

System Design - Process Costing



As discussed in unit 3, cost information is useful for purposes of planning and control, inventory valuation, and decision making. Techniques of assigning costs to manufactured products are ordinarily tailored to the particular nature of the products and manufacturing operations involved. Fundamentally there are two basic cost accounting systems: (i) job-order costing, and (ii) process costing. Job order costing system is used to those manufacturing activities that are characterized by the production of certain items to the unique specifications of the customer or by the performance of some specified activity under a negotiated contract. While process costing system is under to manufactured mass production of a single product or a few products in repetitive production environments, where large number of homogeneous or very similar products are manufactured in a continuous fashion. The basic aim of this unit is to present the basic ideas of process cost accounting system.

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Lesson 1: Process Costing: Introduction

Learning Objectives

After completing this lesson, you are expected to be able to:

- Define process costing.
- Explain the features of process costing.
- Explain important differences between job order and process costing.
- Understand cost accumulation procedures in process costing system.
- Prepare journal entries to record the flow of costs in a process costing system.

Introduction

Process costing is the second principal method of product costing system. Like job-order costing system, this product costing system has the ultimate purpose—assignment of production costs to units of output. Process costing is better adapted to the production of large quantities of similar or identical units of standardized products. Process costing is a method of costing by which costs are accumulated for each separate process or operations, and subsequently related to production quantities passing through the process to ascertain the unit cost. By process costing, we mean the situation such as the processing of chemicals, petroleum, plastics, pharmaceuticals, textiles, cement, sugar, coal and electric utilities, to mention but a few.

Process costing is a form of operation costing. It is method of cost accounting whereby costs are charged to processes of operations and averaged over units produced; it is employed principally where a finished product is the result of a more or less continuous operation. Moreover, process cost accounting is a method of averaging the cost of production, either by separate elements of cost or in total, for a particular period of time over the number of units of product accomplished during the same period.

A manufacturing concern's decision to use process costing is based on the number of different products, the length of production cycle, the amount of work-in-process at the end of accounting period, and the number of departments involved in the production process.

Features of Process Costing

Process costing system has the following distinctive characteristics:

- (a) Manufacturing costs are accumulated for each production department or process.
- (b) As it is impossible to identify the elements of prime cost with a particular unit of finished product, the average cost per unit is obtained by accumulating all manufacturing cost and dividing it by the total output for that period at the various stages of manufacture.
- (c) Manufacturing costs are accumulated by department or process for specific time periods, say a month, and the process costing is designed to

Process costing is a method of costing by which costs are accumulated for each separate process or operations, and subsequently related to production quantities passing through the process to ascertain the unit cost.

measure units produced during this time period.

(d) The output of one process becomes the input of the next process.

(e) Wastage, possibly due to scrap, reaction, evaporation, is unavoidable but must be reduced as near as possible to the minimum.

(f) More than one product may emerge at the end of different process, depending upon the sale value of the products, these are either termed as "joint products" or "by products".

(g) Process costs for a period are apportioned between completed output (transferred to stock or the next process) and unfinished production at the end of the period (work-in-process).

Differences between Job-order and Process Costing System

Job-order Costing System and Process costing system have the same objective. Both types of systems assign material, labor, and manufacturing overhead costs to products. However, some important differences exist between the two systems as given below:

FACTORS	JOB ORDER COSTING SYSTEM	PROCESS COSTING SYSTEM
(1) Production	Job-costing is applicable to goods manufactured to customers specification.	Process costing is applicable to production consisting of succession of continuous operations or processes.
(2) Production requirements	Different for different jobs.	Homogeneous across products on jobs.
(3) Costs	Costs are accumulated for each job.	Costs are accumulated for each process.
(4) Computation	Job cost is computed only when a job is complete.	Costs are compiled on time basis, i.e. for a given accounting period and costs per unit is determined by averaging the process costs.
(5) Transfer of costs	Job costing does not involve transfer of costs from one job to another.	In case of process costing, transfer of output from one process to another involves the transfer of its costs also.
(6) Control	Being each job different from others and production not being continuous, control becomes difficult.	Control over production and costs is much easier in the case of process costing since production is standardized.
(7) Variances	Between actual and estimated direct material and direct labour costs are determined for individual jobs.	Between actual and estimated costs are determined for individual process stages.
(8) Expensive	Job costing is expensive as it	In process costing,

	involves a considerable amount of paper work and effort in recording the cost of each job as it is incurred.	however, paper work is reduced to a minimum as the method is simple, and it lends itself to the technique of standard costing.
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Cost Accumulation in a Process Costing System

The task of accumulating the major manufacturing cost elements is not different under process costing than under job-order costing. Essentially the same source documents and bookkeeping techniques will develop the input of direct material, direct labor, and factory overhead. In a process costing system, costs are accumulated by departments for a specific time period where as in job order costing costs are accumulated by jobs. But the main differences lie in the method of measuring units produced, reporting the product costs, and valuing work-in-process inventories. Cost accumulation is much simpler for a process cost system than for a job order system.

In a process costing system, costs are accumulated by departments for a specific time period where as in job order costing costs are accumulated by jobs

Direct Materials: Usually materials are issued for use in the first process and are, after processing, transferred to the next process and so on. The prices of the direct material include all costs incurred in connection with procuring that material, provided such costs can be traced to a specific lot of material and nothing else. A manufacturing concern that uses a process costing system may have only one product or a few products in process at any one time, and thus may have just a few requisitions per month. The number of requisitions would depend on how often a batch of product is started. However, since costs are accumulated by departments for a time period of time, it is customary to departmentalize the work-in-process account. The journal entry required to record issue of raw materials for production is as follows:

Work-in-process - (Say cutting department)
 Work-in-process - (Say, Finishing department)
 Raw Materials Inventory

Direct Labor: The employees in a factory or other places where manufacturing is carried out are directly connected with the conversion of the direct material in its various stages of manufacture to the finished product are known as "direct labor". Direct labor/payroll costs are accumulated by department for a specified period of time, and the department payroll costs can usually be taken directly from the payroll records without much additional effort. If workers are continuously engaged in one process, the time spent by them is analyzed and their wages are charged to the process concerned. However, if employees perform work for more than one department, they will need to keep records of the time they spend in each department process, and the time spent by workers is apportioned on the basis of the time sheet. The journal entry required to record direct labor is:

Work-in-process (cutting)
 Work-in-process (finishing)
 Accrued wages payable

All indirect expenditure incurred by a business in connection with the actual manufacture of a product is indirect production cost or manufacturing overhead.

Manufacturing Overhead: All indirect expenditure incurred by a business in connection with the actual manufacture of a product is indirect production cost or manufacturing overhead. Expenses which are common to two or more processes, and which cannot be directly allocated to any cost centre, are apportioned to the various cost centres on a suitable basis are called manufacturing overhead. An appropriate base -direct labor cost, a direct labor hours a, machine hours - would be selected in the same manner as in job order costing, and any under applied or over applied overhead would be disposed of. The journal entry required to record manufacturing overhead is :

Work-in-process (cutting)
Work-in-process (Finishing)
Manufacturing Overhead Applied.

Under process costing, the department is considered to be the costing unit. Overhead is frequently applied using a predetermined rate.

The application of manufacturing overhead, under job order and process costing, is essentially an averaging process. Under process costing, the department is considered to be the costing unit. Overhead is frequently applied using a predetermined rate. The point is that overhead costs are incurred by all manufacturing companies and must be distributed to units produced, regardless of the techniques used for accumulating costs.

Demonstration Problem

Problem # 4.1.1

The manufacturing costs of the Assembly department for the month of June are as follows:

Direct materials added		Tk.1,20,000
Conversion costs:		
Direct Labor	Tk.90,000	
Factory overhead	60,000	
		1,50,000
Costs to account for		Tk.2,70,000

The cost of goods completed and transferred to finished goods was Tk.2,31,500 in June.

Required: Prepare a summary journal entries for the use of direct materials, direct labor and factory overhead applied. Also show the journal entry for the transfer of goods completed.

Solution to the Demonstrated Problem:

(i) Work-in-process - Assemble	1,20,000	
Direct Material Inventory		1,20,000
(ii) Work-in-process - Assembly	90,000	
Accrued Payroll		90,000
(iii) Work-in-process - Assembly	60,000	
Factory overhead		60,000
(iv) Finished Goods Inventory	2,31,500	
Work-in-process- Assembly		231,500

PRACTICE TEST

A. Self-Assessment Questions (SAQs)

True False

1. Which of the following statements are true and which are false?
 - (i) A process cost system is suitable for a company with a large volume of standard products produced on relatively continuous basis, for example, soft drinks or petroleum.
 - (ii) Under process costing it is important to identify the materials, labor, and manufacturing overhead costs associated with a particular customer's order, the same as with job order costing.
 - (iii) In one single process more than one product is produced simultaneously.
 - (iv) In process costing system, the production report replaces the job cost sheet.
 - (v) Costing is more difficult in a process costing system than it is in a job-order costing system.
 - (vi) Predetermined overhead application rates are necessary under a process cost system but are not used to compute per-unit costs under a job-order cost system.
 - (vii) In a process costing system, a work-in-process account is maintained for each department.
 - (viii) In process costing, costs incurred in a department are not transferred to the next department.
 - (ix) Since costs are accumulated by department, there is no need for a finished goods inventory account in a process costing system.
 - (x) In a process cost system, the per unit cost of direct materials equals the total cost of materials purchased in the current month divided by the equivalent full units produced in the current month.
 - (xi) Moon Manufacturing has operations that involve three processing departments: Assembly, finishing and packaging. Any debit to work-in-process Inventory: Finishing Department Account must also involve a credit to the work-in-process inventory : Assembly Department.

B. Multiple Choice Questions (MCQs)

2. Choose the best answer for each of the following questions by placing the identifying letter in the space provided to the left.
 - (i) The system which applies costs to like products that are usually mass produced in continuous fashion through a series of production processes is known as:
 - (a) Process costing
 - (b) Variable costing
 - (c) Job-order costing
 - (d) JIT costing

- (ii) Which of the following is not a characteristics of process cost system?
 - (a) The costs incurred in each process are accumulated in separate work-in-process inventory accounts.
 - (b) It is suitable for mass-produced operations.
 - (c) Cost are accumulated separately for each unit of production as it moves through the factory.
 - (d) The cost of finished unit is the sum of the unit costs of performing each manufacturing process.
- (iii) Which of the following is not an example of a product that would be manufactured in a process costing system?
 - (a) Flour, (b) Glass, (c) Toothpaste, (d) A house
- (iv) A process cost system differs from a job order cost system in that:
 - (a) There is no need for overhead application rates in process cost systems.
 - (b) Process cost systems are used primarily in service industries; job order cost systems are used in manufacturing operations.
 - (c) Per unit costs are not computed in process cost systems.
 - (d) The concept of the equivalent full unit is necessary to determine unit costs only in process cost systems.
- (v) In an industry for which process costing method is suitable for determining product cost.
 - (a) There is always work-in-process at the end of the each accounting period.
 - (b) There may or may not be any work-in-process at the end of an accounting period.
- (vi) In process costing, the journal entry to record direct materials used would be:
 - (a) credit to Direct Materials Inventory
 - (b) debit to Cost of Goods Sold
 - (c) credit to respective department's Work-in-Process
 - (d) debit to Finished Goods
- (vii) In process costing, the journal entry to record direct labor would be:
 - (a) debit to Accrued Payroll
 - (b) credit to Factory Overhead
 - (c) debit to respective department's Work-in-Process
 - (d) credit to Finished Goods.
- (viii) In process costing, the journal entry to record factory overhead applied would be:
 - (a) debit to Factory Overhead

- (b) debit to respective department's Work-in-Process
 - (c) credit to Cost of Goods Sold
 - (d) credit to Finished Goods.
- (ix) Which of the following is not a step in process costing?
- (a) calculate output in terms of equivalent units
 - (b) calculate unit costs
 - (c) Summarize the total costs to account for
 - (d) Summarize the total costs by job.

C. Descriptive Questions:

1. What are the typical characteristics of a company that should employ a process costing system?
2. List five types of manufacturing business in which process costing would be an appropriate product costing system.
3. List three non-manufacturing business in which process costing could be used. For example, a public accounting firm could use process costing to accumulate the costs of processing clients' tax returns.
4. How are job order and process costing similar? How do they differ?
5. How are costs accumulated for firms that use a process cost accounting system? How does this differ from cost accumulation under a job order cost accounting system?
6. How many Work-in-process accounts are maintained in a company using process costing?
7. Why is cost accumulation easier under a process costing system than it is under a job-order costing system?
8. Is it appropriate to use a predetermined overhead rate for applying overhead to production when a process cost accounting system is under? Under what it be acceptable to use actual overhead instead of applied overhead? When should applied overhead be used?
9. Show how to prepare a journal entry to enter direct material costs into the Work-in-Process Inventory account for the first department in a sequential production process. Show how to prepare the journal entry recording the transfer of goods from the first to the second department in the sequence.
10. Assume that a firm has two departments, cutting and finishing. Prepare sample journal entries to illustrate the cost accounting cycle for direct materials, direct labor and applied manufacturing overhead.

Lesson 2: Determining Production

Learning objectives

After completing this lesson, you are expected to be able to:

- Describe what is meant by determining production.
- Calculate unit cost in process costing.
- Understand the term equivalent units of production (EUP).
- Calculate EUP.
- Explain the methods of EUP.
- Determine EUP using the weighted average and FIFO method of process costing.
- Determine unit cost, inventory values using weighted average and FIFO method of process costing.

Introduction

As discussed earlier both job order, process costing system accumulates costs by cost component in each production department. However, the two systems assign costs to departmental output differently. In both the method, unit costs are transferred as goods are moved from one department to the next so that a total production cost can be determined/accumulated. As we know that, a unit of production for a product or a department is a natural amount or quantity of the finished product or of the work done by the department which can be used for the measurement of other amounts or quantities of the same product or work. If the entire quantity of the product manufactured is divided by this unit of measurement, the quotient is the production expensed in units of product. In this lesson procedure followed to determine production and a detail of production report will be taken into consideration.

Determining Production

Assigning costs to units of production is an averaging process. As it is necessary to determine the period's true production so that the current months costs can be divided by the result of that months' efforts. In the easiest possible situation, a product's actual units costs is found by dividing a period's departmental production costs by that period's departmental production quantity. This average is expressed by the following formula :

$$\text{Unit Cost} = \frac{\text{Sum of Production Costs}}{\text{Production Quantity}}$$

The principal difficulties encountered in process costing center on the determination of the denominator of the basic formula used to calculate cost per unit. The problem arises because units in a process at the beginning and at the end of a period are by definition less than fully complete. Were they complete, they would be included in the finished goods inventory.

There may be units in beginning Work-in-Process (WIP) inventory which were started last periods but will be completed during the current period. This two-period production sequence means that some costs for these units were incurred last period and additional costs will be incurred in the current period. Additionally, the partially completed units in ending WIP Inventory were started in the current period production efforts on ending WIP Inventory units caused some costs to be incurred in this period and more costs will need to be incurred next period.

So, in order to spreading costs equitably over fully completed units and WIP Inventory comprising partly finished goods on a common basis, the concept of equivalent unit production or, more simply, equivalent production is used.

Equivalent Units of production (EUP)

The concept of equivalent units of production is the Key to spreading costs equitably in process costing. When a firm uses a process costing system, it usually manufactures one or a few items repetitively and would thus be highly likely to have work-in-process inventory at the end of an accounting period. The following three possibilities may normally occur with regard to work-in-process or the question of equivalent units of production.

- (a) Units started in the earlier period/process and finished in the present period/process.
- (b) Units started in the present period/process and finished in the same period/process
- (c) Units started in the present period/process and not finished in the present period/process.

So, the degree of partial completion is the clue to the equivalent units in the work-in-process. A four-step method is suggested for determining the units of equivalent production in a period, as well as related cost per equivalent unit.

- Analyze the physical flow of units for the period/process.
- Determine the equivalent units in the production for the period.
- Accumulate the costs in process for the period.
- Calculate the cost per equivalent unit in the production for the period.

Equivalent units of production are an approximation of the number of whole units of output that could have been production during a period from the actual effort expended during that period.

Equivalent units of production (EUP) measure the output in terms of the quantities of each of the factors of production applied thereto. In other words, Equivalent units of production are an approximation of the number of whole units of output that could have been production during a period from the actual effort expended during that period. EUP are calculated by multiplying the number of actual but incompleted units produced by the respective percentage of completion.

The meaning of EUP can be readily seen in the following example. Assume Department X of a company had no beginning inventory in April. During April, the department worked on 1,10,000 units; of which 1,00,000 units were completed and 10,000 units were 50% completed at

the end of the period. The Equivalent unit of production (EUP) for the period are: 1,05,000 [(1,00,000 X 100%)+(10,000 X 50%)].

Thus, 10,000 units that are 50% complete are equivalent to 5,000 units that are fully complete. In other words, the total costs are the same to produce either 10,000 units that are 50% complete or 5,000 units that are complete. The adjusted figure for partially complete units is then added to the number of completed units to arrive at equivalent units of production.

So, the equivalent units of production is calculated by the following formula:

Equivalent Units of Production = (# of units in process) × (Degree of completion in %)

Methods of Equivalent Units of Production

There are two ways of computing a process's equivalent units of production– (a) Weighted Average Method, and (b) First-in, First-out (FIFO) Method. Both the methods relate to the manner in which cost flow is assumed to occur in the production process, because cost flow assumption primarily affects what costs are attached to opening work-in-process inventory. These two methods are described below for better understanding.

(a) Weighted Average Method: The weighted average method computes an average cost per unit of beginning inventory and current period production. In this method, the cost of opening work-in-process is not kept separate but is averaged with the additional costs incurred during the period. Weighted average equivalent units of production is computed by the following formula:

(Weighted EUP average) = (Units completed) + [(Units in ending inventory) × (percentage complete)]

The key point in the computation of EUP under the weighted average method is that, units in the beginning inventory are always treated as if they were started and completed during the current period. Thus, no adjustment is made for these units, regardless of how much work was done on them before the period started. The above formula must be applied separately to each cost factor.

Cost Per Unit, Weighted Average Method

The basic formula for the calculation of unit cost on a weighted average method is:

EU of Prod FIFO = (Units completed/transferred out)- [(Units in beginning inventory) × (% of complete)] + [(Units in ending inventory) × (% of complete)]

or

EU to complete beginning inventory [(units in beginning inventory) × (100% - % of complete of beginning inventory)

+Units started and completes during the period.

+ EU in ending WIP inventory

Equivocal UP:

EU to complete beginning inventory EU to complete beginning inventory units in beginning inventory × (100% - % completion of beginning inventory

+ Units started and completed during the period

+ EU in ending WIP inventory

EU of period (FIFO) = Units transferred out

- EU in beginning inventory

+ EU in ending WIP inventory

$$\text{Cost per unit, weighted average} = \frac{\begin{array}{l} \text{(Cost of beginning inventory) +} \\ \text{(Cost incurred in current period)} \end{array}}{\text{Equivalent units of production}}$$

The above formula is consistent with the calculating of EUP, since costs associated with beginning inventory are pooled with current period cost to arrive at an average cost per unit. This formula, like that for EUP under weighted average method must be applied to each cost factor separately.

(b) FIFO Method: The principal difference between FIFO and weighted average method occurs in the computations of equivalent units of production and unit cost. The FIFO method separates beginning inventory and current period production and their associated costs so that a current period cost per unit can be calculated. So under FIFO method, we try to calculate the cost of work done this period, and we want the equivalent production done this period rather than a weighted average of this period and prior periods. The formula for FIFO equivalent unit of production is as follows:

$$(\text{Equivalent Units of Production, FIFO}) = (\text{Units completed}) - [(\text{Units in beginning inventory}) \times (\text{percentage complete})] + [(\text{Units in ending inventory}) \times (\text{percentage complete})]$$

The key point in the computation of EUP under FIFO method is that, opening inventory of work-in-process is kept as a separate figure. Costs incurred to completed this opening work-in-process are added to the opening work-in-process cost and the sum of these two costs is the total cost of completed units of opening work-in-process at which it is transferred to the next process. Like the formula for weighted average equivalent units of production, this formula must be applied separately to each cost factor.

Cost Per Unit, FIFO Method

FIFO method evaluates the current period activity. The formula for computing FIFO cost per unit is:

$$\text{Cost per unit, FIFO} = \frac{\text{Current-period costs}}{\text{Equivalent units of production}}$$

In the above formula, the cost figure that we divide by equivalent units of production is just the cost of current period, instead of the sum of the cost in the beginning inventory and the cost of the current period. As earlier, this calculation must be done for each cost factor.

Illustration: 4.1

Using the following data, compute Equivalent units of production under (a) weighted average method, and (b) FIFO method.

Units in beginning work-in-process (100% complete as to material; 40% complete as to conversion cost)	15,000
Units started during the month	5,00,000
Units completed during the month	5,13,000
Ending work-in-process (100% complete as to material 80% complete as to conversion costs)	10,000

Solution: As the formula is applicable for each cost factor, using the formula, EUP is calculated in tabular form:

Weighted Average	Direct Material	Conversion
Units completed	5,13,000	5,13,000
(+) Ending work-in-Process inventory (10,000 units @100% and 80% complete)	<u>10,000</u>	<u>8,000</u>
Weighted Average EUP	<u>5,23,000</u>	<u>5,21,000</u>
FIFO	Direct Material	Conversion
(-) Beginning Work-in-Process Inventory (100% Complete as to material and 40% as to conversion cost)	<u>(15,000)</u>	<u>(6,000)</u>
Units completed	5,13,000	5,13,000
(+) Ending work-in-Process inventory (10,000 units @100% and 80% complete)	<u>10,000</u>	<u>8,000</u>
FIFO EUP:	<u>5,08,000</u>	<u>5,15,000</u>

From the above illustration it is clear that weighted average method emphasises on the units that were completed during the period as well as the units that were started but not completed during the period. Unlike, FIFO method, the weighted average method does not exclude the equivalent units that were in beginning inventory. thus, one easiest way to shift weighted average to FIFO, just simply remove the equivalent units of production in the previous period from beginning work-in-process.

Illustration: 4.2

DEMONSTRATION PROBLEM

Munim Manufacturing Company uses a process cost system to account for the costs of its only product, Product X. Production takes place in three departments: Fabrication, Assembly, and Packaging.

At the end of the fiscal year, June 30, 2004, the following inventory of Product X is on hand.

- (a) No unused raw materials or packaging materials.
- (b) Fabrication Department: 300 units, 1/3 complete as to raw materials and 1/2 complete as to direct labor.
- (c) Assembly Department: 1000 units, 2/5 complete as to direct labor.
- (d) Packaging Department: 100 units, 3/4 complete as to packaging and 1/4th complete as to direct labor.
- (e) Shipping on finished goods are: 400 units.

- Required:**
- (i) The number of equivalent units of raw materials in all inventories at June 30, 2004.
 - (ii) The number of equivalent units of Fabrication Department's direct labor in all inventories at June 30, 2004.
 - (iii) The number of equivalent units of packaging materials in all inventories at June 30, 2004.

Solution to Demonstration Problem

- (i) Calculation of Equivalent units of Raw Materials in all inventories, June 30, 2004:

Fabrication Department (300 units × 1/3 complete	100
Assembly Department	1,000
Packaging Department	100
Shipping area	400

	1,600
	=====

- (ii) Calculation of Equivalent units of Fabrication Department's direct labor in all inventories, June 30, 2004:

Fabrication Department (300 × 1/2)	150
Assembly Department	1,000
Packaging Department	100
Shipping area	400

	1,650
	=====

- (iii) Calculation of Equivalent units of Packaging materials in all inventories, June 30, 2004:

Packaging Department (100 × 3/4)	75
Shipping area	400

	475
	=====

Problem- 4.2.2

Collins Company operates two producing departments, whose quantity reports appear as follows:

	Department 1	Department 2
Beginning inventory	200	80
Department 1 - all materials, 25%		
Conversion cost		
Department 2 - 60% conversion cost		
Started in process	<u>2,260</u>	<u>2,160</u>
	<u>2,460</u>	<u>2,240</u>
Transferred out	2,160	2,000
Ending inventory	300	240
Department 1 - all materials, 60%	-----	-----
conversion cost		
Department 2 - 80% conversion cost		
	<u>2,460</u>	<u>2,240</u>

Required:

Computer equivalent units of production figures for each department, using:

- (1) Weighted average method and
- (2) FIFO method.

Solution to Demonstration Problem

(1) Calculation of Equivalent units of Production (EUP): Weighted Average Method.

	Materials Unit		Conversion Unit	
Department 1:				
Transferred out (i.e. units completed)	2,160		2,160	
Add: Ending inventory	<u>300</u>	(100%)	<u>180</u>	(240×60%)
EUP :	<u>2,460</u>		<u>2,340</u>	

	Materials Units		Conversion Units
Department 1:			
Transferred out (i.e. units completed)	2,160		2,160
Less: Beginning inventory (all units)	<u>200</u>		<u>200</u>

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Shorted and finished during period	1,960	1,960	
Add: Beginning inventory (work this period)	-0-	150	(200×75%)
Add: Ending inventory	<u>300</u>	<u>180</u>	(300×60%)
EUP:	<u>2,260</u>	<u>2,290</u>	

	Units from Department 1	Conversion Cost	
Department 2:			
Transferred out	2,000	2,000	
Less: Beginning inventory (all units)	<u>80</u>	<u>80</u>	
Shorted and finished during period	1,920	1,920	
Add: Beginning inventory (work this period)	-0-	32	(80×40%)
Add: Ending inventory	<u>240</u>	<u>192</u>	(240×80%)
EUP:	<u>2,160</u>	<u>2,160</u>	

Problem 4.2.3

In attempting to verify the costing of the December 31st, 2004, inventory of work-in-process and finished goods recorded in Joy Corporation's books, the auditor general finds:

Finished goods, 4,00,000 units	Tk.20,19,600
Work-in-Process, 6,00,000 units, 50% complete as to labor and factory overhead	Tk.13,21,920

The company uses average costing. Materials are added to production at the beginning of the manufacturing process and factory overhead is applied at the rate of 60% of direct labor cost. Toy's inventory cost records disclosed zero finished goods on January 01, 2004, and the following additional information for 2004:

	Units	Cost	
		Materials	Labor
Work-in-Process, January 01 (80% complete as to labor and factory overhead)	4,00,000	Tk.4,00,000	6,30,000
Units started in production	20,00,000		
Materials cost		Tk.26,00,000	
Labor cost			Tk.39,90,000
Unit completed	18,00,000		

Required:

- (1) Compute the equivalent units of production.
- (2) Compute the unit production cost of materials, labor, and factory overhead.
- (3) Cost the ending finished goods and work-in-process inventories and compare to book balances.
- (4) Show journal entry to correctly state the finished goods and work-in-process ending inventories.

Solution:

(1)		Materials	Labor and Factory Overhead	
Units completed during the year		18,00,000	18,00,000	
Add: Ending inventory		<u>6,00,000</u>	<u>3,00,000</u>	
Equivalent units of production		<u>24,00,000</u>	<u>21,00,000</u>	(80×50%)

(2)	Total	Materials	Labor	Factory Overhead	
Beginning work-in-process	14,08,000	4,00,000	6,30,000	3,78,000	(6,00,000× 60%
Add: Costs added during the process	<u>89,84,000</u>	<u>26,00,000</u>	<u>39,90,000</u>	<u>23,94,000</u>	(39,00,000× 60%
Total:	<u>1,03,92,000</u>	<u>30,00,000</u>	<u>46,20,000</u>	<u>27,72,000</u>	
(÷) Equivalent units of production (Calculated in requirement 1)		<u>24,00,000</u>	<u>21,00,000</u>	<u>21,00,000</u>	
Unit production cost	<u>Tk.477</u>	<u>Tk.1.25</u>	<u>Tk.2.20</u>	<u>Tk.1.32</u>	

(3)	Total Tk.	Finished Goods Tk.	Work-in Process Tk.
Finished Goods (40,00,000 units × Tk.4.77)	19,08,000	19,08,000	
Work-in-process:			
Materials (6,00,000 units × Tk.1.25)	7,50,000		7,50,000
Labor (3,00,000 units × Tk.2.20)	6,60,000		6,60,000
Factory overhead (3,00,000 unit × Tk.1.32)	<u>3,96,000</u>		<u>3,96,000</u>
Cost as per test	37,14,000	19,08,000	18,06,000
Cost as per books	<u>33,41,520</u>	<u>20,19,600</u>	<u>13,21,920</u>
Difference	<u>3,72,480</u>	<u>(1,11,600)</u>	<u>4,84,080</u>

PRACTICE TEST

A. Self-Assessment Questions (SAQs):

1. Which of the following statements are true and which are false?
 - (i) Production in terms of equivalent units under weighted average method of accounting, in reference to the Process Costing system, shows total work done during the current period. —
 - (ii) Under the FIFO method, units transferred out are treated in separate blocks—one block consisting of the units in the beginning inventory, and the other block consisting of the units started and completed during the period. —
 - (iii) With reference to Process Costing system FIFO method can be used even if information on the degree of completion of opening work-in-process is not available. —
 - (iv) In a process cost system, the per unit cost of direct materials equals the total cost of materials purchased in the current month divided by the equivalent full units produced in the current month. —
 - (v) In a process cost system, the per unit cost of direct materials equals the total cost of materials used in the current month divided by the number of units completed in the current month. —
 - (vi) The number of equivalent full units of production during a period may be greater than, equal to, or similar than the actual number of units completed and transferred to the Finished Goods Inventory. —
 - (vii) Under the FIFO method, units in the beginning work-in-process inventory are treated as if they were completed before any new units are completed. —
 - (viii) Under the FIFO method of computing equivalent units of production, costs in the beginning work-in-process inventory are kept separate from costs of the current period. —
 - (ix) Completing 2,500 units which were each 70% completed at the beginning of the period represents 1,750 equivalent full units of work during the current period. —
 - (x) If beginning work-in-process inventory contains 500 units that are 60% complete, then the inventory contains 300 equivalent units. —
 - (xi) The weighted average and FIFO methods will typically produce widely different unit costs - particularly when there are no beginning work-in-process inventories. —
 - (xii) From a standpoint of cost control, the weighted average method is superior to the FIFO method. —

- (xiii) Reducing the size of work-in-process inventories will tend to reduce the difference between FIFO and weighted average method unit costs. —

B. Multiple Choice Questions (MCQs):

2. Choose the best answer for each of the following questions by placing the identifying letter in the space provided to the left.
- (i) Per unit costs:
- (a) Are relevant only when a company is engaged in manufacturing activities.
 - (b) Are determined in the job order cost systems but cannot be computed when a process cost system is in use.
 - (c) Are relevant in manufacturing, merchandising, merchandising, and service industries, regardless of the type of cost accounting system is in use.
 - (d) Are determined by relating manufacturing costs to the number of units sold.
- (ii) Which of the following is not an accurate statement regarding process cost summaries?
- (a) A process cost summary is prepared only at the end of the production process as units are transferred to the finished Goods Inventory.
 - (b) A process cost summary determines the departmental unit cost of production.
 - (c) A process cost summary determines the cost allocated to unfinished units in a particular department.
 - (d) A process cost summary determines the cost allocated to units completed and transferred to the next department on to the finished goods warehouse.
- (iii) The number of equivalent full units of production:
- (a) Is equal to the number of units completed by a department.
 - (b) May not be greater than the number of units completed by a department.
 - (c) Is used to compute the overhead application rate.
 - (d) May be less than, equal to, or greater than the number of physical units completed by a department.
- (iv) Department X of a Manufacturing company works on only one product, and all costs are incurred uniformly as the product goes along the assembly line. The 8,000 units in process on December 1 were 60% completed. An additional 80,000 units were placed in production during December. At December 31, the 20,000 units still in process were 80% completed. The equivalent full units of production during December amounted to:
- (a) 79,200
 - (b) 80,800
 - (c) 99,200
 - (d) 1,00,800.

- (v) Simple Company started 4,800 units into process during the month. 500 units were in the beginning inventory and 300 units were in the ending inventory. How many units were completed and transferred out during the month?
- (a) 5,000
 - (b) 4,600
 - (c) 5,300
 - (d) 5,100
- (vi) During May, Department X started and completed 55,000 units and also finished 10,000 units that were 60% completed on April 30. There 65,000 units were transferred to storage. On May 31, Department X's ending inventory consisted of 5,000 units that were 30% completed. Department X's ending inventory consisted of 5,000 units that were 30% completed. Department X's equivalent full units of production for May amounted to:
- (a) 55,000
 - (b) 60,500
 - (c) 65,000
 - (d) 70,000
- (vii) Last month Neil Company started 8,000 units into production. The Company had 2,000 units in process on January 1 of that year, which were 60% complete with respect to conversion, and 3000 units in process on December 31 which were 50% complete. 7,000 units were completed and transferred to the next department during the year. Using the weighted average method, the equivalent units of production for conversion for the year would be:
- (a) 8,300
 - (b) 8,500
 - (c) 9,200
 - (d) 9,500
- (viii) Refer to the data in the question (vii) above; using the FIFO method, the equivalent units of production for conversion costs for the year would be:
- (a) 8,300
 - (b) 7,700
 - (c) 7,300
 - (d) 6,700
- (ix) Dolly Corporation uses the FIFO method in its process costing system. The company had Tk.6,000 of materials cost in its beginning work-in-process inventory and the Company added Tk.75,000 in materials cost during the period. The equivalent units of production for materials was 20,000. The unit cost per

equivalent unit for materials would be:

- (a) Tk.3.75
 - (b) Tk.4.05
 - (c) Tk.0.30
 - (d) Tk.3.30
- (x) Costs in the beginning work-in-process inventory are added to the costs of the current period when making unit cost calculations by:
- (a) the FIFO cost method
 - (b) the weighted average cost method
 - (c) the quantity schedule method
 - (d) none of these.

C. Descriptive Questions:

1. Why are equivalent units of production used as an output measure in process costing? In your answer, be sure to address the problems created by partially completed inventories.
2. What creates the difference between weighted average and FIFO equivalent units of production? Which EUP calculation more accurately portrays the actual flow of units through a manufacturing process and why?
3. Explain the reasoning underlying the name of the weighted-average method.
4. How are the costs of the beginning work-in-process inventory treated differently under the weighted average and FIFO methods?
5. Why it is necessary to calculate separate equivalent unit of production for each cost component of a product? Are there times when separate EUP schedules are necessary and, if so, why?
6. How are units "started and completed" in the current period calculated? Is this figure used in both weighted average and FIFO cost assignment? Why or why not?
7. How is the unit cost for each cost component assigned to the units produced during the current period (a) the weighted average method and (b) the FIFO method.
8. Why might the FIFO method of process costing be more effective than the weighted average method from a behavioral standpoint?

Answer to SAQs:

True-False

(i), (ii), (iii), (iv), (v), (vi), (vii), (viii), (ix), (x), (xi), (xii), (xiii)

MCQs: (i), (ii), (iii), (iv), (v), (vi), (vii), (viii), (ix), (x)

Lesson 3: The Production Report

Learning Objectives

After completing this lesson, you are expected to be able to:

- Explain the purposes of cost of production report.
- Understand the steps followed to prepare cost of production report.
- Under stand the procedure of cost reconciliation.
- Combine the quantity schedule, equivalent units of production and cost reconciliation into a production report.
- Prepare cost of production report under the weighted average and FIFO methods.

Introduction

The production report is the key document in a typical process costing system and is vital to the proper operation of the system. Generally this report is prepared in such a way as to disclose the cost per unit of product for each element of cost. In most instances where many kinds of material are involved, it is not practical to subdivide the direct material by kind. Instead, the direct material is shown as a single item, as are direct labor and applied factory overhead. The procedure involved in a production report is a combination of costs that have already been used or converted into the product. Thus the production report is a useful tool that provides the information used in all calculations in process costing.

Definition of Production Report

Production report is a process cost accounting report that summarizes unit costs and costs of inventories.

Production report is a process cost accounting report that summarizes unit costs and costs of inventories. The purpose of the production report is to summarize for the manager all of the activity that takes place in a departments Work-in-Process account for a period. This activity includes the flow of production quantities through the department, and it shows the amount of production cost transferred out of the departments Work-in-Process Inventory account during the period.

A cost of production report shows:

1. any cost, total and unit, transferred to it from a preceding department;
2. materials, labor, and factory overhead added by the department;
3. unit costs added by the department;
4. cumulative costs, total and unit, to the end of operations in the department;
5. the cost of opening and closing work-in-process inventories; and
6. cost transferred to a succeeding department or to a finished goods storeroom.

The following steps are followed to prepare production report.

Prepare a Quantity Schedule: The first step to prepare production report is to prepare quantity schedule, which accounts the physical flow of units through a department, In other words. A quantity schedule shows the total number of units for which a department is held accountable and the disposition made of these units is also part of each departments cost of production report. As the quantity schedule analyse the physical flow of units, it is prepared in the following tabular form:

A quantity schedule shows the total number of units for which a department is held accountable and the disposition made of these units is also part of each departments cost of production report.

	Physical Units
Work-in-Process-beginning inventory	-----
Units started during the period	-----
Total units to account for	-----
Units completed and transferred out during the period	-----
Work-in-Process- ending inventory	-----

The above table can be reflected by the following inventory formula.

$$\left(\begin{array}{c} \text{Physical units in beginning} \\ \text{Work-in-process} \end{array} \right) + \left(\begin{array}{c} \text{Physical units} \\ \text{started} \end{array} \right) - \left(\begin{array}{c} \text{Physical units completed} \\ \text{and transferred out} \end{array} \right) = \left(\begin{array}{c} \text{Physical units in ending} \\ \text{work-in-process} \end{array} \right)$$

Compute Equivalent Units and Unit Costs: The second step in the process of preparing production report is to calculate equivalent units and unit cost of direct material and conversion activity. As we have confined our discussion to weighted average method and FIFO method, the procedure of computation equivalent units and unit cost have already discussed in earlier lesson.

To recapitulize we can say that, weighted average method treats units in the beginning work-in-process inventory as if they were started and completed during the current period. The otherhand, only work needed to complete units in the beginning inventory is included in the computation of equivalent units. Units started and completed during the current period is shown as a separate figure.

Under weighted average method, unit cost will contain some elements of cost from the earlier period. On the otherhand, in FIFO method, unit cost well contain only elements of cost from the current period.

Under weighted average method, unit cost will contain some elements of cost from the earlier period. On the otherhand, in FIFO method, unit cost well contain only elements of cost from the current period.

Prepare a Cost Reconciliation: The third step in the process of preparing cost reconciliation is to show (i) what costs have been charged to a department during a production period; and (ii) how these costs are accounted for. Usually, the costs engaged to a department will consist of:

- (a) Cost in the beginning work-in-process inventory.
- (b) Materials, labor, and manufacturing overhead added during the period.
- (c) Costs (if any) transferred in from the preceding department.

So, the cost section of this report is generally divided into two parts; (a) one showing total cost for which the department is accountable, and (b) another showing the disposition of these costs.

The cost of production report and its supporting schedule indicate each element of cost for each department because these detailed data are needed for cost control and for determining the cost of the ending work-in-process inventory. As this step is known as cost reconciliation, cost transferred out to the next department or into Finished Goods Inventory must be equal to the costs remaining in the ending work-in-process inventory.

We have now completed our discussion to all the three steps necessary to prepare a cost of production report. Now at the stage of demonstration, we will demonstrate problems relating to weighted average method and first-in-first out or FIFO method process costing.

Demonstration Problem

Problem # 4.3.1: Weighted Average Costing

A product called Aggregate is manufactured in one department of West Corporation. Materials are added at the beginning of the process. Shrinkage of 10% to 14% all occurring at the beginning of the process, is considered normal. Labor and factory overhead are added continuously throughout the process.

The following information relates to November production:

Work-in-Process, November 1 (4,000 Kg, 75% complete):		
Materials	Tk.	22,800
Labor		24,650
Factory overhead		21,860
November costs:		
Materials (FIFO costing)		
Inventory, November 1, 2,000 Kgs		10,000
Purchase, November 3, 10,000 Kgs		51,000
Purchase, November 18, 10,000 Kgs		51,500
Released to production during November, 16,000 Kgs		
Labor		1,03,350
Factory overhead		93,340

Transferred out, 15,000 Kgs.

Work-in-process, November 30, 3,000 Kgs, 33¹/₃%

Complete (average costing)

Required: Prepare a Cost of Production Report for November.

Solution to the Demonstration Problem

West Corporation
Cost of Production Report
For November 200__

Quantity Schedule:

Units in process at beginning (all materials - 75% labor and factory overhead)	4,000	
Units started in process	<u>16,000</u>	
		20,000
Units transferred to next department	15,000	

Units still in process (all materials - $33\frac{1}{3}\%$ labor and factory overhead)	3,000	
Shrinkage ($2000 / 6000 = 12.5\%$ with the normal)	2,000	
	<u>20,000</u>	20,000

Cost Reconciliation:	Total Cost	Unit Cost
Cost Charged to the Department:		
Cost added by department:		
Work-in-Process-beginning inventory:		
Materials	Tk.22,800	
Labor	24,650	
Factory overhead	21,860	
Cost added during period:		
Materials (Tk. 10,000+Tk.51,000+ (4000×5.15)]	81,600	Tk.5.80
Labor	1,03,350	8.00
Factory overhead	93,340	7.20
Total cost to be accounted for	<u>Tk.3,47,600</u>	<u>Tk.21.00</u>

Cost Accounted for as Follows:		
Transferred out ($1,500 \times \text{Tk.21}$)		Tk.3,15,000
Work-in-process - ending inventory:		
Materials ($3,000 \times \text{Tk.5.80}$)	Tk.17,400	
Labor ($3,000 \times 33\frac{1}{3}\% \times \text{Tk.8.00}$)	8,000	
Factory overhead ($3,000 \times 33\frac{1}{3}\% \times \text{Tk.7.20}$)	7,200	
		32,600
Total Cost accounted for		<u>Tk.3,47,600</u>

Additional Computations:

Equivalent Units of Production:	
Materials	= 15,000 + 3,000 = 18,000 units
Labor and Factory overhead	= 15,000 + ($3,000 \times 33\frac{1}{3}\%$) = 16,000 units
Unit costs: Materials	= Tk.22,800 + Tk.81,600 = Tk.1,04,400 ∴ Tk.1,04,400/18,000 units = Tk.5.80 per unit
Labor	= Tk.24,650 + Tk.1,03,350 = Tk.1,28,000 ∴ Tk.1,28,000/16,000 units = 8.00 per unit
Factory overhead	= Tk.21,860 + Tk.93,340 = Tk.1,15,200 ∴ Tk.1,15,200/16,000 units = Tk.7.20 per unit

Problem # 4.3.20: FIFO Costing

OHM Plastics Corporation produces non-breakable containers for cosmetics, using three departments: Mixing, Molding, and Finishing. On July 1, the work-in-process inventory in the Molding Department was 1,000 units, 50% complete as to materials and conversion costs, while July 31, work-in-process inventory consisted of 2,800 units, 75% complete as to materials and conversion costs. During July, the Finishing Department received 20,000 units from the Molding Department. In the Molding Department, 800 units, a normal quantity, were lost during processing. FIFO method of costing is used.

Relevant Cost data are as follows:

Work-in-process, July 1,	Tk.3,000
July Costs:	
Cost from Mixing Department	Tk.97,632
Materials	16,200
Labor	26,658
Factory overhead	19,872

Required: Using the FIFO costing method, prepare the cost of production report for the Molding Department for July. Round unit costs to the nearest cent.

Solution to the Demonstration Problem

**OHM Plastics Corporation
Molding Department
Cost of Production Report
For July 200__**

Quantity Schedule:

Units in the process at beginning (50% material and conversion cost)	1,000	
Units received from preceding department	<u>22,600</u>	<u>23,600</u>
Units transferred to next department	20,000	
Units still in process (75% materials and conversion cost)	2,800	
Units lost in process	<u>800</u>	<u>23,600</u>

	Total Cost	Unit Cost
Cost Reconciliation:		
Cost Charged to the Department:		
Work-in-Process- beginning inventory:	<u>Tk.3,000</u>	
Cost from preceding department:		
Transferred in during the month (22,600 units)	<u>97,632</u>	<u>Tk.4.32</u>
Cost added by department:		
Materials	16,200	0.75
Labor	26,568	1.23
Factory overhead	<u>19,872</u>	<u>0.92</u>
Total cost added	62,640	<u>2.90</u>
Adjustment for lost unit		<u>0.16</u>
Total Cost to be accounted for	<u>Tk.1,63,272</u>	<u>Tk.7.38</u>

Cost Accounted for as Follows:

Transferred to next department-
From beginning inventory:

Inventory cost	Tk.3,000	
Materials added (1000 × ½ × Tk.0.75)	375	
Labor added (1000 × ½ × Tk.1.23)	615	
Factory overhead added (1000 × ½ × Tk.0.92)	<u>460</u>	
From Current production:		<u>Tk.4,450</u>
Units started and finished (19000 × Tk.1,40,188* ¹ 7.38)		Tk.1,44,638
Work-in-process- ending inventory:		
Adjusted cost from preceding department [2800 × (Tk.4.32 + Tk.0.16)]	Tk.12,544	
Materials (2800 × ¾ × Tk.0.75)	1,575	
Labor (2800 × ¾ × Tk.1.23)	2,583	
Factory overhead (2800 × ¾ × Tk.0.92)	<u>1,932</u>	
		<u>18,634</u>
Total Cost accounted for		<u>Tk.1,63,272</u>

Workings:

(a) *1, 19,000 units × Tk.7.38 = 1,40,220.

In order to avoid decimal discrepancy, the cost transferred from current production is computed as follows:

Tk.1,63,272 - (Tk.4,450 + Tk.18,634) = Tk.1,40,188.

(b) Calculation of Equivalent Units of Production:

Transferred out	20,000	
Less: Beginning inventory (all units)	<u>1,000</u>	
Started and finished this period	19,000	
Add: Beginning inventory (work this period)	500	
Add: Ending inventory (Work this period)	<u>2,100</u>	
	<u>21,600</u>	Units

(c) Calculation of Unit Cost:

Tk.16,200
Materials = ----- = Tk.0.75 per unit
21,600 units

Tk.26,568
Labor = ----- = Tk.1.23 per unit
21,600 units

Tk.19.872
Factory Overhead = ----- = Tk.0.92 per unit
21,600 units

(d) Adjustment for Lost Units:

Tk.97,632
Method No. 1: ----- = Tk.4.48
(22,600 - 800) Units

∴ Tk.(4.48-Tk.4.32) = Tk.0.16

Method No. 2: 800 units × Tk.4.32 = Tk.3,456

$$\begin{array}{r} \text{Tk.3456} \\ \therefore \frac{\text{-----}}{21,600 \text{ units}} = \text{Tk.0.16} \end{array}$$

Problem # 4.3.3: FIFO method Vs Weighted Average Method

Puspa, Inc. uses three departments to produce a detergent. The Finishing Department is the third and last step before the product is transferred to storage.

All materials needed to give the detergent its final composition are added at the beginning of the process in the Finishing Department. Any lost units occur only at this point and are considered to be normal.

The company uses FIFO costing. The following data for the Finishing Department for September have been made available:

Production data:

In process, September 1 (labor and factory overhead, ³ / ₄ complete)	20,000	gals.
Transferred in from preceding department	80,000	gals.
Finished and transferred to storage	70,000	gals.
In process, September 30 (labor and factory overhead, ¹ / ₂ complete)	20,000	gals.

Additional data:

Work-in-process inventory, September 1:

Cost from preceding department Tk.76,000

Cost from this department:

Materials	43,000
Labor	78,000
Factory overhead	<u>84,000</u>

Total Work-in-process inventory, September 1	<u>2,81,000</u>
Transferred in during September	<u>2,80,000</u>

Cost added in this department:

Materials	1,40,000
Labor	3,25,000
Factory overhead	<u>2,60,000</u>

Total cost added	<u>7,25,000</u>
Total cost to be accounted for	<u>Tk. 12,86,000</u>

- Required:** (1) Prepare a cost of production report for the Finishing Department for September using FIFO costing.
- (2) Prepare a cost of production report for the Finishing Department for September, using weighted average costing (Carry unit cost computations to three decimal places, and round up the digit's in the fourth decimal place).

Solution to the Demonstration Problem
Puspa Inc.
Finishing Department - FIFO costing
Cost of Production Report
For September 200__

Quantity Schedule:

Gallons in process at beginning (3/4 conversion cost)	20,000	
Gallons received from preceding department	<u>80,000</u>	<u>1,00,000</u>
Gallons transferred to storage	70,000	
Gallons still in process (1/2 conversion cost)	20,000	
Gallons lost in process	<u>10,000</u>	<u>1,00,000</u>

Cost Reconciliation:

Cost Charged to the Department:

Work-in-Process inventory, September 1	<u>Tk.2,81,000</u>	
Transferred in during September	<u>Tk.2,80,000</u>	<u>Tk.3.50</u>

Cost added by department:

Materials	Tk.1,40,000	Tk.2.00
Labor	3,25,000	5.00
Factory overhead	<u>2,60,000</u>	<u>4.00</u>
Total cost added	Tk.7,25,000	<u>11.00</u>
Adjustment for lost unit		<u>0.50</u>
Total Cost to be accounted for	<u>Tk.12,86,000</u>	<u>Tk.15.00</u>

Cost Accounted for as follows:

Transferred to Storage-		
From beginning inventory	Tk. 2,81,000	
Labor (5000 × Tk.5.00)	25,000	
Factory overhead (5000 × Tk.4.00)	<u>20,000</u>	
	Tk.3,26,000	
From Current production:		
Units started and finished	<u>7,50,000</u>	
(50000 × Tk.15.00)		
		Tk.10,76,000
Work-in-process inventory, September 30:		
Adjusted cost from preceding department [20000 units × (Tk.3.50 + Tk.0.50)]	Tk.80,000	
Materials (20000 units × Tk.2.00)	Tk.40,000	
Labor (20000 units × ½ × Tk.5.00)	50,000	
Factory overhead (20000 units × ½ × Tk.4.00)	<u>40,000</u>	
		<u>2,10,000</u>
Total cost accounted for		<u>Tk.12,86,000</u>

Workings: (a) Calculation of Equivalent Units of Production:

	Materials	Labor and Factory Overhead
Transferred out	70,000	70,000
Less: Beginning inventory (all units)	<u>20,000</u>	<u>20,000</u>
Started and Finished this period	50,000	50,000

Add: Beginning inventory (work this period) ($\frac{1}{4}$ of 20,000 converted)	----	5,000
Ending inventory ($\frac{1}{2}$ 20,000 converted)	<u>20,000</u>	<u>10,000</u>
	<u>70,000</u> Units	<u>65,000</u> Units

(b) Adjustment for lost units:

Tk.2,80,000 Cost transferred in during September	=	Tk.2,80,000	
-----		-----	= Tk.4.00
80,000 Equivalent Units - 10,000 Lost Units		70,000	
Tk.2,80,000 Cost transferred in during September	=	Tk.2,80,000	
-----		-----	= Tk.3.50
80,000 Units transferred in during September		80,000	
Lost Units Cost adjustment			<u>Tk.0.50</u>

Or, $\frac{10,000 \text{ units} \times \text{Tk.3.50}}{70,000 \text{ Units}}$	=	$\frac{\text{Tk.35,000}}{70,000 \text{ units}}$	= Tk.0.50
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(2)

Puspa Inc.
Finishing Department - Weighted Average Costing
Cost of Production Report
For September 200__

Quantity Schedule:

Gallons in process at beginning ($\frac{3}{4}$ conversion cost)	20,000	
Gallons received from preceding department	<u>80,000</u>	<u>1,00,000</u>
Gallons transferred to storage	70,000	
Gallons still in process ($\frac{1}{2}$ conversion cost)	20,000	
Gallons lost in process	<u>10,000</u>	<u>1,00,000</u>

Cost Changed to the Department:	Total Cost	Unit Cost
Cost Charged to the Department:		
Work-in-Process beginning inventory	Tk.76,000	Tk.3.800
Transferred in during September	<u>2,80,000</u>	<u>3.500</u>
Total	<u>Tk.3,56,000</u>	<u>Tk.3.560</u>

Cost added by department:

Materials	Tk.43,000	
Labor	78,000	
Factory overhead	84,000	
Cost added during period:		
Materials	1,40,000	Tk.2.033
Labor	3,25,000	5.038
Factory overhead	<u>2,60,000</u>	<u>4.300</u>
Total cost added	<u>Tk.9,30,000</u>	<u>11.371</u>
Adjustment for lost unit		<u>0.396</u>
Total Cost to be accounted for	<u>Tk.12,86,000</u>	<u>Tk.15.327</u>

Cost Accountd for as Follows:

Transferred to storage	Tk.10,72,840*
Work-in-process-ending inventory	
Adjusted cost from preceding department [20000 units × (Tk.3.560 + 0.396)]	Tk.79,120
Materials (20000 × Tk.2.033)	40,660
Labor (20000 × ½ × Tk.5.038)	50,380
Factory overhead (20000 × ½ × Tk.4.300)	<u>43,000</u>
	<u>Tk.2,13,160</u>
Total cost accounted for	<u>Tk.12,86,000</u>

* Finished and Transferred to storage 70,000 units Tk.15.327 per unit = Tk.10,72,890

In order to avoid decimal discrepancy, the cost transferred to storage is computed as follows:

$$(Tk.12,86,000 - 2,13,160) = Tk.10,72,840$$

Workings:

(a) Calculation of Equivalent Units of Production:

	Materials	Labor and Factory Overhead
Transferred out	70,000	70,000
Add: Ending inventory (½ of 20,000 converted)	<u>20,000</u>	<u>20,000</u>
	<u>90,000</u> Units	<u>80,000</u> Units

(b) **Calculation of Units Cost:**

Materials	=	Tk.43,000 + Tk.1,40,000 = Tk.1,83,000
Labor	=	Tk.78,000 + Tk.3,25,000 = Tk.4,03,000
	∴	Tk.4,03,000/80000 units = Tk.5.038 per unit
Factory Overhead	=	Tk.84,000 + Tk.2,60,000 = Tk.3,44,000
	∴	Tk.3,44,000/80000 units = Tk.4.300 per unit

(c) **Adjustment for Cost Units:**

Method No.1:

$$Tk.3.56,000 - \text{-----} = Tk.3.956; (Tk.3.956 - Tk.3.560) = Tk.0.396 \text{ per unit}$$

90,000 units

Method No. 2: 10,000 units × Tk.3.560 = Tk.17,800

$$\therefore Tk.17,800/90,000 \text{ units} = Tk.0.396 \text{ per unit}$$

PRACTICE TEST

A. Self-Assessment Questions (SAQs):

1. Which of the following statements are true and which are false?
 - (i) In process costing system, the production report takes the place of the job cost sheet.
 - (ii) The purpose of the quantity schedule is to show the equivalent units for the period.
 - (iii) The term conversion cost includes the cost of manufacturing overhead as well as the cost of direct materials.
 - (iv) The first step in preparing a cost of production report is to calculate unit cost.
 - (v) The cost associated with beginning inventory is not included in the computation to determine the cost per equivalent unit for the current period for a particular department.
 - (vi) The last step in preparing cost of production report is to determine equivalent units of production.
 - (vii) The cost associated with beginning inventory is included in the process cost summary figure for "total cost to be accounted for" by a department for a particular month.
 - (viii) When there is beginning work-in-process inventory, the weighted average method of process costing must be used.
 - (ix) A process cost summary is used to determine the cost allocated to units completed by a department as well as the cost allocated to unfinished units remaining in the department at the end of the period.
 - (x) The FIFO process costing method sharply distinguishes the current work done from the previous work done on the beginning inventory of work-in-process.
 - (xi) The cost allocated to completed units plus the cost allocated to ending inventory of unfinished units equals the total amount of manufacturing costs incurred by a department during the period.
 - (xii) The key difference between the FIFO and weighted average computations for work-in-process inventory is equivalent units.

B. Multiple Choice Questions (MCQs):

2. Choose the best answer for each of the following questions by placing the identifying letter in the space provided to the left.
 - (i) With reference to Process costing, under weighted average method of accounting, in the "cost production report" in terms of equivalent units.
 - (a) Opening Work-in-process does not appear.

- (b) Opening WIP is shown at the percentage which represents balance work done during the current period to complete these partly completed units.
- (ii) When there are unfinished units in hand at the end of an accounting period and a process cost system is in use,
 - (a) Unit cost is determined by dividing total cost for the period by the number of units completed during the period.
 - (b) Unit cost is determined by dividing total cost for the period by the number of units worked on during the period.
 - (c) Unit cost is determined by dividing total cost for the period by the number of equivalent units produced during the period.
 - (d) Unit cost cannot be determined until all units are completed.
- (iii) The number of completed units that could have been produced from the inputs applied is called.
 - (a) Equivalent units
 - (b) Physical units
 - (c) Partial units
 - (d) Conversation units
- (iv) The total cost to account for in a cost of production report must equal the:
 - (a) Ending work-in-process
 - (b) Cost of units completed and transferred
 - (c) Total costs accounted for
 - (d) Total of direct materials and conversion costs for the units not completed.
- (v) The unit cost on a cost of production report is found by dividing the total cost by:
 - (a) units started and completed
 - (b) equivalent units of production
 - (c) units in ending work-in-process
 - (d) units completed and transferred.
- (vi) In a cost of production report, the total cost accounted for is equal to the cost of units completed and transferred plus the cost of:
 - (a) beginning work-in-process
 - (b) the units started and finished
 - (c) the units completed but still on hand
 - (d) ending work-in-process.
- (vii) The weighted average process costing adds the cost of all work done in the current period to the:
 - (a) work done in the preceding period on the current

- period's beginning inventory of work-in-process
 - (b) the ending inventory of work-in-process
 - (c) all costs estimated to be incurred in the next department
 - (d) the work done in the preceding department of the current period's ending inventory of work-in-process.
- (viii) Under process costing, the method of handling beginning work-in-process inventory that is almost never used in practice is:
- (a) weighted average
 - (b) FIFO
 - (c) LIFO
 - (d) specific identification
- (ix) Costs incurred in a previous department for items that have been received by a subsequent department are called:
- (a) subsequent costs
 - (b) variable costs
 - (c) transferred in costs
 - (d) moving costs.
- (x) During June, the equivalent full units of direct materials added to the product worked on by Department M amounted to a total of 40,000 applies as follows: beginning inventory – 8,000 units; units started and completed in June - 28,000; and ending inventory – 4,000 units. Assuming that the cost of direct materials requisitioned by the department in June was Tk.65,000, the amount of the materials cost to be assigned to the ending inventory would be:
- (a) Tk.5,000
 - (b) Tk.6,000
 - (c) Tk.4,2000
 - (d) Tk.5,4000
- (xi) The conversion cost (direct labor plus factory overhead) for the month of April is Tk.5 per unit; the beginning goods in process inventory consisted of 1,000 unit 100% completed as to materials and 40% completed as to conversion costs, with a cost of Tk.2,810. The total cost of these 1,000 units upon completion is:
- (a) Tk.5,810
 - (b) Tk.4,810
 - (c) Tk.7,810
 - (d) Tk. some other amount.
- (xii) The Finishing Department of Gunu Manufacturing works on only one product, and all costs are incurred uniformly while the units remain in the department. On March 01, there were 7,000 units in process that were 40% completed. An additional 60,000 units were transferred into the Finishing

Department during March. At March 31, there were 10,000 units in process that were 70% completed. Compute the equivalent full units of production for the finishing Department during March.

- (a) Tk.59,800
 - (b) Tk.61,200
 - (c) Tk.69,800
 - (d) Tk.71,200
- (xiii) Dolly Company uses the weighted average method. It had Tk.8,000 of conversion cost in its beginning work-in-process inventory and added Tk.64,000 of conversion cost. The amount of cost assignment to these units would be:
- (a) Tk.12,600
 - (b) Tk.4,800
 - (c) Tk.11,200
 - (d) Tk.5,400
- (xiv) The Head treatment department is the third department in a sequential process. The work-in-process account for the department would consist of:
- (a) costs transferred in from the prior department.
 - (b) materials costs added in the head treatment department
 - (c) conversion costs added in the heat treatment department
 - (d) all of the above.
- (xv) Merry Company had Tk.6,000 cost in its beginning work-in-process inventory for materials and the company added Tk.75,000 in cost for materials during the period. The company completed 20,000 equivalent units of production for materials and it uses the FIFO method. The unit cost for materials would be:
- (a) Tk.3.75
 - (b) Tk.4.05
 - (c) Tk.0.30
 - (d) Tk. none of the above
- (xvi) The beginning inventory of Department N consisted of 3,000 units, 80% completed as to materials and 25% completed as to conversion costs. Conversion costs is Tk.6 per unit for Department N; direct materials cost per unit for Department N is Tk.10.
- (xvii) Refer to the information above Assuming that the per unit costs for materials and conversion cost have remained stable for several months, the cost of Department B's beginning inventory is:
- (a) Tk.19,500
 - (b) Tk.28,500
 - (c) Tk.48,000
 - (d) Tk.21,900

(xviii) Again refer to the information above, the additional cost to complete the processing of these 3000 units through Department N amounts to:

- (a) Tk.28,500
- (b) Tk.48,000
- (c) Tk.26,100
- (d) Tk.19,500

C. Descriptive Questions:

1. What is the propose of the cost of production report? How would such a report assist cost accountants in making entries for a period?
2. What is the purpose of a department production report prepared using process costing?
3. What is a quantity schedule, and what purpose does it serve?
4. Why are the Equivalent unit of production calculations made for standard process costing the same as the EUP calculations for FIFO process costing?
5. On the cost reconciliation part of production report, the weighted-average method treats all units transferred out in the same way. How does this differ from the FIFO method of handling units transferred out?
6. From the standpoint of cost control, why is the FIFO method superior to the weighted average method?
7. How are inventories accounted for under a standard process costing system? What information is provided to management when inventories are accounted for in this manner?

Answer to SAQs:

- True - False : 1. (i), (ii), (iii), (iv), (v), (vi), (vii), (viii), (ix), (x)
2. (i), (ii), (iii)