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ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

Course: Cost Accounting (462) • Level: B.COM / Associate Degree

Semester: Autumn 2026

Assignment No. 2 (Units 6–9)

SOLVED ASSIGNMENT GUIDE

(For Study & Reference)

Note: This guide is prepared for study and reference purposes. Students are advised to read the relevant units of the course book and write the assignment in their own words.

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Question 1: Defective Units and Rework Costs — The Surgical Instrument Company (20 Marks)

Question as printed: The Surgical Instrument Company manufactures for stock purposes a number of high-precision instruments which must meet strict specifications. During the last month, an order for 200 instruments was executed by the company and the following costs were incurred: Material cost Rs. 130,000; Direct labour Rs. 90,000; MOH Applied 120% of Direct labour. The Quality Control Department rejected 15 instruments as they could not comply with the technical standards as envisaged. In order to rework for the removal of defects in the defective instruments, the additional costs appended below were committed to rework: Material cost Rs. 6,000; Direct labour Rs. 2,500; MOH Applied 120% of Direct labour. Required: Record the manufacturing costs and additional costs incurred on the removal of defects and rework under each of the following options: (a) When the rework costs are charged directly to the job from which the defects were noticed. (b) When additional costs incurred on reworking are charged to the overall periodic production.

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Introduction

Defective units are units that do not meet the prescribed quality standards but can be made saleable by incurring additional cost on materials, labour and overheads; this additional work is called rework or rectification. Defectives differ from spoiled (scrap) units, which cannot be corrected economically and must be sold for their scrap value or discarded. The accounting problem is how to record the cost of rework. Two treatments are in common use. If the defect is traceable to the particular job—for example because of the special specifications of that job—the rework cost is charged to that job, increasing its cost. If the defect is of a general and normal nature arising in the ordinary course of production, the rework cost is treated as a factory overhead of the period and is thus spread over all production. This answer first computes and records the original manufacturing cost of the 200 instruments, and then records the rework cost under each of the two options, showing the resulting unit cost under each treatment.

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Working Notes

Original cost of producing 200 instruments: material Rs. 130,000 + direct labour Rs. 90,000 + manufacturing overhead (MOH) applied at 120% of direct labour (120% × 90,000 = Rs. 108,000) = Rs. 328,000; cost per instrument before rework = 328,000 ÷ 200 = Rs. 1,640. Rework cost for the 15 defective instruments: material Rs. 6,000 + direct labour Rs. 2,500 + MOH applied at 120% of direct labour (120% × 2,500 = Rs. 3,000) = Rs. 11,500. After successful rework, all 200 instruments (185 originally good plus 15 rectified) are available as finished, saleable instruments.

Recording the Original Manufacturing Costs

The original costs are charged to the work-in-process (job) account in the usual way, whether or not rework later proves necessary:

Table 1: Journal Entries — Original Production Costs

Entry	Debit (Rs.)	Credit (Rs.)
Work-in-Process Inventory (Job) A/c — Dr. To Materials Inventory A/c (material issued for 200 instruments)	130,000	130,000
Work-in-Process Inventory (Job) A/c — Dr. To Wages Payable / Payroll A/c (direct labour charged to the job)	90,000	90,000
Work-in-Process Inventory (Job) A/c — Dr. To Manufacturing Overhead Applied A/c (MOH at 120% of direct labour)	108,000	108,000
Total cost accumulated on the job (Rs. 1,640 per instrument)	**328,000**	

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Option (a): Rework Costs Charged Directly to the Job

Under this option the defect is regarded as the responsibility of the specific job, so the whole rework cost of Rs. 11,500 is added to the cost of that job. The entries are:

Table 2: Journal Entries — Option (a)

Entry	Debit (Rs.)	Credit (Rs.)
Work-in-Process Inventory (Job) A/c — Dr. To Materials Inventory A/c (material used in rework)	6,000	6,000
Work-in-Process Inventory (Job) A/c — Dr. To Wages Payable / Payroll A/c (direct labour on rework)	2,500	2,500
Work-in-Process Inventory (Job) A/c — Dr. To Manufacturing Overhead Applied A/c (MOH at 120% of rework labour)	3,000	3,000

Finished Goods Inventory A/c — Dr. To Work-in-Process Inventory (Job) A/c (transfer of completed job: 328,000 + 11,500)	**339,500**	**339,500**

Result under option (a): total cost of the job = Rs. 328,000 + Rs. 11,500 = Rs. 339,500; unit cost = 339,500 ÷ 200 = Rs. 1,697.50 per instrument. The advantage of this treatment is accuracy and accountability for that particular job: the job bears the full cost it actually caused, and if the finished instruments are priced on a cost-plus basis for that order, the rework is recovered in the price. This treatment is appropriate where the defects arose because of the peculiar requirements of the job itself, unusual specifications, or causes identifiable with that batch. Its drawback is that one job's unit cost is inflated by an incident that may be a normal risk of factory production as a whole, which can distort comparisons between jobs.

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Option (b): Rework Costs Charged to Overall Periodic Production

Under this option the rework is treated as a normal incident of production in general. The rework costs are therefore charged to the factory (manufacturing) overhead control account of the period, from where they are absorbed by all the production of the period through the overhead absorption rate. The job itself is closed at its original cost:

Table 3: Journal Entries — Option (b)

Entry	Debit (Rs.)	Credit (Rs.)
Factory Overhead Control (Rework) A/c — Dr. To Materials Inventory A/c (material used in rework)	6,000	6,000
Factory Overhead Control (Rework) A/c — Dr. To Wages Payable / Payroll A/c (direct labour on rework)	2,500	2,500

Factory Overhead Control (Rework) A/c — Dr. To Manufacturing Overhead Applied A/c (MOH at 120% of rework labour)	3,000	3,000
Finished Goods Inventory A/c — Dr. To Work-in-Process Inventory (Job) A/c (transfer of completed job at original cost)	**328,000**	**328,000**

Result under option (b): the job is transferred to finished goods at Rs. 328,000, giving a unit cost of Rs. 1,640 per instrument, unchanged by the rework. The rework cost of Rs. 11,500 enters the factory overhead of the month and will be recovered gradually from all jobs produced in the period as overhead is absorbed. This treatment is appropriate when defective work within normal limits is an expected feature of the production process—as with precision instruments made to strict specifications—because it avoids penalising a single job for a general factory risk and keeps job costs comparable. Its weakness is that it conceals the cost of poor quality inside general overhead, so unless a separate rework or quality-cost report is maintained, management may never see how much defects are costing the company. In practice, many firms charge normal rework to overhead (option b) but record it in a distinct rework account first, so that the figure remains visible for quality control while still being spread over production; rework caused by abnormal negligence, on the other hand, is treated as a loss and charged to the costing profit and loss account rather than to any job or to overhead.

Comparison of the Two Options

Table 4: Summary of the Two Treatments

Item	Option (a): Charged to the job	Option (b): Charged to periodic production
Original job cost	Rs. 328,000	Rs. 328,000

Rework cost Rs. 11,500 borne by	This job only	All production of the period (through FOH)
Total cost transferred to finished goods	Rs. 339,500	Rs. 328,000
Unit cost of each instrument	Rs. 1,697.50	Rs. 1,640.00
Most suitable when	Defect is specific to the job	Defect is a normal, general production risk

Conclusion

To conclude, the production of 200 instruments cost Rs. 328,000 (Rs. 1,640 per instrument), and rectifying the 15 defective instruments cost a further Rs. 11,500 (material Rs. 6,000, labour Rs. 2,500 and applied MOH Rs. 3,000). Charged to the job, the rework raises the job cost to Rs. 339,500 and the unit cost to Rs. 1,697.50; charged to overall periodic production, the job remains at Rs. 328,000 and Rs. 1,640 per instrument while the Rs. 11,500 is absorbed by the period's production through factory overhead. The choice between the two treatments depends on whether the defect is attributable to the particular job or is a normal risk of production generally.

Question 2: Timekeeping Department and Methods of Recording Attendance; Earnings of Mr. Liaquat (20 Marks)

Question as printed: (a) Describe the functions of a timekeeping department and various methods used for controlling the attendance of workers in a factory. (b) Mr. Liaquat is employed in Imperial Electrical Industries as a wire operator. His monthly pay is Rs. 12,000 with 20% Conveyance Allowance and 45% House Rent Allowance. He is also entitled to overtime pay at double the hourly rate for working beyond 40 hours in a week. Mr. Liaquat worked in the factory during April 2014 as under: 1st Week 48 Hours; 2nd Week 54 Hours; 3rd Week 60 Hours; 4th Week 58 Hours. Required: Compute his total earnings for the month.

Introduction

Labour is usually the most sensitive element of cost in a factory: workers are paid for time, so the business must record accurately when each worker arrives and leaves, and how that time is spent. Timekeeping is the recording of attendance time, while time booking records how the attended time is used on jobs and processes. Part (a) describes the functions of the timekeeping department and the methods by which attendance is controlled; part (b) applies the related payroll ideas by computing the monthly earnings, including overtime, of Mr. Liaquat.

Part (a)(i): Functions of the Timekeeping Department

The timekeeping department, usually located at the factory gate under the personnel or administration department, performs the following functions. It records the time of arrival and departure of every worker, both for day workers and shift workers, and maintains the attendance record on the basis of which wages of time-rated workers are calculated. It records late arrivals, early departures, authorised leave and absence, and reports habitual latecomers and absentees to management. It maintains statutory records required under factory and labour laws, including registers of workers and overtime. It supplies the payroll department with verified attendance and overtime data, and supplies the cost department with labour time summaries used in charging labour cost to jobs and in computing idle time. It also controls entry to the factory, issues gate passes and identity tokens, and thereby supports security and discipline. In short, the timekeeping department creates the reliable time record from which wages are paid, labour cost is computed and attendance is controlled.

Part (a)(ii): Methods of Controlling Attendance

Attendance has traditionally been recorded by manual methods. In the attendance register method, each worker signs, or the timekeeper marks, a register kept at the gate; it is cheap and simple but suitable only for small factories, and it can be misused through proxy marking and disputes over late entries. In the metal disc or token method, each worker is given a numbered disc which he picks from a board on arrival and drops into a box (or places on a board on leaving); discs remaining unclaimed after the start time reveal latecomers, and the timekeeper records attendance from the discs. It is more orderly than a register but still depends on the honesty and alertness of the timekeeper.

Mechanical and electronic methods were developed to remove human error and favouritism. In the clock card (time recorder) method, each worker has a card kept in a rack by the time clock; on arrival and departure the worker inserts the card into the clock, which prints the exact time. The printed card provides an indisputable record for payroll and overtime, though "buddy punching"—one worker clocking in for an absent friend—remains a risk unless supervised. Dial time recorders work similarly, the worker turning a dial to his number which records the time against it. Modern factories use electronic systems: magnetic-stripe or RFID smart cards read by terminals at the gate, and biometric systems using fingerprints or face recognition. Biometrics eliminate proxy attendance completely, feed data directly to payroll and cost accounting software, and produce instant reports on latecoming, absenteeism and overtime. Whatever the method, effective attendance control combines the recording device with clear rules—grace periods, deduction or disciplinary action for latecoming, prior authorisation of overtime by the foreman, and daily absentee reports to supervisors—and with the separation of duties between

timekeeping, payroll preparation and wage payment, which prevents fraud such as the inclusion of dummy ("ghost") workers in the wage sheet.

Part (b): Computation of Mr. Liaquat's Total Earnings for April 2014

Assumptions stated: monthly basic pay of Rs. 12,000 relates to the normal working month of 4 weeks × 40 hours = 160 hours, so the hourly rate is 12,000 ÷ 160 = Rs. 75 per hour; overtime beyond 40 hours in a week is paid at double the hourly rate, i.e. Rs. 150 per overtime hour; the allowances (conveyance 20% and house rent 45%) are calculated on the monthly basic pay and are payable in full for the month.

Table 5: Overtime Hours Worked by Mr. Liaquat

Week	Hours worked	Normal hours	Overtime hours
1st Week	48	40	8
2nd Week	54	40	14
3rd Week	60	40	20
4th Week	58	40	18
Total	**220**	**160**	**60**

Table 6: Total Earnings of Mr. Liaquat for April 2014

Component	Basis	Rs.
Basic pay (monthly)	Given	12,000
Conveyance allowance	20% of 12,000	2,400
House rent allowance	45% of 12,000	5,400
Overtime pay	60 hours × Rs. 150 (double of Rs. 75)	9,000
Total earnings for the month		**28,800**

Thus Mr. Liaquat's gross earnings for April 2014 are Rs. 28,800, consisting of Rs. 19,800 of regular pay and allowances (12,000 + 2,400 + 5,400) and Rs. 9,000 of overtime premium earnings for the 60 overtime hours worked during the month. The overtime element is

substantial—almost one-third of the total—which is typical when weekly hours rise to 54–60; from the cost accounting viewpoint such heavy overtime should be authorised and monitored by the timekeeping and production departments, because it raises the labour cost per unit and may indicate a need to recruit additional workers or reschedule production.

Conclusion

In conclusion, the timekeeping department records attendance, supplies verified time data to payroll and costing, and enforces punctuality through methods ranging from registers and tokens to clock cards and biometric systems. On the given data, Mr. Liaquat earns basic pay Rs. 12,000, conveyance allowance Rs. 2,400, house rent allowance Rs. 5,400 and overtime pay Rs. 9,000 for 60 overtime hours at the double rate of Rs. 150 per hour—total earnings of Rs. 28,800 for April 2014.

Question 3: Disposition of Under- and Over-Applied Factory Overheads; Basharat Production Industries (20 Marks)

Question as printed: (a) What are the methods for disposition of under- and over-applied factory overheads? Explain with necessary journal entries. (b) The following data has been extracted from the record of Basharat Production Industries for the year 2014: Budgeted factory overheads Rs. 500,000; Actual factory overheads Rs. 455,000; Budgeted machine hours 12,500 hours; Actual machine hours 12,000 hours. Required: (1) Work out (i) predetermined overhead absorption rate per machine hour, (ii) applied overhead cost, (iii) over- or under-absorbed factory overhead cost. (2) Give journal entries for (i) incurrence of factory overheads, (ii) application of overheads to production, (iii) disposition of over- or under-absorbed overheads.

Introduction

Factory overheads cannot wait until the end of the year to be charged to production, because product costs are needed continuously for pricing, tenders and inventory valuation. Companies therefore apply overheads to production during the year at a predetermined rate based on budgeted overheads and budgeted activity. Because budgets are estimates, the overhead actually applied almost never equals the overhead actually incurred: if applied overhead exceeds actual overhead, overhead is over-applied (over-absorbed); if it falls short, overhead is under-applied (under-absorbed). At the end of the period this balance in the factory overhead account must be disposed of. Part (a) explains the recognised methods of disposition with journal entries, and part (b) works the figures and entries for Basharat Production Industries.

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Part (a): Methods of Disposition of Under- and Over-Applied Overheads

Method 1 — Write off to cost of goods sold (or costing profit and loss account). If the amount of under- or over-applied overhead is small (immaterial), the simplest and most common treatment is to transfer it entirely to the cost of goods sold of the period, on the reasoning that most of the period's production has already been sold. For under-applied overhead (applied less than actual, leaving a debit balance in the overhead account): Cost of Goods Sold A/c — Dr. To Factory Overhead Control A/c. For over-applied overhead (a credit balance): Factory Overhead Control A/c — Dr. To Cost of Goods Sold A/c. Some firms credit or debit the amount to the costing profit and loss account instead, particularly where the difference arose from abnormal causes such as a strike, breakdown or idle capacity; abnormal under-absorption should in principle be treated as a period loss and never loaded onto product cost.

Method 2 — Proration (apportionment) among work-in-process, finished goods and cost of goods sold. If the amount is material, writing it off entirely to cost of goods sold would distort both profit and inventory values, because part of the period's production is still unsold in the stores and part is still in process. The difference is therefore apportioned among the three accounts in proportion to the applied overhead contained in each of them (or, approximately, in proportion to their balances). For under-applied overhead: Work-in-Process Inventory A/c — Dr.; Finished Goods Inventory A/c — Dr.; Cost of Goods Sold A/c — Dr.; To Factory Overhead Control A/c (with the total under-applied amount). For over-applied overhead the entry is reversed: Factory Overhead Control A/c — Dr.; To Work-in-Process Inventory A/c; To Finished Goods Inventory A/c; To Cost of Goods Sold A/c. Proration restates inventories and cost of goods sold to approximately their actual-cost figures and is the theoretically correct treatment for material amounts.

Method 3 — Carry forward to the next period. Where overheads are under- or over-absorbed because of seasonal or cyclical fluctuations that are expected to reverse within the accounting year or operating cycle—for example, a seasonal factory that under-absorbs in the slack quarter and over-absorbs in the peak quarter—the balance may be carried forward in a reserve or suspense account instead of being disposed of immediately. The overhead control account is closed to an Overhead Reserve/Suspense A/c, and the balance is adjusted against the following period's absorption. This method is acceptable only where the reversal is reasonably certain; otherwise it merely postpones the recognition of a real difference. A related approach is to use a supplementary rate: a second rate is computed for the under- or over-absorbed amount and applied to the period's output, which in effect achieves the same result as proration. The choice

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among the methods depends on the materiality of the amount and on the cause of the difference—estimation error, change in spending, or change in the volume of activity.

Part (b): Basharat Production Industries — Computations

(i) Predetermined overhead absorption rate = Budgeted factory overheads ÷ Budgeted machine hours = Rs. 500,000 ÷ 12,500 hours = Rs. 40 per machine hour. (ii) Applied overhead cost = Predetermined rate × Actual machine hours = Rs. 40 × 12,000 = Rs. 480,000. (iii) Actual factory overheads were Rs. 455,000, while Rs. 480,000 was applied to production; applied overhead therefore exceeds actual overhead by 480,000 − 455,000 = Rs. 25,000, so factory overhead is over-applied (over-absorbed) by Rs. 25,000. The over-absorption arose because, although activity was lower than budget (12,000 against 12,500 hours), actual overhead spending (Rs. 455,000) fell much more than proportionately below the budget of Rs. 500,000.

Table 7: Journal Entries — Basharat Production Industries

No.	Entry	Debit (Rs.)	Credit (Rs.)
(i)	Factory Overhead Control A/c — Dr. To Materials Inventory / Wages Payable / Accumulated Depreciation / Cash etc. A/cs (actual factory overheads incurred during the year)	455,000	455,000
(ii)	Work-in-Process Inventory A/c — Dr. To Factory Overhead Applied (Control) A/c (overheads applied to production: 12,000 machine hours × Rs. 40)	480,000	480,000
(iii)	Factory Overhead Control A/c — Dr. To Cost of Goods Sold A/c	25,000	25,000

	(disposition of over-applied overheads of Rs. 25,000, written off to cost of goods sold, the amount being relatively small)		

After entry (iii), the factory overhead control account is fully closed: it was debited with Rs. 455,000 of actual overhead and with Rs. 25,000 on disposition, and credited with Rs. 480,000 applied—debits and credits both total Rs. 480,000. Because the overhead was over-applied, production had been charged with Rs. 25,000 more overhead than was actually incurred; crediting cost of goods sold removes this excess charge and increases the reported gross profit accordingly. Had the amount been material relative to inventories, proration among work-in-process, finished goods and cost of goods sold would have been used instead, in the proportions of the applied overhead contained in each.

Conclusion

To conclude, under- and over-applied overheads are disposed of by writing the balance off to cost of goods sold (or costing profit and loss) when it is small, by prorating it among work-in-process, finished goods and cost of goods sold when it is material, or by carrying it forward when it results from seasonal fluctuations expected to reverse. For Basharat Production Industries, the predetermined rate is Rs. 40 per machine hour, applied overhead is Rs. 480,000 against actual overhead of Rs. 455,000, giving over-applied overhead of Rs. 25,000, which is closed by debiting Factory Overhead Control and crediting Cost of Goods Sold.

Question 4: Store Ledger Card; Periodic and Perpetual Inventory Systems (20 Marks)

Question as printed: (a) Describe the contents of a Store Ledger Card and the objects for its maintaining in an organization. (b) Comprehensively state the periodic and perpetual inventory systems and their application in trading as well as manufacturing concerns.

Introduction

Materials usually form the largest single element of the cost of a manufactured product, and stock is often the largest current asset of a trading concern. Sound material control therefore requires records that show, for every item, how much was received, how much was issued and how much remains, together with its value. The store ledger card is the central record of this kind maintained by the cost accounting department. Linked with it is the broader question of which inventory system the organisation adopts—the periodic system, which counts stock physically at intervals, or the perpetual system, which keeps a continuous record of every movement. This answer describes the store ledger card and its objects in part (a), and explains the two inventory systems and their applications in part (b).

Part (a)(i): Contents of a Store Ledger Card

A separate store ledger card (also called a stores ledger account or stock ledger card) is maintained for each item of material in the stores. Cards are normally kept in the cost office, and they record quantities and values, whereas the bin card kept beside the material in the store records quantities only. The card carries identification particulars at its head: the name and description of the material, its code number, the bin number and store location, the unit of measurement (kilograms, litres, pieces and so on), and the control levels—maximum level,

minimum level, re-order level and re-order quantity—together with the pricing method adopted for issues, such as FIFO, LIFO or weighted average. The body of the card is divided into three sections, each with columns for date, reference document number, quantity, rate per unit and total amount. The receipts section records purchases and returns from departments, supported by goods received notes. The issues section records materials issued to production and other departments against material requisitions, with the job or department charged. The balance section shows, after every transaction, the quantity on hand, its rate and its total value. Space is also provided for recording orders placed and materials reserved, and for remarks such as stock verification adjustments and losses.

Part (a)(ii): Objects of Maintaining the Store Ledger Card

The objects of maintaining store ledger cards are as follows. First, they provide a continuous (perpetual) record of the quantity and value of every material in stock, so management can know the stock position at any moment without a physical count. Second, they value issues to production on a consistent pricing basis, enabling the cost of each job, process or department to be charged with the correct material cost. Third, they support inventory control: comparison of the balance with the maximum, minimum and re-order levels printed on the card triggers timely re-ordering, prevents both overstocking (which locks up capital) and stock-outs (which stop production), and highlights slow-moving and obsolete items. Fourth, they provide the stock figures needed for the balance sheet and for the cost statements at the end of any period. Fifth, they act as a check on the storekeeper: the book balances can be compared with bin cards and with physical verification, so shortages, pilferage and recording errors are detected and responsibility can be fixed. Sixth, they create an audit trail, because every receipt

and issue is referenced to an authorised document. In sum, the store ledger card converts the physical movements of materials into financial information for costing, control and financial reporting.

Part (b)(i): The Periodic Inventory System

Under the periodic inventory system, the quantity and value of inventory are determined only at the end of an accounting period by physically counting, weighing or measuring all stock on hand. During the period, purchases are recorded in a purchases account but no continuous stock record is maintained, and the cost of goods sold is computed residually: opening inventory + purchases (and, in a factory, other manufacturing costs) − closing inventory (found by the physical count) = cost of goods sold or materials consumed. The system is simple and cheap to operate and suits small businesses dealing in many low-value items. Its weaknesses are serious: no stock information is available between counts, so interim accounts cannot be prepared accurately; there is no control over shortages, because theft, wastage and breakage are silently absorbed into the computed cost of goods sold; production planning lacks up-to-date stock data; and the physical count itself may require the business or factory to close down.

Part (b)(ii): The Perpetual Inventory System

Under the perpetual inventory system, a continuous record of receipts, issues and balances is maintained—through store ledger cards, bin cards and, nowadays, computerised inventory software—so that the book balance of every item is known at all times. Issues to production are charged to jobs or to cost of goods sold as they occur, and inventory is reduced immediately. Physical verification is still performed, but progressively (continuous stocktaking): a few items are counted each day and compared with the records, and discrepancies are investigated and

adjusted through an inventory adjustment account. The advantages are up-to-date stock information for management and interim accounts, effective control that reveals losses and inefficiencies, avoidance of a complete annual shutdown for counting, and support for level-based reordering. Its disadvantages are the higher cost of record-keeping and the need for disciplined documentation of every movement.

Table 8: Periodic and Perpetual Inventory Systems Compared

Point of comparison	Periodic system	Perpetual system
When stock is known	Only after physical count at period end	Continuously, from records
Cost of goods sold	Computed as a residual figure	Recorded with every issue/sale
Control over losses and theft	Weak — losses hidden in cost of goods sold	Strong — discrepancies investigated
Cost of operating the system	Low	Higher
Interim financial statements	Difficult without a count	Readily prepared
Physical verification	Complete count at period end	Continuous, item by item

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Part (b)(iii): Application in Trading and Manufacturing Concerns

In trading concerns, the choice depends mainly on size and the value of goods. Small retailers and wholesalers handling large numbers of inexpensive items traditionally use the periodic system, counting stock at the year end to value closing inventory and compute cost of goods sold. Large trading organisations, supermarkets and distributors, however, now use the perpetual system through point-of-sale and barcode systems: every sale automatically reduces inventory and records cost of goods sold, giving management daily information on stock and margins by product line. In manufacturing concerns, the perpetual system is practically indispensable. A factory holds three kinds of inventory—raw materials, work-in-process and finished goods—and must know material balances continuously to keep production running, to

value issues to jobs and processes through store ledger cards, and to prepare the statement of cost of goods manufactured at any date. The periodic system can serve only the smallest manufacturing units, and even there it weakens material control, because materials consumed can only be estimated as opening stock plus purchases minus the counted closing stock. In practice, most manufacturing firms operate the perpetual system for materials and finished goods while still verifying the records by continuous physical stocktaking, combining the strengths of both approaches.

Conclusion

To conclude, the store ledger card identifies each material and records its receipts, issues and balances in quantity and value, serving the objects of continuous stock information, correct valuation of issues, inventory control, financial reporting and checking the storekeeper. The periodic inventory system values stock only through a period-end physical count and computes cost of goods sold as a residual, whereas the perpetual system maintains continuous records supported by the store ledger. Trading concerns may use either system according to their size, but manufacturing concerns, with raw materials, work-in-process and finished goods to control, generally require the perpetual system.

Question 5: Distribution of Service Department Overheads — Step Method and Algebraic Method, Petiwal Production Company (20 Marks)

Question as printed: The Petiwal Production Company operates with two producing departments, P-1 and P-2, and two service departments, S-1 and S-2. Actual factory overheads before distribution of servicing departments' costs, together with the usage of services from

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the servicing departments, are as under: P-1: Rs. 200,000, using 40% of S-1 and 20% of S-2; P-2: Rs. 238,000, using 50% of S-1 and 40% of S-2; S-1: Rs. 72,000, using 40% of S-2; S-2: Rs. 90,000, using 10% of S-1. Total: Rs. 600,000. Required: (1) Determine the total overhead cost of the Production Departments after proration of the overhead cost of the Servicing Departments using the Step method. (2) Prorate the Servicing Departments' overhead costs over the Producing Departments using the Algebraic method and compute the total overhead costs of each Producing Department.

Introduction

Factory overheads are first collected in the departments in which they are incurred—the primary distribution. Production departments then have to bear also the cost of the service departments (such as maintenance, stores, power house and canteen), which exist only to serve production; transferring service department costs to production departments is called the secondary distribution or proration. Three methods are used: the direct method, which ignores services rendered by one service department to another; the step (step-down) method, which recognises services to other service departments but closes each service department in turn, in a chosen order, without reopening it; and the algebraic (reciprocal) method, which recognises mutual services fully through simultaneous equations. Because service departments S-1 and S-2 here serve each other—S-1 uses 40% of S-2's services and S-2 uses 10% of S-1's—both the step method and the algebraic method are applied below, and their results are compared.

Requirement (1): Step Method

Order of closing: the service department that renders the greater service to the other service department is closed first. S-2 renders 40% of its services to S-1, whereas S-1 renders only 10%

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of its services to S-2; S-2 is therefore distributed first. Step 1: distribute S-2's cost of Rs. 90,000 in the ratio of its usage—P-1 20% = Rs. 18,000; P-2 40% = Rs. 36,000; S-1 40% = Rs. 36,000. S-1's total cost then becomes 72,000 + 36,000 = Rs. 108,000. Step 2: S-2 is now closed and receives nothing further, so S-1's cost of Rs. 108,000 is distributed only to the production departments in the ratio of their usage of S-1, 40:50, i.e. on the re-based proportions 40/90 and 50/90: P-1 receives 108,000 × 40/90 = Rs. 48,000 and P-2 receives 108,000 × 50/90 = Rs. 60,000.

Table 9: Step Method — Secondary Distribution of Overheads (Rs.)

Department	P-1	P-2	S-1	S-2
Overheads before proration	200,000	238,000	72,000	90,000
Distribute S-2 (20% : 40% : 40%)	18,000	36,000	36,000	(90,000)
Sub-total	218,000	274,000	108,000	—
Distribute S-1 (40/90 : 50/90)	48,000	60,000	(108,000)	—
Total overheads of production departments	**266,000**	**334,000**	**—**	**—**

Under the step method, therefore, the total overhead cost of P-1 is Rs. 266,000 and of P-2 is Rs. 334,000; together they equal Rs. 600,000, the total factory overhead before distribution, which checks the arithmetic. It should be noted that the answer under the step method depends on the order in which the service departments are closed; closing S-2 first is the conventional choice here because S-2 gives the larger inter-service benefit.

Requirement (2): Algebraic (Reciprocal) Method

The algebraic method recognises the mutual services completely. Let x be the total cost of S-1 (including its share of S-2) and y the total cost of S-2 (including its share of S-1). S-1's own cost is

Rs. 72,000 and it receives 40% of S-2's total cost, so x = 72,000 + 0.40y. S-2's own cost is Rs. 90,000 and it receives 10% of S-1's total cost, so y = 90,000 + 0.10x. Substituting: x = 72,000 + 0.40(90,000 + 0.10x) = 72,000 + 36,000 + 0.04x = 108,000 + 0.04x; hence 0.96x = 108,000 and x = Rs. 112,500. Then y = 90,000 + 0.10 × 112,500 = 90,000 + 11,250 = Rs. 101,250. Check: x = 72,000 + 0.40 × 101,250 = 72,000 + 40,500 = Rs. 112,500, which agrees.

Now the total (grossed-up) service costs are apportioned to the production departments according to their usage. P-1 receives 40% of S-1 and 20% of S-2: (0.40 × 112,500) + (0.20 × 101,250) = 45,000 + 20,250 = Rs. 65,250. P-2 receives 50% of S-1 and 40% of S-2: (0.50 × 112,500) + (0.40 × 101,250) = 56,250 + 40,500 = Rs. 96,750. The total apportioned, 65,250 + 96,750 = Rs. 162,000, equals the combined own costs of the service departments (72,000 + 90,000), as it must, because the mutual charges cancel out.

Table 10: Algebraic Method — Total Overheads of Production Departments (Rs.)

Item	P-1	P-2
Own overheads before proration	200,000	238,000
Share of S-1 (total Rs. 112,500)	45,000 (40%)	56,250 (50%)
Share of S-2 (total Rs. 101,250)	20,250 (20%)	40,500 (40%)
Total overhead cost after proration	**265,250**	**334,750**

Under the algebraic method, therefore, the total overhead cost of P-1 is Rs. 265,250 and of P-2 is Rs. 334,750, again totalling Rs. 600,000. Comparing the two methods, the step method gives P-1 Rs. 266,000 and P-2 Rs. 334,000, while the reciprocal method gives Rs. 265,250 and Rs. 334,750 respectively. The difference arises because the step method does not allow S-2 to receive any share of S-1's cost once S-2 has been closed; the algebraic method is theoretically

the most accurate because it fully recognises reciprocal services, and it is the preferred method where service departments serve each other substantially, as they do here (40% and 10%). Once the production departments' total overheads are known under either method, they are absorbed into product cost through departmental overhead absorption rates based on a suitable base such as direct labour hours or machine hours.

Conclusion

To conclude, after prorating the service departments' overheads, the step method shows total overheads of Rs. 266,000 for P-1 and Rs. 334,000 for P-2, whereas the algebraic (reciprocal) method shows Rs. 265,250 for P-1 and Rs. 334,750 for P-2. Both methods reallocate exactly the Rs. 162,000 of service department cost and preserve the overall total of Rs. 600,000, but the algebraic method reflects the mutual services between S-1 and S-2 more faithfully and is therefore the more accurate basis for departmental overhead rates.

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