenses are rent and rates, supervisory, labour, lighting and heating, etc. These expenses being fixed in nature are determined for a particular period and then apportioned among different departments on some equitable bases. The overhead expenses thus apportioned to each department are further apportioned among the machines (machine cost centers) in that depart-ment on an equitable basis.

The following are bases used for the apportionment of expenses for computing machine hour rate:

Overhead Expenses	*Basis*
1. Standing Charges:	
(*i*) Supervision	Estimated time devoted to each machine.
(*ii*) Rent and Rates	Floor area occupied by each machine.
(*iii*) Heating and Lighting	Number of points or floor occupied by each machine.
(*iv*) Lubricating oil and consumable stores	Capital value, machine hours or past experience.
(*v*) Insurance	Insured value of each machine.
(*vi*) Miscellaneous Expenses	Equitable basis depending on facts.
2. Machine or variable Expenses:	
(*i*) Depreciation	Machine hours.
(*ii*) Repairs	Machine hours or captial values or cost of repairs spread over the working life of a machine.
(*iii*) Power	Horse Power of machines or machine hours or meter readings.

Self-Check 2	Written Test

Name: _____ **Date:** _____

(Total marks:)

Instructions: Write all your answers in the provided answer sheet on page

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Information Sheet-3	Calculating total job cost including overheads and mark-up percentages.

Job costing is an accounting tool that allows businesses to track costs by individual jobs. Job costing is calculated by accumulating the cost of labor, materials and overhead for a specific project.

Job costing, also called project-based accounting is the process of tracking costs and revenue for each individual project. Job costing looks at each project in detail, breaking down the costs of labor, materials and overhead. It makes fewer assumptions than other costing methods.

Job costing is commonly used in the construction industry, where costs vary widely from job to job. But it's also used by manufacturers, creative agencies, law firms and more. Because job costing tracks costs in detail for each job, it can be a helpful tool for small business owners to evaluate individual jobs and see if any expenses can be reduced on similar projects in the future.

How to Calculate Job Costing

Job costing is calculated by accumulating the cost of labor, materials and overhead on a specific job. The accounting activities involved in calculating job costing are:

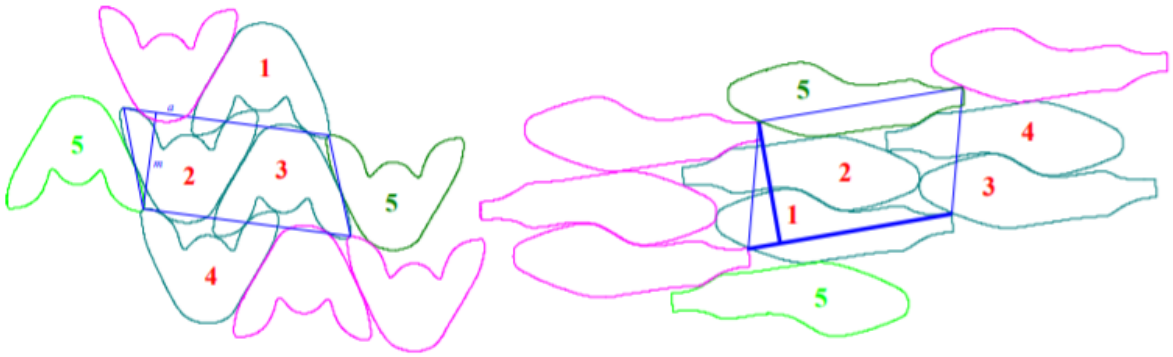
Calculate labor costs

Calculate how much it costs your business to employ all staff members who will work on the project per day. Multiply the payroll day rate by the amount of time you estimate you'll need to complete the job. If you'll rely on subcontractors for work your company doesn't complete itself, factor those costs into your total labor costs for the job. It can help to get an estimate from each of these contractors.

Calculate material costs

Calculate the cost of all materials used on the job. For a construction business, this would include materials such as lumber, wiring, screws and more. You may choose to

add a margin to these materials to cover other related costs including wastage or delivery fees.



Estimate applied overhead

Overhead is the most difficult cost to calculate, because you'll need to rely on an approximation instead of a more exact figure. You'll need to estimate the total overhead costs factoring into the job, including rent on your office, administrative costs and depreciation on the equipment used. Many businesses apply a blanket overhead fee to each project, such as 10 percent per job. An accountant can help you analyze your business and develop a specific approach to overhead. Or, you can calculate your predetermined overhead rate.

Job Costing Example

Your law firm completed a client's case. The total cost of your firm's billable labor hours is $20,000 and you will bill $2,500 in material costs. Your firm has determined your applied overhead cost for the job is $8,500.

You now have all the elements you need. Here's how to calculate job costing:

Direct Materials ($2,500) + Direct Labor ($20,000) + Applied overhead ($8,500) = $31,000

Your total job cost for your client's case is **$31,000.**

Formula to Calculate Markup Price

The markup price is the difference between the selling price or a product or service and the total cost. In order to make a profit on every good or service sold, you want to charge a price that's a percentage above how much it costs (manufacturing, packaging, etc.).

Therefore, the formula to calculate the markup price is:

MARKUP = SELLING PRICE – COST

While you can calculate markup by hand, it's easier to use a free Markup Calculator to do the work for you. Simply plug in the cost and the markup percentage, and the Markup Calculator will calculate your margins, revenue, and profit.

What is a Good Markup Percentage?

While there is no set "ideal" markup percentage, most businesses set a 50 percent markup.

Otherwise known as "keystone", a 50 percent markup means you are charging a price that's 50% higher than the cost of the good or service.

However, there's a simple formula you can use to calculate a good markup percentage for your business:

MARKUP PERCENTAGE = (SELLING PRICE – UNIT COST) / UNIT COST x 100%

Simply take the sales price minus the unit cost, and divide that number by the unit cost. Then, multiply by 100 to determine the markup percentage.

For example, if your product costs $50 to make and the selling price is $75, then the markup percentage would be 50%: ($75 – $50) / $50 = .50 x 100 = 50%.

Charging a 50% markup on your products or services is a safe bet, as it ensures that you are earning enough to cover the costs of production plus are earning a profit on top of that. Too small of margins and you may barely be earning money on top of the costs of making the product.

Use the free Markup Calculator to calculate the ideal markup price for your products or services.

Self-Check 3	Written Test

Name: _____ **Date:** _____

(Total marks:)

Instructions: Write all your answers in the provided answer sheet on page

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Information Sheet-4	Finalizing overall cost and recording

Job cost sheet

Job cost sheet is a complete sheet, which is prepared by the factory accountant for every job started in the factory. It is a primary document for accumulating all costs related to a particular job. In a job order costing system, we maintain a job cost sheet for each job. It tells about the total cost of a particular job. Each job sheet breaks the costs down in terms of direct materials, direct labor, and manufacturing overhead assigned to individual jobs. Following information normally appes in a particular job cost sheet.

1. Job Number (It is a number, assigned to each job by the factory accountant)
2. Date started (When the job is started)
3. Date completed (When the job is completed)
4. Description (It's a complete name of the product which is to be manufactured)
5. Number of units completed
6. Total cost of raw material (With date, requisition #, quantity and rate)
7. Total cost of Direct labor (With time card #, labor hours, rate)
8. Total applied manufacturing overhead (With activity base, quantity and application rate)
9. Cost summary (Total cost of material, labor and manufacturing overheads for particular job an cost per unit)
10. Shipping summary (How many units have been sold and how many are in stock with cost)

Advantages of a Job Cost Sheet

- It shows the total cost and cost per unit of the product produced during the given period.
- It helps the producers to control over the cost of production.

- It acts as a guide to the manufacturers and helps them in formulating a definite and profitable production policy.
- It helps the management in fixing up the selling price of their products.
- It helps management in the comparative study of the various elements of cost with the past result and standard cost.

Format of Job Cost Sheet

Job Cost Sheet

Job Number_____ Date initiated_____

Department_____ Date completed_____

Item_____ Units completed_____

For stock_____

Direct Materials		Direct Labor			Manufacturing Overhead		
Req. No.	Amount	Ticket	Hours	Amount	Hours	Rate	Amount

Cost Summary	Units Shipped		
Direct materials	Date	Number	Balance
Direct labor			
Manufacturing overhead			
Total cost			
Unit product cost			

Example

Anbesa shoe factory is one of the large-scale shoes factories in the Ethiopia. The company receives the orders and the production is done according to the customer's requirements. For costing purpose, company's accounts department uses the job order costing.

At the start of November 2020, the company received two orders from Harmony shoes. One was for 1,000 ankle boot (14″) and the second one was for 1,500 court shoes (40″). Company's operation department assigned the following job numbers to these orders.

1,000 ankle boot Job No. 303
1,500 court shoes Job No. 304

Following transactions have been recorded during the completion of these two orders.

Date	
Nov.2	Purchased 5000ft^2 upper material from Dire tannery @ birr 50/ft2 on cash basis.
Nov. 2	Purchased 20 ltr of temporary adhesive (indirect material) from Kadisco @ birr 30 per ltr on cash
Nov. 3	Purchased packing material amounted to 15,000 0n credit basis
Nov. 5	1000ft2 upper material issued to production department for job# 303.
Nov. 5	2500ft2 upper material issued to production department for job# 304.
Nov. 8	16 ltr temporary adhesive issued to production department.
Nov. 10	Direct labor incurred on job #303, 1000 hours @ birr 25 per hour.
Nov. 12	Direct labor incurred on job #304, 1500 hours @ birr 25 per hour.
Nov. 13	300 ft2 upper leather issued to production department for job # 303
Nov.13	800 ft2 upper leather issued to production department for job # 304
Nov.15	Direct labor incurred on job #303, 200 hours @ birr 25 per hour.
Nov.15	Direct labor incurred on job #304, 300 hours @ birr 25 per hour.
Nov.	Packing material issued to production department amounted to birr 4,000

Manufacturing overheads:

Job # 303	Manufacturing overhead is applied on the basis of direct labor hours @ $20 per hour.
Job # 304	Manufacturing overhead is applied on the basis of machine hours @ $30 per hour.

Machine was used for job # 303 and 304, 200 hours and 750 hours respectively.

On November 25, both jobs have been completed and transferred to the storeroom. On November 28, both the orders shipped to the customer on account at the following prices

Ankle boot (Size 40) birr 170 ankle boot
court shoes (size 38) birr 10 per court shoes

Required:

- ✓ Enter the above data in the general journal.
- ✓ Prepare the job sheets for both the jobs. (Marketing and administration expenses were birr 15 per unit in job # 303 and birr 10 per unit in job # 304).

1,000 ankle boot Job No. 303
1,500 court shoes Job No. 304

Solution

Journal entries		
Nov. 02 Direct material inventory	25,000	
Cash		25,000
Nov. 02 Manufacturing supplies inventory	600	
Cash		600
Nov. 03 Manufacturing supplies inventory	15,000	
A/P		15,000
Nov. 05 Work in process (Job # 303)	50,000	
Direct material inventory		50,000
Nov. 05 Work in process (Job # 304)	125,000	
Direct material inventory		125,000
Nov. 08 Manufacturing overhead	480	
Manufacturing supplies inventory		480
Nov. 10 Work in process (job # 303)	250,000	
Wages payable		250,000
Nov. 12 Work in process (job # 304)	37,500	
Wages payable		37,500
Nov. 13 Work in process (Job # 303)	15,000	
Direct material inventory		15,000
Nov. 13 Work in process (job # 304)	40,000	
Direct material inventory		40,000
Nov. 15 Work in process (job # 303)	5,000	
Wages payable		5,000
Nov. 15 Work in process (job # 304)	7,500	
Wages payable		7,500
Nov. 20 Manufacturing overhead	14,000	
Manufacturing supplies inventory		14,000
Nov. 20 Work in process (Job # 303)(1200 x 20)	24,000	
Work in process (Job # 304)(750 x 30)	22,500	
Manufacturing Overheads		46,500
Nov. 25 Finished goods inventory	351,500	
Work in process (Job # 303)		119,000
Work in process (Job # 304)		232,500
Nov. 28 Cost of goods sold	351,500	
Finished goods inventory		351,500
Nov. 28 A/R	485,000	
Sales		485,000

Job Cost Sheets for Job # 303 and 304:

Job Cost Sheet			
Job Number	303	Description	T. Shirts
Date Started	2nd November	Date Completed	25th November
Number of units compiled	1,000		

Direct Material				
Date	**Requisition #**	**Quantity (Units)**	**Unite Price ($)**	**Cost ($)**
5th November		1,000	50	50,000
13th November		300	50	15,000
				65,000

Direct Labor				
Date	**Time Card #**	**Hours**	**Rate ($)**	**Cost($)**
10th November		1,000	25	25,000
15th November		200	25	5,000
				30,000

Manufacturing Overhead				
Date	**Activity Base**	**Quantity**	**Application rate ($)**	**Cost($)**
10th November	Direct labor hours	1,000	20	20,000
15th November	Direct labor hours	200	20	4,000
				24,000

Cost Summary	
Cost Item	**Amount ($)**
Direct Material	65,000
Direct labor	30,000
Manufacturing overhead	24,000
Total Cost	119,000
Unit Cost	119.00

Job Cost Sheet			
Job Number	304	Description	Trousers
Date Started	2nd November	Date Completed	25th November
Number of units compiled	1,500		

Direct Material				
Date	**Requisition #**	**Quantity (Units)**	**Unite Price ($)**	**Cost ($)**
5th November		2,500	50	125,000
13th November		800	50	40,000
				165,000

Direct Labor				
Date	**Time Card #**	**Hours**	**Rate ($)**	**Cost($)**
12th November		1,500	25	37,500
15th November		300	25	7,500
				45,000

Manufacturing Overhead				
Date	**Activity Base**	**Quantity**	**Application rate ($)**	**Cost($)**
12th November	Machine hours	750	30	22,500
				22,500

Cost Summary	
Cost Item	**Amount ($)**
Direct Material	165,000
Direct labor	45,000
Manufacturing overhead	22,500
Total Cost	232,500
Unit Cost	155.00

Self-Check 4	Written Test

Name: _____ **Date:** _____

(Total marks :)

Instructions: Write all your answers in the provided answer sheet on page

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Information Sheet-5	Verifying costs, calculations or other details and documenting for future reference

STYLE NO.	LAST NO	MENS/ LADIES/ CHILDREN			
001	H 17774	MEN'S			
TYPE OF SHOE	CUSTOMER	COSTING SIZE			
MEN'S OXFORD		8			
PRICE VALIDITY	FROM		TO		
CURRENCY RATE	ETB				
SHOE COMPONENTS	AMOUNT	UNIT	PRICE	UNIT	COST (ETB)/PRS.
Upper material(Cow F.G. 1.2-1.4)		Sq. Ft.		Sq. ft.	
Lining Material (Goat natural0.7-0.9)		Sq.Ft.		Sq. Ft.	
Socks half/Full		Sq.Ft.		Sq. Ft.	
Interlining Textile		Mtrs		Mtrs.	
Needles (34 LR &134 PCL)		Prs./Needle		Needle	
Thread (60/3)		Mtr/.prs.		Mtr	

Thread (40/3)		Mtr./prs		Mtr.	
Thread		Mtr/Prs.		Mtr.	
Tapes (Top line-2 mm)		Mtr/prs		Mtrs.	
Tapes (20mm wide)		Mtr/prs		Mtrs.	
Tapes		Mtr/prs.		Mtr.	
Laces		Prs.		Prs.	
Elastic		Mtrs/Prs		Mtrs.	
Eyelet (Brass Blend)		Pcs.		Pcs	
Metallic Trimms		/Prs.			
Consumables, thermo adhesive for folding, rubber sol. Etc.					
Counter		Sheet		Sheet	
Toe puff		Sheet		Sheet	
Unit sole of leather/TPR/TR/Rubber					
Insole					
Shoe consumables Tacks/Glue/Finish					
Shoe Box					
Shoe carton					

Strap/ labels		
Total Material Cost		
Provision for rejection (5%)		
Total Material Cost		
Provision for rejection (5%)		
Direct labour		
Overheads		
Total Cost		
Commission & sales expenditure(20%)		
Margin (10%)		
Price		
(Excluding commission & incl. Freight, advt, sales- 5%)		
Price		

SR.NO	MATERIAL CODE	Material Name	CATEGORY	UOM	REMARKS
1					
2					
3					
4					

5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

25					
26					
27					
28					
29					
30					

Rate paid per unit of production × Number of units completed in the pay period

Method of calculating the monthly payment:

LABOR COST CALCULATION						
LINE ----------						
ARTICLE: ----------		DAY/OUTPUT: ----------PAIR				
ONE MONTH: ------- DAYS		TOTAL PRODUCTION IN A MONTH: ---------- PAIRS				
SR. NO	OPERATION	PROPOSED MANPOWER	TYPE OF MANPOWER	SALARY/MONTH/MANPOWER	SALARY /MONTH/ OPERATION	SALARY/ PAIR/OPERATION
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

12						
13						
14						
15						
16						
	TOTAL					

NOTE: It is assumed:
SKILLED OPERATIOR:---------- BIRR
SEMI-SKILLED: ---------- BIRR
UNSKILLED: ---------- BIRR

Cost calculation of tools & equipment's:

Sr.No.	**Description**	**Ind/Imp.**	**Qty.**	**Price**	**Total Value**
				ETB	**ETB**
1	Shoe designer tool kit	-----	-----	-----	-----
2	Shoe making tool kits	-----	-----	-----	-----
3	Machine maintenenance & Electricians tool kit	-----	-----	-----	-----

4	Clicking dies-1 set each	-----	-----	-----	-----
5	PVC last	-----	-----	-----	-----
6	Clicking pads, Spray gun & other equip.	-----	-----	-----	-----
7	Testing equipments, thickness gauge, measuring scale etc.	-----	-----	-----	-----
8	Workshop tables racks etc.	-----	-----	-----	-----
9	Other furniture and equipments	-----	-----	-----	-----
Total					-----

OVERHEADS (O/H):

(i) Salary (per month)				
A. Personal for workshop				
Sr.No.	**Description**	**No.**	**Salary (ETB)**	**Total Value (ETB)**
1	Production Manager (Tech.)	-----	-----	-----
2	Designer	-----	-----	-----
3	Supervisors (Tech.)	-----	-----	-----
4	Electrician and mechanic	-----	-----	-----
TOTAL				-----
B. Personal for administration				

1	Accountant cum Cashier	-----	-----	-----
2	Store Keeper	-----	-----	-----
3	Watchmen	-----	-----	-----
4	Sweeper	-----	-----	-----
TOTAL				-----
TOTAL SALARY PER MONTH (A+B)				-----
Add 20% Perquisites				-----
TOAL				-----
TOTAL (ROUND OFF)				-----
(ii) Utilities (per month)				
1	Power			-----
2	Fuel & water			-----
TOTAL				-----
(iii) Other Contingent Expenses (per month)				
1	Rent			-----
2	Repair and Maintenance			-----
3	Other Consumables store			-----
4	Insurance			-----
5	Postage and Telephones expenses			-----
6	Stationery & Printing			-----

7	Traveling expenses			-----
8	Other miscellaneous expenses			-----
TOTAL				-----

Direct procurement and indirect procurement				
		TYPES		
		Direct procurement	**Indirect procurement**	
		Raw material and production goods	**Maintenance, repair, and operating supplies**	**Capital goods and services**
FEATURES	**Quantity**	Large	Low	Low
	Frequency	High	Relatively high	Low
	Value	Industry specific	Low	High
	Nature	Operational	Tactical	Strategic
	Examples	Crude oil in petroleum industry	Lubricants, spare parts	Crude oil storage facilities

Key Answers for all self-checks

LG #37	LO #1- Gather information

Self-check 1

Self-check 1 Written test

State True or False

A True

B False

C True

D False

E True

F True

Short answers

1. Product costing is the process of assigning costs to inventory and production based on the expenses that go into producing or buying inventory. It is an especially important process for manufacturers, and there are several potential costing methods that businesses choose for their simplicity, accuracy or other factors.
2. Quantity of products play a major role in fixing product costing as higher the quantity, more time it takes to produce the total order but the raw materials like leather can be tanned easily, insoles in higher quantity can be procured easily, When demand for a product is constant over the year and each new order is delivered in full when inventory reaches zero it is called economic order quantity. There is a fixed cost for each order placed, regardless of the number of units ordered. There is also a cost for each unit held in storage, commonly known as holding cost, sometimes expressed as a percentage of the purchase cost of the item.
3. TQM philosophy is to Adopt the new philosophy. We are in a new economic age.

Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.

Cease dependence on mass inspection to quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.

End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move towards a single supplier for any one item, on a long-term relationship of loyalty and trust.

4. Computation of the raw material and component requirements for end products listed in the master schedule, is done by the product structure. The product structure is specified by the bill of materials, which is a listing of component parts and subassemblies that make up each product. A file which lists all assemblies together is the bill-of-materials file. The structure of an assembled product can be pictured by taking a simple product in which a group of individual components make up two subassemblies, which in turn make up the product. The product structure is in the form of a pyramid in which lower level feeding into the levels above the items at each successively higher level are called the parents of the items in the level directly.
5. The benefits of production scheduling include:

    - Process change-over reduction
    - Inventory reduction, leveling
    - Reduced scheduling effort
    - Increased production efficiency
    - Labor load leveling
    - Accurate delivery date quotes
    - Real time information

6. According to TQM, the quality is totally defined by the customer's perceptions. It doesn't matter what we think, it matters what our customers think, and the customers' perceptions are constantly changing. It is up to us to make sure our organization is fast and flexible enough to respond to their demand of better

products/services. Quality management, as specified in ISO-9000, is about managing our organization with the objective of satisfying our customers' needs. TQM stands for Total Quality Management. It is one of the most effective and least understood corporate strategies. It can affect every level, procedure and every person in a company. It is a comprehensive process that can bring a company to the forefront of the global market.

7. Forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date. Backward scheduling is planning the tasks from the due date or required-by date to determine the start date and/or any changes in capacity required

Self-check 2

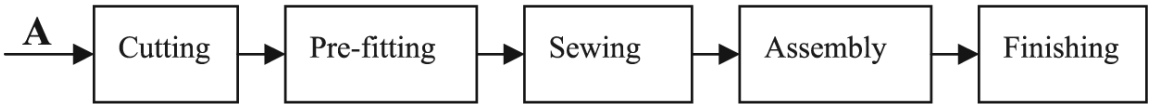
State True of False

1. True
2. False
3. True
4. False
5. True
6. False
7. True
8. False
9. True
10. False

Short answers

1. Sequence of operation deals with the flow of succeeding & preceding operations to carry out in the production floor in utilize the resources. The flow of the material should be referred from sequence as it tells us the operations to be carried out & the material required for operation. This sequence can be in the form of flow chart suggesting the flow of activities in a direction.

2. As in case of footwear manufacturing the path of material moves from Cutting department to Closing & from Closing to Lasting , in few companies even components or bottoming ie. Sole & insole manufacturing is also done in house in such cases either the material is sent to components or lasting & from lasting to finishing , finally to quality , packing & dispatching .
3. Alternative path is the path which can be followed if there are complex projects, which requires a series of activities that can be performed in parallel with other activities
4. To fix sequence of operations the process engineer should begin his process with the qualifying operations, route it through critical operations & secondary operations carry it through qualifying operations & finally end up with auxiliary operations.
5.



A: Leather Received From Tannery

Self-check 3

State True & false

1. True
2. False
3. True
4. True
5. True

Short answers:

1. We apply JIT concept in many of our routine activities even without feeling about it. We get the newspapers delivered to our doorsteps on JIT basis everyday because we want to read them when the news items are fresh and current
2. It means assignment of job to a facility, viz: machine, men, dept, etc. Assigning a subject to a teacher is loading. Loading should be done at the higher level. Frequently, when attempting to decide how orders are to be scheduled onto

available facilities, one is faced with various alternative solutions

3. Period required to prepare a device , machine , process or system for it to be ready to function or accept a job is set up time
4. In Toyota two types of kanban are distinguished for controlling the flow of items:
   A A withdrawal kanban
   B production ordering kanban
5. The results of just-in-time inventory management are apparent: cost reduction, increased speed to market and identification of bottlenecks in the workflow. Effective implementation, however, requires a different way of thinking about relationships with suppliers, bringing them into a cooperative endeavor with the recognition of mutual goals.
6. Standard time is the amount of time it should take a qualified worker to complete a specified task, working at sustainable rate, using given methods, tools and equipment's, raw materials and work place arrangements.
7. The standard time for an element or a job is calculated as follows:

Standard time =(observed time x Rating)x percent total allowance

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100

8. MTM Advantages
   1. They are based on large number of workers under controlled conditions.
   2. The analyst is not required to rate performance in developing the standard.
   3. There is no disruption of the operation.
   4. Standards can be established even before a job is done.

Self-check 4

Section A:

Fill in the blanks:

1. Procurement
2. Seven
3. (Utilization * truck capacity).
4. Tooling
5. Manufacturing expenses

Section B

Short answers:

1. Cost Sheet:

A document that reflects the cost of the items and services required by a particular

project or department for the performance of its business purposes. For example, a departmental cost sheet might include the material costs, labor costs and overhead costs incurred over a given time frame by a department and it therefore provides a record of costs that are chargeable to that department.

2. Procurement Cost:

Procurement is the acquisition of goods, services or works from an outside external source. It is favorable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Corporations and public bodies often define processes intended to promote fair and open competition for their business while minimizing exposure to fraud and collusion.

Almost all purchasing decisions include factors such as delivery and handling, marginal benefit, and price fluctuations. Procurement generally involves making buying decisions under conditions of scarcity. If good data is available, it is good practice to make use of economic analysis methods such as cost-benefit analysis or cost-utility analysis.

3. Transportation Cost:

Transportation:

The expenses involved in moving products or assets to a different place, which is often passed on to consumers. For example, a business would generally incur a transportation cost if it needs to bring its products to retailers in order to have them offered for sale to consumers.

Transportation costs formula

Transportation costs are reported in the Cost Per Unit field on each tab of the Transportation Reports.

Transportation costs are calculated for each Lane based on a per-unit cost for each Product. This cost is multiplied by the number of units of the Product that move on that Lane.

4. Overhead Cost:

Overheads include the Cost of Indirect Materials, Indirect Labour, and indirect

expenses such as;

a) Manufacturing expenses: Expenses incurred to run the factory are called manufacturing expenses. Expenses relating to production management and administration are included therein. Examples: Rent, Insurance, Power, Water, Depreciation etc.

b) Office and Administrative expenses: These expenses are not related to factory but they pertain to the management and administration of business. Such expenses are incurred on the direction and control of a firm. Examples: Postage, Telephone, and fax, bank Charges, legal charges, furniture and equipment etc.

c) Selling and Distribution expenses. : Expenses incurred for marketing of a commodity, for securing orders for the articles, despatching goods sold, advertising, travelling, preparing tenders etc. come to this category.

5. Material:

The Substance from which the product is made is known as material. It may be in a raw or a manufactured state. It can be direct as well as indirect.

Direct Material: All materials which become integral parts of the finished product and which can be conveniently assigned to specific physical units are termed as direct materials and are variable in nature.

Indirect Material: All materials which are used for purposes ancillary to the business and which cannot be conveniently assigned to specific physical units is termed as Indirect Material and are fixed in nature.

LG #38	LO #2- Estimate materials and labor

Self-check 1

A Match the following section A with Section B

Section A	Section B
1	B
2	A
3	C
4	E
5	D

B Fill in the blanks

I batch oriented
II general ledger (GL)
III purchasing department

Short answers :

1. Materials requirement planning is required for the following reasons :
- Inventory reduction.
- Reduction in production and delivery lead time:
- MRP helps avoid delays in production
- Realistic commitments
- Increased efficiency

2. Scheduled Receipts : They are materials already on order from a vendor or in-house shop due to be received at the beginning of the period. Put differently, they are open orders scheduled to arrive from vendors or elsewhere in the pipeline.
3. Planned order receipt - The quantity expected to be received by the beginning of the period in which it is shown under lot-for lot ordering; this quantity will equal net requirement. Any excess is added to available inventory in next time period.
4. INDEPENDENT DEMAND -It exists when a demand for a particular item is unrelated to a demand for other item or when it is not a function of demand of other inventory item. Independent demands are not derivable or calculable from the demand of something else hence they must be forecast.

5. It is defined as dependent if the demand of an item is directly related to, or derived from the demand of another item or product. This dependency may be “vertical” such as when the component is needed in order to build a subassembly or product, or “horizontal” as in the case of an attachment or owner’s manual shipped with the product.

6. A batch process might utilize a hybrid of MRP-II and JIT type of system, particularly when the batches are somewhat repetitive in nature. In this case the master

schedule will not be identical from day-to-day but will have some repetitive elements. MRP II is used to push material in to the factory and to plan capacity, while the JIT (pull system) is used for execution on the shop floor. This makes it possible to eliminate the shop-floor control element of MRP II with its substantial work-in-process tracking.

7. Material Requisition or Purchase Request is a precise document generated by an internal or external organization to notify the purchasing department of items it needs to order, their quantity, and the time frame that will be given in the future
8. GOODS RECEIPT NOTE: Record of goods received at the point of receipt. This record is used to confirm all goods have been received and often compared to a purchase order before payment is issued. In case of any loss or damage the debit note is also raised against the manufacturer or supplier as the case may be.
9. A Kanban is a card containing all the information required to be done on a product at each stage along its path to completion and which parts are needed at subsequent processes. These cards are used to control work-in-progress (W.I.P.), production, and inventory flow. A Kanban system allows a company to use. Just in Time (J.I.T) production and ordering systems which allow them to minimize their inventories while still satisfying customer demands.

Self-check 2

Fill in the blanks:

1. buying it externally
2. Logistics management
3. Selection
4. a credit memo
5. benefits and costs

Short answers:

1. Logistics management has been defined as that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of raw materials, in-process inventory, finished goods, services and related information from the point-of-origin to the point-of-consumption (including inbound, outbound, internal and external flows) in such a way as to meet the customers' requirements cost-effectively and ensure that the current and future profitability are maximized

2. Sourcing is the act of transferring work from one entity to another. Outsourcing is the act of transferring work to an external party

3. In-house logistics, or in sourcing logistics means that the company operates its logistics activities in-house. The company owns transport, warehouses, handling equipment, and others including staff to process the logistics functions.

4. Fourth party logistics, or supply chain logistics is an evolution of supply chain outsourcing. It manages and integrates all kinds of resources and oversees 3PL functions throughout the supply chain with the sense of global market, strategic advantages and long-term relationship

5. Process Selection allows an organization to offer a safe and reliable product and service through pragmatic design and effective capacity planning. With the help of process selection we can understand the different types of processing including manual, rigid, and flexible as well as various automated approaches to processing
6. The reasons which are available to us in order to decide whether to develop a competence in house or hire an outside competent organization to supply that product, service or particular expertise. The latter requires that the outsourcer to be honest, ethical, competent. It also requires that outsourcing contract should be flexible yet pragmatic and carry proper levels of services.

- Available capacity if an organization has the equipment, necessary skills and time, it often makes sense to produce an item or perform a service in house. The additional costs would be relatively small compared with those required to buy items or subcontract them.
- Expertise: If a firm lacks the expertise to do a job satisfactorily, buying might be a reasonable alternative.
- Quality considerations- Firms that specialize can usually offer higher quality than an organization can attain itself. Conversely, special quality requirements or the ability to closely monitor quality may cause an organization to perform a job itself.

7. Variable costs: When evaluating transaction costs, a company has to consider the variable costs of producing a component in-house versus purchasing it. The variable internal costs are the additional amounts it costs to make the components whereas fixed costs start changing when a company considers multiyear supplier contracts. The longer commitment allows a company to reduce fixed costs by reducing the resources allocated to producing components since it now purchases them.
8. Benefit-cost analysis (BCA) is a technique for evaluating a project or investment by comparing the economic benefits with the economic costs of the activity.

Self-check 3

A Fill in the blanks:

1. international standard definitions
2. Direct labor cost
3. Unskilled labor
4. Scheduling

B. Short answers:

1. Direct labor cost is a part of wage-bill or payroll that can be specifically and consistently assigned to or associated with the manufacture of a product, a particular work order, or provision of a service
2. **The important features of direct labor are as follows:**

1. It is conveniently identified and allocated to cost unit.

2. It varies directly with the volume of output.

3. It is engaged in the manufacture of goods or providing services.

4. It is engaged in altering the composition, form or condition of a product

3. Some examples of direct labor engaged in various industries are:

(i) Labour engaged in converting raw materials into finished product.

(ii) Labour engaged on a construction job.

(iii) Compositors engaged in a printing press.

4. The standard direct labor cost per unit is calculated as follows :

   Standard direct labor rate X standard direct labor hours = standard direct labor cost per unit
5. Fixed labor represents salaried employees who are paid certain wage amounts regardless of the amount of hours they work. Companies have different strategies for fixed labor by either paying for overtime or may be sometimes not even to pay for any overtime worked by employees.
6. Indirect labour is that labour which cannot be easily and conveniently allocated to the job, process or production unit. It represents labour which is not directly engaged in the manufacture of a product or in a job or service but indirectly helps in production whereas Direct labour is also described as the labour which is engaged directly in manufacture of a product or in a particular job or service and which can be convenient allocated to the job, process or production unit. It is the labour engaged in changing composition, form or condition of a product manufactured.
7. A further breakdown of indirect labour costs include idle time, overtime premiums, and labour fringe benefits.

Labour and overhead combined are called the **conversion costs** of the firm. The conversion cost may be considered the cost of taking an original product and modifying it into a final product.

Self-check 4

LG #39	LO #3- Calculate product costs and document

Self-check 1

Fill In The Blanks:

1. Basic substance in its natural, modified, or semi-processed state, used as an input to a production process for subsequent modification or transformation into a finished good.
2. as factory overhead
3. "administrative overhead"
4. Total amount of money paid to employees for a period, such as a week or a month.
5. Fixed
6. the cost of capacity rendered idle if the item currently being manufactured is sub contracted

Short Answers:

1. Costing is the function – normally undertaken by administration and/or the management of manufacturing companies – to identify and compute occurring costs associated with production and related activities.
2. An accounting term that refers to all ongoing business expenses not including or related to direct labor, direct materials or third-party expenses that are billed directly to customers. Overhead must be paid for on an ongoing basis, regardless of whether a company is doing a high or low volume of business. It is important not just for budgeting purposes, but for determining how much a company must charge for its products or services to make a profit. For example, a service-based business that operates in a traditional white-collar office setting would have overhead expenses such as rent, utilities and insurance.
   Overhead expenses can be fixed, meaning they are the same from month to month, or variable, meaning they increase or decrease depending on the business's activity level. They can also be semi-variable, meaning that some portion of the expense will be incurred no matter what, and some portion depends on the level of business activity. Overhead can also be general, meaning that it applies to the company's operations as a whole, or applied, meaning that it can be allocated to a specific project or department. These expenses are typically found on a company's income statement.
3. Recoupment cost implies the set – up costs, if the product is to be manufactured at the home plant or the procurement cost , if the item is to be purchased.
4. **Definition:** An expenditure or cost incurred by a company in order to expand its business operations. In other words, these are expenses incurred by an organization to increase its capacity to conduct business operations.
5. The price that an investor pays for a security. This price is important as it is the main component in calculating the returns achieved by the investor.

Essentially, it can be thought of as the price that is paid for anything that is bought. Purchase cost includes the price given to the vendor, transport cost, excise, sales tax, octroi etc. It also includes the price that an investor pays for a security. This price is important as it is the main component in calculating the returns achieved by the investor.

Self-check 2

Self-check 3

Self-check 4

LG #37	**LO #2- Estimate materials and labor**

LG #37	**LO #3- Calculate product costs and document**