

3

Labour

Basic Concepts

Labour Cost	The cost of wages and other benefits paid by employer to workers on the basis of time or on the basis of quantum of output as a result of physical or mental exertion.
Direct Labour	Labour cost that is specifically incurred for or can be readily charged to or identified with a specific job, contract, work order or any other unit of cost.
Indirect Labour	Labour cost which cannot be readily identified with products or services but are generally incurred in carrying out production activity.
Idle Time	Idle time refers to the labour time paid for but not utilized on production. Idle time thus represents the time for which wages are paid but no output is obtained.
Normal Idle Time	Idle time which <i>arises due to unavoidable reasons</i> under the given working environment. The cost of normal idle time should be charged to the cost of production.
Abnormal Idle Time	Idle time which arises <i>due to avoidable reasons</i> and can be checked if proper controls are in place. Cost incurred in abnormal idle time is charged to Costing Profit and Loss account.
Time Keeping	It refers to maintenance and recording of attendance of an employee.
Time Booking	It refers to the detailed recording of the actual time spent by an employee on a single job, process or in any other production related activities.
Overtime	Overtime is the amount of wages paid for working beyond normal working hours.
Overtime Premium	The rate for overtime work is higher than the normal time rate The <i>extra amount so paid over the normal rate</i> is called overtime premium.
Labour Turnover	Labour turnover in an organization is the <i>rate of change in the composition of labour force</i> during a specified period measured against a suitable

	index.
Incentives	Incentive can be defined as the stimulation for effort and effectiveness by offering monetary and other benefits.
Time Rate System	Under this system workers are paid for their effort on the <i>basis of time</i> spent on the work i.e., hour, day, week or month etc.
Differential Time Rate	Under this method different hourly rates are fixed for different levels of efficiency. Upto a certain level a fixed rate is paid and <i>based on the efficiency level the hourly rate increases gradually.</i>
Straight Piece Work	Payment is made on the basis of a fixed amount per unit of output irrespective of time taken. It is the number of units produced by the worker multiplied by rate per unit.
Differential Piece Rate	Under differential piece rate system different piece rate slabs are used for different efficiency or activity level. Efficiency is measured against the standard output level.
Wage Abstract	A summary giving details of wages to be charged to individual jobs, work orders or processes for a specific period.
Job Evaluation	It is a process of analyzing and assessment of jobs to ascertain their relative worthiness from the management's points of view.
Merit Rating	It is a systematic evaluation of the personality and performance of each employee by his supervisor or some other qualified persons.
Time and Motion Study	It is the study of time taken and motions (movements) performed by workers while performing their jobs at the place of their work.

Basic Formulae

Time Rate System	Earnings = Hours worked × Rate per hour	
Straight Piece Rate System	Earnings = Number of units × Piece rate per unit	
	Differential Piece Rate System	
Merrick Differential Piece Rate System	<i>Efficiency</i>	<i>Payment</i>
	Up to 83 %	Ordinary piece rate
	83% to 100%	110% of ordinary piece rate (10% above the ordinary piece rate)

3.3 Cost Accounting

	Above 100% (20%)	120% or 130% of ordinary piece rate to 30% of ordinary piece rate)
	Combination of Time and Piece Rate	
Gantt Task and Bonus System	<i>Output</i> Output below standard Output at standard Output above standard	<i>Payment</i> Guaranteed time rate 120% of time rate 120% of piece rate
Emerson Efficiency System	Earning is calculated as follows :	
	<i>Efficiency</i> Below 66-2/3% 66-2/3% to 100% Above 100% 1%	<i>Payment</i> No bonus, only guaranteed time rate is paid. Worker is paid by hourly rate for the time he actually worked plus an increase in bonus according to degree of efficiency on the basis of step bonus rates. Bonus rate can be up to 20%. 120% of time wage rate plus additional bonus of 1% for each increase in efficiency.
Bedeaux Point System	Earnings = Hours worked × Rate per hour + $\left(\frac{75}{100} \times \frac{\text{Bedeaux points saved}}{60} \times \text{Rate per hour} \right)$	
Haynes Mani System	This system is similar to Bedeaux Point system. Instead of Bedeaux points saved, 'MANIT'(Man-minutes) saved are measured for payment of bonus. Bonus is distributed as follows : 50% bonus to the workers 10% bonus to the supervisors 40% bonus to the employer	
Accelerated Premium System	In this system individual employer makes his own formula. The following formula may be used for a general idea of the scheme: $y = 0.8 \times x^2$ Where y = wages x = efficiency	

Premium Bonus Plan	
Halsey Premium Plan	Earnings = Hours worked \times Rate per hour + $\left(\frac{50}{100} \times \text{Time saved} \times \text{Rate per hour} \right)$
Halsey-Weir Premium Plan	Earnings = Hours worked \times Rate per hour + $\left(\frac{30}{100} \times \text{Time saved} \times \text{Rate per hour} \right)$
Rowan System	Earnings = Hours worked \times Rate per hour + $\left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour} \right)$
Labour Turnover Rate	
Separation Method	Separation Method = $\frac{\text{Number of separations during the period}}{\text{Average number of workers on roll}} \times 100$
Replacement Method	Replacement Method = $\frac{\text{Number of workers replaced in a period}}{\text{Average number of workers on roll}} \times 100$
Flux Method	Flux Method = $\frac{\text{No. of separations} + \text{No. of replacements}}{\text{Average number of workers on roll}} \times 100$ OR $= \frac{\text{No. of separations} + \text{No. of replacements} + \text{No. of new recruitments}}{\text{Average number of workers on roll}} \times 100$

SECTION-A

Question-1

Discuss the Gantt task and bonus system as a system of wage payment and incentives.

Solution:

Gantt Task and Bonus System: This system is a combination of time and piecework system. According to this system a high standard or task is set and payment is made at time rate to a worker for production below the set standard.

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Wages payable to workers under the plan are calculated as under:

Output	Payment
(i) Output below standard	Guaranteed time rate
(ii) Output at standard	Time rate plus bonus of 20% (usually) of time rate
(iii) Output over standard	High piece rate on worker's output. (It is so fixed so as to include a bonus of 20% of time rate)

Question-2

Discuss the accounting treatment of Idle time and overtime wages.

Solution:

Accounting treatment of idle time wages & overtime wages in cost accounts: Normal idle time is treated as a part of the cost of production. Thus, in the case of direct workers, an allowance for normal idle time is built into the labour cost rates. In the case of indirect workers, normal idle time is spread over all the products or jobs through the process of absorption of factory overheads.

Under Cost Accounting, the overtime premium is treated as follows:

- If overtime is resorted to at the desire of the customer, then the overtime premium may be charged to the job directly.
 - If overtime is required to cope with general production program or for meeting urgent orders, the overtime premium should be treated as overhead cost of particular department or cost center which works overtime.
 - Overtime worked on account of abnormal conditions should be charged to costing Profit & Loss Account.
 - If overtime is worked in a department due to the fault of another department the overtime premium should be charged to the latter department.
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Question-3

Discuss the effect of overtime payment on productivity.

Solution:

Effect of overtime payment on productivity: Overtime work should be resorted to only when it is extremely essential because it involves extra cost. The overtime payment increases the cost of production in the following ways:

1. The overtime premium paid is an extra payment in addition to the normal rate.
2. The efficiency of operators during overtime work may fall and thus output may be less than normal output.

3. In order to earn more the workers may not concentrate on work during normal time and thus the output during normal hours may also fall.
 4. Reduced output and increased premium of overtime will bring about an increase in cost of production.
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Question-4

State the circumstances in which time rate system of wage payment can be preferred in a factory.

Solution:

Circumstances in which time rate system of wage payment can be preferred:

In the following circumstances the time rate system of wage payment is preferred in a factory.

1. Persons whose services cannot be directly or tangibly measured, e.g., general helpers, supervisory and clerical staff etc.
 2. Workers engaged on highly skilled jobs or rendering skilled services, e.g., tool making, inspection and testing.
 3. Where the pace of output is independent of the operator, e.g., automatic chemical plants.
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Question-5

Discuss briefly, how you will deal with casual workers and workers employed on outdoor work in Cost Accounts.

Solution:

Casual and outdoor workers: Casual workers (badli workers) are employed temporarily, for a short duration to cope with sporadic increase in volume of work. If the permanent labour force is not sufficient to cope effectively with a rush of work, additional labour (casual workers) are employed to work for a short duration.

Outdoor workers are those workers who do not carry out their work in the factory premises. Such workers either carry out the assigned work in their homes (e.g., knitwear, lamp shades) or at a site outside the factory.

Casual workers are engaged on daily basis. Wages are paid to them either at the end of the day's work or after a periodic interval. Wages paid are charged as direct or indirect labour cost depending on their identifiability with specific jobs, work orders, or department.

Rigid control should be exercised over the out-workers specially with regard to following:

1. Reconciliation of materials drawn/ issued from the store with the output.
 2. Ensuring the completion of output during the stipulated time so as to meet the orders and contracts comfortably.
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3.7 Cost Accounting

Question-6

It should be management's endeavor to increase inventory turnover but to reduce labour turnover. Expand and illustrate the idea contained in this statement.

Solution:

Inventory turnover: It is a ratio of the value of materials consumed during a period to the average value of inventory held during the period. A high inventory turnover indicates fast movement of stock.

Labour turnover: It is defined as an index denoting change in the labour force for an organization during a specified period. Labour turnover in excess of normal rate is termed as high and below it as low turnover.

Effects of high inventory turnover and low labour turnover: High inventory turnover reduces the investment of funds in inventory and thus accounts for the effective use of the concern's financial resources. It also accounts for the increase of profitability of a business concern. As against high labour turnover the low labour turnover is preferred because high labour turnover causes-decrease in production targets; increase in the chances of break-down of machines at the shop floor level; increase in the number of accidents; loss of customers and their brand loyalty due to either non-supply of the finished goods or due to sub-standard production of finished goods; increase in the cost of selection, recruitment and training; increase in the material wastage and tools breakage.

All the above listed effects of high labour turnover account for the increase in the cost of production/ process/ service. This increase in the cost finally accounts for the reduction of concern's profitability. Thus, it is necessary to keep the labour turnover at a low level.

As such, it is correct that management should endeavour to increase inventory turnover and reduce labour turnover for optimum and best utilization of available resources and reduce the cost of production and thus increase the profitability of the organization.

Question-7

Explain the meaning of and the reasons for Idle time and discuss its treatment in cost accounting.

Solution:

Idle time refers to the labour time paid for but not utilized on production. It, in fact, represents the time for which wages are paid, but during which no output is given out by the workers. This is the period during which workers remain idle.

Reasons for idle time: According to reasons, idle time can be classified into normal idle time and abnormal idle time. Normal idle time is the time which cannot be avoided or reduced in the normal course of business.

The main reasons for the occurrence of normal idle time are as follows:

1. Time taken by workers to travel the distance between the main gate of factory and the place of their work.
2. Time lost between the finish of one job and starting of next job.
3. Time spent to overcome fatigue.
4. Time spent to meet their personal needs like taking lunch, tea etc.

The main reasons for the occurrence of abnormal idle time are:

1. Due to machine break downs, power failure, non-availability of raw materials, tools or waiting for jobs due to defective planning.
2. Due to conscious management policy decision to stop work for some time.
3. In the case of seasonal goods producing units, it may not be possible for them to produce evenly throughout the year. Such a factor too results in the generation of abnormal idle time.

Treatment in Cost Accounting: Idle time may be normal or abnormal.

Normal idle time: It is inherent in any job situation and thus it cannot be eliminated or reduced. For example: time gap between the finishing of one job and the starting of another; time lost due to fatigue etc.

The cost of normal idle time should be charged to the cost of production. This may be done by inflating the labour rate. It may be transferred to factory overheads for absorption, by adopting a factory overhead absorption rate.

Abnormal idle time: It is defined as the idle time which arises on account of abnormal causes; e.g. strikes; lockouts; floods; major breakdown of machinery; fire etc. Such an idle time is uncontrollable.

The cost of abnormal idle time due to any reason should be charged to Costing Profit & Loss Account.

Question 8

Discuss the objectives of time keeping & time booking.

Solution:

Objectives of time keeping and time booking: Time keeping has the following two objectives:

- (i) *Preparation of Payroll:* Wage bills are prepared by the payroll department on the basis of information provided by the time keeping department.
- (ii) *Computation of Cost:* Labour cost of different jobs, departments or cost centers are computed by costing department on the basis of information provided by the time keeping department.

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The objectives of time booking are as follows:

- (i) To ascertain the labour time spent on a job and the idle labour hours.
 - (ii) To ascertain labour cost of various jobs and products.
 - (iii) To calculate the amount of wages and bonus payable under the wage incentive scheme.
 - (iv) To compute and determine overhead rates and absorption of overheads under the labour and machine hour method.
 - (v) To evaluate the performance of labour by comparing actual time booked with standard or budgeted time.
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Question-9

Distinguish between Job Evaluation and Merit Rating.

Solution:

Job Evaluation: It can be defined as the process of analysis and assessment of jobs to ascertain reliably their relative worth and to provide management with a reasonably sound basis for determining the basic internal wage and salary structure for the various job positions. In other words, job evaluation provides a rationale for differential wages and salaries for different groups of employees and ensures that these differentials are consistent and equitable.

Merit Rating: It is a systematic evaluation of the personality and performance of each employee by his supervisor or some other qualified persons.

Thus the main points of distinction between job evaluation and merit rating are as follows:

1. Job evaluation is the assessment of the relative worth of jobs within a company and merit rating is the assessment of the relative worth of the man behind a job. In other words job evaluation rate the jobs while merit rating rate employees on their jobs.
 2. Job evaluation and its accomplishment are means to set up a rational wage and salary structure whereas merit rating provides scientific basis for determining fair wages for each worker based on his ability and performance.
 3. Job evaluation simplifies wage administration by bringing uniformity in wage rates. On the other hand merit rating is used to determine fair rate of pay for different workers on the basis of their performance.
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Question 10

A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following:

- (i) *The entire gains of improved production should not go to the workers.*
- (ii) *In the name of speed, quality should not suffer.*
- (iii) *The rate setting department being newly established is liable to commit mistakes.*

You are required to devise a suitable incentive scheme and demonstrate by an illustrative numerical example how your scheme answers to all the requirements of the management.

Solution:

Rowan scheme of premium bonus (variable sharing plan) is a suitable incentive scheme for the workers of the factory. If this scheme is adopted, the entire gains due to time saved by a worker will not pass to him.

Another feature of this scheme is that a worker cannot increase his earnings or bonus by merely increasing its work speed. The reason for this is that the bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore they work at such a speed which helps them to maintain the quality of output too.

Lastly, Rowan System provides a safeguard in case of any loose fixation of the standards by the rate setting department. It may be observed from the following illustration that in the Rowan Scheme the bonus paid will be low due to any loose fixation of standards. Workers cannot take undue advantage of such a situation. The above three features of Rowan Plan can be discussed with the help of the following illustration:

Illustration

$$\begin{aligned}
 (i) \quad \text{Time allowed} &= 4 \text{ hours} \\
 \text{Time taken} &= 3 \text{ hours} \\
 \text{Time Saved} &= 1 \text{ hour} \\
 \text{Rate} &= ₹ 5 \text{ per hour.} \\
 \text{Bonus} &= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} \\
 &= \frac{3 \text{ hours}}{4 \text{ hours}} \times 1 \text{ hour} \times ₹ 5 = ₹ 3.75
 \end{aligned}$$

In the above illustration time saved is 1 hour and therefore total gain is ₹ 5. Out of ₹ 5/- according to Rowan Plain only ₹ 3.75 is given to the worker in the form of bonus. In other words a worker is entitled for 75 percent of the time saved in the form of bonus.

(ii) The figures of bonus in the above illustration when the time taken is 2 hours and 1 hours respectively are as below:

$$\begin{aligned}
 \text{Bonus} &= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{2 \text{ hours}}{4 \text{ hours}} \times 2 \text{ hours} \times ₹ 5 = ₹ 5 \\
 \text{Bonus} &= \frac{1 \text{ hours}}{4 \text{ hours}} \times 3 \text{ hours} \times ₹ 5 = ₹ 3.75
 \end{aligned}$$

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The above figures of bonus clearly show that when time taken is half of the time allowed, the bonus is maximum. When the time taken is reduced from 2 to 1 hour, the bonus figures fell by ₹ 1.25. Hence, it is quite apparent to workers that it is of no use to increase speed of work. These features of Rowan Plan thus protect the quality of output.

- (iii) If the rate setting department erroneously sets the time allowed as 10 hours instead of 4 hours, in the above illustration, then the bonus paid will be as follows:

$$\text{Bonus} = \frac{3 \text{ hours}}{10 \text{ hours}} \times 7 \text{ hours} \times ₹ 5 = ₹ 10.5$$

The bonus paid for saving 7 hours thus is ₹ 10.50 which is approximately equal to the wages of 2 hours. In other words the bonus paid to the workers is low. Hence workers cannot take undue advantage of any mistake committed by the rate setting department of the concern.

Question-11

What do you mean by time and motions study? Why is it so important to management?

Solution:

Time and motions study: It is the study of time taken and motions (movements) performed by workers while performing their jobs at the place of their work. Time and motion study has played a significant role in controlling and reducing labour cost.

Time Study is concerned with the determination of standard time required by a person of average ability to perform a job. Motion study, on the other hand, is concerned with determining the proper method of performing a job so that there are no wasteful movements, hiring the worker unnecessarily. However, both the studies are conducted simultaneously. Since materials, tools, equipment and general arrangement of work, all have vital bearing on the method and time required for its completion. Therefore, their study would be incomplete and would not yield its full benefit without a proper consideration of these factors.

Time and motion study is important to management because of the following features:

1. Improved methods, layout, and design of work ensure effective use of men, material and resources.
 2. Unnecessary and wasteful methods are pin-pointed with a view to either improving them or eliminating them altogether. This leads to reduction in the work content of an operation, economy in human efforts and reduction of fatigue.
 3. Highest possible level of efficiency is achieved in all respect.
 4. Provides information for setting labour standards - a step towards labour cost control and cost reduction.
 5. Useful for fixing wage rates and introducing effective incentive scheme.
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Question-12

What do you understand by labour turnover? How is it measured?

Solution:

Labour turnover in an organization is the rate of change in the composition of labour force during a specified period measured against a suitable index. The standard of usual labour turnover in the industry or labour turnover rate for a past period may be taken as the index or norm against which actual turnover rate should be compared.

The methods for measuring labour turnover are:

$$\text{Replacement method} = \frac{\text{Number of employees replaced during the year}}{\text{Average number of employees on roll during the year}} \times 100$$

$$\text{Separation method} = \frac{\text{Number of employees separated during the year}}{\text{Average number of employees on roll during the year}} \times 100$$

$$\text{Flux method} = \left[\frac{\text{No. of employees replaced during the year} + \text{No. of employees separated during the year}}{\text{Average number of employees on roll during the year}} \right] \times 100$$

Or

$$= \left[\frac{\text{No. of employees replaced during the year} + \text{No. of employees separated during the year} + \text{No. of employees recruited during the year}}{\text{Average number of employees on roll during the year}} \right] \times 100$$

Question-13

Discuss the two types of cost associated with labour turnover.

Solution:**Types of cost associated with labour turnover**

Two types of costs which are associated with labour turnover are:

- (i) *Preventive costs:* This includes costs incurred to keep the labour turnover at a low level i.e., cost of medical schemes. If a company incurs high preventive costs, the rate of labour turnover is usually low.
- (ii) *Replacement costs:* These are the costs which arise due to high labour turnover. If men leave soon after they acquire the necessary training and experience of work, additional costs will have to be incurred on new workers, i.e., cost of advertising, recruitment, selection, training and induction, extra cost also incurred due to abnormal breakage of

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tools and machines, defectives, low output, accidents etc., caused due to the inefficiency and inexperienced new workers.

It is obvious that a company will incur very high replacement costs if the rate of labour turnover is high. Similarly, only adequate preventive costs can keep labour turnover at a low level. Each company must, therefore, workout the optimum level of labour turnover keeping in view its personnel policies and the behaviour of replacement costs and preventive costs at various levels of labour turnover rates.

Question-14

Distinguish between Direct and Indirect labour.

Solution:

Direct labour cost is the labour costs that is specifically incurred for or can be readily charged to or identified with a specific job, contract, work-order or any other unit of cost.

Indirect labour costs are labour costs which cannot be readily identified with products or services but are generally incurred in carrying out production activity.

The importance of the distinction lies in the fact that whereas direct labour cost can be identified with and charged to the job, indirect labour costs cannot be so charged and are, therefore, to be treated as part of the factory overheads to be included in the cost of production.

Question-15

What do you understand by overtime premium? What is the effect of overtime payment on productivity and cost? Discuss the treatment of overtime premium in cost accounts and suggest a procedure for control of overtime work.

Solution:

Work done beyond normal working hours is known as overtime work. Overtime payment is the amount of wages paid for working beyond normal working hours. The rate for overtime work is higher than the normal time rate; usually it is at double the normal rates. The extra amount so paid over the normal rate is called overtime premium. Overtime work should be resorted to only when it is extremely essential because it involves extra cost. The overtime payment affects to increase the cost of production in the following ways:

- (1) The premium paid is an extra payment in addition to the normal rate.
- (2) The efficiency of operators during overtime work may fall and thus the output may be lesser than normal output.
- (3) In order to earn more the workers may not concentrate on work during normal time and thus the output during normal hours may also fall.

- (4) Reduced output and increased premium will bring about an increase in costs of production.

Under cost accounting the overtime premium is treated as follows:

- (i) If overtime is resorted to, at the desire of the customer, then overtime premium may be charged to the job directly.
- (ii) If overtime is due to a general pressure of work to increase the output, the premium may be charged to general overheads.
- (iii) If overtime is due to the negligence or delay, it may be charged to the department concerned.
- (iv) If it is due to circumstances beyond control, e.g. fire, strike etc. it may be charged to Costing Profit and Loss Account.

It is necessary that proper Control over the overtime work should be exercised in order to keep it to the minimum. The procedure based on following steps may be adopted for such control.

- (1) Watch on the output during normal hours should be maintained to ensure that overtime is not granted when normal output is not obtained during the normal hours, without any special reasons.
 - (2) Statement concerning overtime work to be prepared along with justifications, at appropriate places for putting up before competent authority.
 - (3) Prior sanction about overtime should be obtained from competent authority.
 - (4) Actual rate of output produced during the overtime period should be compared with normal rate of output.
 - (5) Periodical reports on overtime wages should be sent to top management for taking corrective action.
 - (6) If possible an upper limit may be fixed for each category of worker in respect of overtime.
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Question-16

Enumerate the various methods of Time booking

Solution:

The various methods of time booking are:

- (a) Job ticket.
 - (b) Combined time and job ticket.
 - (c) Daily time sheet.
 - (d) Piece work card.
 - (e) Clock card.
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Question-17

Enumerate the remedial steps to be taken to minimize the labour turnover.

Solution:

The following steps are useful for minimizing labour turnover:

- (a) *Exit interview*: An interview to be arranged with each outgoing employee to ascertain the reasons of his leaving the organization.
 - (b) *Job analysis and evaluation*: to ascertain the requirement of each job.
 - (c) Organization should make use of a scientific system of recruitment, placement and promotion for employees.
 - (d) Organization should create healthy atmosphere, providing education, medical and housing facilities for workers.
 - (e) Committee for settling workers grievances.
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Question-18

Describe briefly, how wages may be calculated under the following systems:

- (i) *Gantt task and bonus system*
- (ii) *Emerson's efficiency system*
- (iii) *Rowan system*
- (iv) *Halsey system*
- (v) *Barth system.*

Solution:

- (i) **Gantt task and bonus system**: As per this system a higher standard is set and payment is made at time rate to a worker for production below the standard. If the standards are achieved or exceeded, the payment is made at a higher piece rate. The piece rate fixed also includes an element of bonus to the extent of 20%. Bonus is calculated over the time rate.

- (ii) **Emerson's Efficiency System**: Under this system wages may be calculated as below:

<i>Performance</i>		<i>Wages</i>
Below 66⅔% efficiency	–	Time rate without any bonus
66⅔% - 100% efficiency	–	Bonus varies between 1% to 20%*
Above 100% efficiency	–	Bonus of 20% of basic wages plus 1% for every 1% increase in efficiency.

*At 100% efficiency the bonus percentage will be 20%.

- (iii) **Rowan System:** As per this system standard time allowance is fixed for the performance of a job and bonus is paid if time is saved.

$$\text{Total Wages} = (\text{Time taken} \times \text{Time Rate}) + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Time Rate} \right)$$

- (iv) **Halsey System:** Under this system a standard time is fixed for each job. If there is no saving on this standard time allowance, the worker is paid only his day rate.

$$\text{Total Wages} = (\text{Time taken} \times \text{Time rate}) + (50\% \text{ of time saved} \times \text{time rate})$$

- (v) **Barth System:**

$$\text{Earnings} = \text{Hourly rate} \times \sqrt{\text{Standard hours} \times \text{Hours worked}}$$

This is particularly suitable for trainees and beginners and also for unskilled workers.

Question-19

Discuss accounting treatment of idle capacity costs in cost accounting.

Solution:

Treatment of Idle Capacity Cost

- If idle capacity is due to unavoidable reasons such as repairs & maintenance, changeover of job etc., a supplementary overhead rate may be used to recover the idle capacity cost. In this case, the costs are charged to production capacity utilized.
- If idle capacity cost is due to avoidable reasons such as faulty planning, power failure etc, the cost should be charged to Costing P&L A/c.
- If idle capacity is due to seasonal factors, then the cost should be charged to cost of production by inflating overhead rates.

Question-20

Enumerate the causes of labour turnover.

Solution:

Causes of Labour Turnover: The main causes of labour turnover in an organisation/ industry can be broadly classified under the following three heads:

- Personal Causes;
- Unavoidable Causes; and
- Avoidable Causes.

Personal causes are those which induce or compel workers to leave their jobs; such causes include the following:

- Change of jobs for betterment.

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- (ii) Premature retirement due to ill health or old age.
- (iii) Domestic problems and family responsibilities.
- (iv) Discontent over the jobs and working environment.

Unavoidable causes are those under which it becomes obligatory on the part of management to ask one or more of their employees to leave the organisation; such causes are summed up as listed below:

- (i) Seasonal nature of the business;
- (ii) Shortage of raw material, power, slack market for the product etc.;
- (iii) Change in the plant location;
- (iv) Disability, making a worker unfit for work;
- (v) Disciplinary measures.

Avoidable causes are those which require the attention of management on a continuous basis so as to keep the labour turnover ratio as low as possible. The main causes under this case are indicated below:

- (i) Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,
 - (ii) Strained relationship with management, supervisors or fellow workers;
 - (iii) Lack of training facilities and promotional avenues;
 - (iv) Lack of recreational and medical facilities;
 - (v) Low wages and allowances.
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SECTION-B

Calculation of Labour Turnover

Question 1

From the following information, calculate Labour turnover rate and Labour flux rate:

No. of workers as on 01.01.2013 = 7,600

No. of workers as on 31.12.2013 = 8,400

During the year, 80 workers left while 320 workers were discharged 1,500 workers were recruited during the year of these, 300 workers were recruited because of exits and the rest were recruited in accordance with expansion plans.

Solution:

Labour turnover rate:

It comprises of computation of labour turnover by using following methods:

(i) *Separation Method:*

$$= \frac{\text{No. of workers left} + \text{No. of workers discharged}}{\text{Average number of workers}} \times 100$$

$$= \frac{(80 + 320)}{(7,600 + 8,400) \div 2} \times 100 = \frac{400}{8,000} \times 100 = 5\%$$

(ii) *Replacement Method:*

$$= \frac{\text{No. of workers replaced}}{\text{Average number of workers}} \times 100 = \frac{300}{8,000} \times 100 = 3.75\%$$

(iii) *New Recruitment:*

$$= \frac{\text{No. of workers newly recruited}}{\text{Average number of workers}} \times 100$$

$$= \frac{\text{No. Recruitments} - \text{No. of Replacements}}{\text{Average number of workers}} \times 100$$

$$= \frac{1,500 - 300}{8,000} \times 100 = \frac{1,200}{8,000} \times 100 = 15\%$$

Flux Method:

$$= \frac{\text{No. of separations} + \text{No. of accessions}}{\text{Average number of workers}} \times 100$$

$$= \frac{(400 + 1500)}{(7,600 + 8,400) \div 2} \times 100 = \frac{1,900}{8,000} \times 100 = 23.75\%$$

Question-2

Accountant of your company had computed labour turnover rates for the quarter ended 30th September, 2013 as 14%, 8% and 6% under Flux method, Replacement method and Separation method respectively. If the number of workers replaced during 2nd quarter of the financial year 2013-14 is 36, find the following:

- (i) The number of workers recruited and joined; and
- (ii) The number of workers left and discharged.

Solution:

$$\text{Labour Turnover Rate (Replacement method)} = \frac{\text{No. of workers replaced}}{\text{Average No. of workers}}$$

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$$\begin{aligned} \text{Or, } \frac{8}{100} &= \frac{36}{\text{Average No. of workers}} \\ \text{Or, Average No. of workers} &= 450 \\ \text{Labour Turnover Rate (Separation method)} &= \frac{\text{No. of workers separated}}{\text{Average No. of workers}} \\ \text{Or, } \frac{6}{100} &= \frac{\text{No. of workers separated}}{450} \\ \text{Or, No. of workers separated} &= 27 \\ \text{Labour Turnover Rate (Flux Method)} &= \frac{\text{No. of Separations} + \text{No. of accession (Joinings)}}{\text{Average No. of workers}} \\ \text{or, } \frac{14}{100} &= \frac{27 + \text{No. of accessions (Joinings)}}{450} \\ \text{or, } 100 (27 + \text{No. of Accessions}) &= 6,300 \\ \text{or, No. of Accessions} &= 36 \\ \text{(i) The No. of workers recruited and Joined} &= 36 \\ \text{(ii) The No. of workers left and discharged} &= 27 \end{aligned}$$

Question-3

Corrs Consultancy Ltd. is engaged in BPO industry. One of its trainee executives in the Personnel department has calculated labour turnover rate 24.92% for the last year using Flux method.

Following is the some data provided by the Personnel department for the last year:

<i>Employees</i>	<i>At the beginning</i>	<i>Joined</i>	<i>Left</i>	<i>At the end</i>
<i>Data Processors</i>	540	1,080	60	1,560
<i>Payroll Processors</i>	?	20	60	40
<i>Supervisors</i>	?	60	---	?
<i>Voice Agents</i>	?	20	20	?
<i>Assistant Managers</i>	?	20	---	30
<i>Senior Voice Agents</i>	4	---	---	12
<i>Senior Data Processors</i>	8	---	---	34
<i>Team Leaders</i>	?	---	---	?
<i>Employees transferred from the Subsidiary Company</i>				
<i>Senior Voice Agents</i>	---	8	---	---

Senior Data Processors	---	26	---	---
Employees transferred to the Subsidiary Company				
Team Leaders	---	---	60	---
Assistant Managers	---	---	10	---

At the beginning of the year there were total 772 employees on the payroll of the company. The opening strength of the Supervisors, Voice Agents and Assistant Managers were in the ratio of 3 : 3 : 2.

The company has decided to abandon the post of Team Leaders and consequently all the Team Leaders were transferred to the subsidiary company.

The company and its subsidiary are maintaining separate set of books of account and separate Personnel Department.

You are required to calculate:

- Labour Turnover rate using Replacement method and Separation method.
- Verify the Labour turnover rate calculated under Flux method by the trainee executive of the Corrs Consultancy Ltd.

Solution:

Working Notes:

- Calculation of no. of employees at the beginning and end of the year

	At the Beginning of the year	At the end of the year
Data Processors	540	1,560
Payroll Processors [Left- 60 + Closing- 40 – Joined- 20]	80	40
Supervisors*	30	90
Voice Agents*	30	30
Assistant Managers*	20	30
Senior Voice Agents	4	12
Senior Data Processors	8	34
Team Leaders	60	0
Total	772	1,796

(*) At the beginning of the year:

Strength of Supervisors, Voice Agents and Asst. Managers =

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[772 – {540 + 80 + 4 + 8 + 60} employees] or [772 – 692 = 80 employees]

[(Supervisors- $80 \times \frac{3}{8} = 30$, Voice Agents- $80 \times \frac{3}{8} = 30$ & Asst. Managers- $80 \times \frac{2}{8} = 20$) employees]

At the end of the year:

[Supervisor-(Opening- 30 + 60 Joining) = 90; Voice Agents- (Opening- 30 + 20 Joined – 20 Left) = 30]

(ii) No. of Employees Separated, Replaced and newly recruited during the year

Particulars	Separations	New Recruitment	Replacement	Total Joining
Data Processors	60	1,020	60	1,080
Payroll Processors	60	--	20	20
Supervisors	--	60	--	60
Voice Agents	20	--	20	20
Assistant Managers	10	10	10	20
Sr. Voice Agents	--	8	--	8
Sr. Data Processors	--	26	--	26
Team Leaders	60	--	--	--
Total	210	1,124	110	1,234

(Since, Corrs Consultancy Ltd. and its subsidiary are maintaining separate Personnel Department, so transfer-in and transfer-out are treated as recruitment and separation respectively.)

(a) Calculation of Labour Turnover:

$$\text{Replacement Method} = \frac{\text{No. of employees replaced during the year}}{\text{Average no. of employees on roll}} \times 100$$

$$= \frac{110}{(772+1,796)/2} \times 100 = \frac{110}{1,284} \times 100 = 8.57\%$$

$$\text{Separation Method} = \frac{\text{No. of employees separated during the year}}{\text{Average no. of employees on roll}} \times 100$$

$$= \frac{210}{1,284} \times 100 = 16.36\%$$

(b) Labour Turnover under Flux Method:

$$= \frac{\text{No. of employees (Joined + Separated) during the year}}{\text{Average no. of employees onroll}} \times 10$$

$$= \frac{\text{No. of employees (Re placed + New recruited + Separated) during the year}}{\text{Average no. of employees onroll}} \times 100$$

$$= \frac{1,234 + 210}{1,284} \times 10 = 112.46\%$$

Labour Turnover calculated by the executive trainee of the Personnel department is incorrect as it has not taken the No. of new recruitment while calculating the labour turnover under Flux method.

Question-4

Human Resources Department of A Ltd. computed labour turnover by replacement method at 3% for the quarter ended June 2015. During the quarter, fresh recruitment of 40 workers was made. The number of workers at the beginning and end of the quarter was 990 and 1,010 respectively.

You are required to calculate the labour turnover rate by Separation Method and Flux Method.

Solution:

$$\text{Labour Turnover by Replacement Method} = \frac{\text{No. of workers replaced during the quarter}}{\text{Average no. of workers onroll during the quarter}}$$

$$\text{Or,} \quad 0.03 = \frac{\text{No. of workers replaced during the quarter}}{(990 + 1,010) \div 2}$$

$$\text{Or, No. of workers replaced during the quarter} = 0.03 \times 1,000 = 30 \text{ workers}$$

(i) Labour Turnover by Separation Method

$$= \frac{\text{No. of workers separated during the quarter}}{\text{Average no. of workers onroll during the quarter}} \times 100$$

$$= \frac{\text{Worker at beginning} + \text{Fresh recruitment} + \text{Replacements} - \text{Workers at closing}}{\text{Average no. of workers onroll during the quarter}} \times 100$$

$$= \frac{990 + 40 + 30 - 1,010}{(990 + 1,010) \div 2} \times 100 = \frac{50 \text{ workers}}{1,000 \text{ workers}} \times 100 = 5\%$$

(ii) Labour Turnover by Flux Method

$$= \frac{\text{No. of workers (Separated + Replaced + Fresh Recruitment) during the quarter}}{\text{Average no. of workers onroll during the quarter}} \times 100$$

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$$= \frac{50 + 30 + 40}{(990 + 1,010) \div 2} \times 100 = \frac{120 \text{ workers}}{1,000 \text{ workers}} \times 100 = 12\%$$

Question-5

X Y Z Ltd. wants to ascertain the profit lost during the year 2013-14 due to increased labour turnover. For this purpose, they have given you the following information:

- (1) *Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit.*
- (2) *20% of the output during training period was defective. Cost of rectification of a defective unit was ₹ 25.*
- (3) *Potential productive hours lost due to delay in recruitment were 1,00,000 hours.*
- (4) *Selling price per unit is ₹ 180 and P/V ratio is 20%.*
- (5) *Settlement cost of the workers leaving the organization was ₹ 1,83,480.*
- (6) *Recruitment cost was ₹ 1,56,340*
- (7) *Training cost was ₹ 1,13,180.*

You are required to calculate the profit lost by the company due to increased labour turnover during the year 2013-14.

Solution:

$$\text{Output by experienced workers in 50,000 hours} = \frac{50,000}{60} = 5,000 \text{ units}$$

$$\therefore \text{Output by new recruits} = 60\% \text{ of } 5,000 = 3,000 \text{ units}$$

$$\text{Less of output} = 5,000 - 3,000 = 2,000 \text{ units}$$

$$\text{Total loss of output} = 10,000 + 2,000 = 12,000 \text{ units}$$

$$\text{Contribution per unit} = 20\% \text{ of } 180 = ₹ 36$$

$$\text{Total contribution cost} = 36 \times 12,000 = ₹ 4,30,000$$

$$\text{Cost of repairing defective units} = 3,000 \times 0.2 \times 25 = ₹ 15,000$$

Profit forgone due to labour turnover

	(₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340

Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2013-14	9,00,000

Calculation of Effective hourly wages rate, Incentives and Total earnings

Question-6

ZED Limited is working by employing 50 skilled workers, it is considering the introduction of incentive scheme-either Halsey scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope up the increasing demand for the product by 40%. It is believed that proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers; it could act as sufficient incentive for them to produce more.

Because of assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 2014.

Hourly rate of wages (guaranteed)	₹ 30
Average time for producing one unit by one worker at the previous performance (This may be taken as time allowed)	1.975 hours
Number of working days in the month	24
Number of working hours per day of each worker	8
Actual production during the month	6,120 units

Required:

- Calculate the effective rate of earnings under the Halsey scheme and the Rowan scheme.
- Calculate the savings to the ZED Limited in terms of direct labour cost per piece.
- Advise ZED Limited about the selection of the scheme to fulfill their assurance.

Solution:

Working notes:

1. Computation of time saved (in hours) per month:

$$\begin{aligned}
 & \text{(Standard production time for 6,120 units) – (Actual time taken by the workers)} \\
 = & (6,120 \text{ units} \times 1.975 \text{ hours}) - (24 \text{ days} \times 8 \text{ hours per day} \times 50 \text{ skilled workers}) \\
 = & (12,087 \text{ hours} - 9,600 \text{ hours}) \\
 = & 2,487 \text{ hours}
 \end{aligned}$$

3.25 Cost Accounting

2. Computation of bonus for time saved under Halsey and Rowan schemes:

Time saved (Refer to working note 1)	=	2,487 hours
Wage rate per hour	=	₹ 30
Bonus under Halsey Scheme (With 50% bonus)	=	$\frac{1}{2} \times 2,487 \text{ hours} \times ₹ 30$ = ₹ 37,305
Bonus under Rowan Scheme	=	$\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$ = $\frac{2,487 \text{ hours}}{12,087 \text{ hours}} \times 9,600 \text{ hours} \times ₹ 30$ = ₹ 59,258.38

(i) Computation of effective rate of earnings under the Halsey and Rowan scheme:

Total earnings (under Halsey scheme) (Refer to working note 2)

$$\begin{aligned}
 &= \text{Time wages} + \text{Bonus} \\
 &= (24 \text{ days} \times 8 \text{ hours} + 50 \text{ skilled workers} \times ₹ 30) + ₹ 37,305 \\
 &= ₹ 2,88,000 + ₹ 37,305 = ₹ 3,25,305
 \end{aligned}$$

Total earnings (under Rowan scheme) (Refer to working note 2)

$$\begin{aligned}
 &= \text{Time wages} + \text{Bonus} \\
 &= ₹ 2,88,000 + ₹ 59,258.38 \\
 &= ₹ 3,47,258.38
 \end{aligned}$$

$$\text{Effective rate of earnings per hour (under Halsey Plan)} = \frac{₹ 3,25,305}{9,600 \text{ hours}} = ₹ 33.89$$

$$\text{Effective rate of earnings per hour (under Rowan Plan)} = \frac{₹ 3,47,258.38}{9,600 \text{ hours}} = ₹ 36.17$$

(ii) Savings to the ZED Ltd., in terms of direct labour cost per piece:

	(₹)
Direct labour cost (per unit) under time wages system (1.975 hours per unit × ₹ 30)	59.25
Direct labour cost (per unit) under Halsey Plan $\left(\frac{₹ 3,25,305}{6,120 \text{ units}} \right)$	53.15

Direct labour cost (per unit) under Rowan Plan $\left(\frac{₹3,47,258.38}{6,120 \text{ units}} \right)$ 56.74

Saving of direct labour cost under:

Halsey Plan (₹ 59.25 – ₹ 53.15) ₹ 6.10

Rowan Plan (₹ 59.25 – ₹ 56.74) ₹ 2.51

(iii) Advise to ZED Ltd.: (about the selection of the scheme to fulfill assurance)

Halsey scheme brings more savings to the management of ZED Ltd., over the present earnings of ₹ 2,88,000 but the other scheme i.e. Rowan scheme fulfils the promise of 20% increase over the present earnings of ₹ 2,88,000 by paying 20.58% in the form of bonus. Hence Rowan Plan may be adopted.

Question-7

A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three systems, which are under consideration of the management.

	Workers		
	A	B	C
Actual hours worked in a week	38	40	34
Hourly rate of wages	₹ 6	₹ 5	₹ 7.20
Production in units			
Product- P	21	-	60
Product- Q	36	-	135
Product -R	46	25	-
Standard time allowed per unit of each product is:			
	P	Q	R
Minutes	12	18	30

For the purpose of piece rate, each minute is valued at ₹ 0.10

You are required to calculate the wages of each worker under:

- Guaranteed hourly rates basis
- Piece work earnings basis, but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.
- Premium bonus basis where the worker receives bonus based on Rowan scheme.

3.27 Cost Accounting

Solution:

(i) Computation of wages of each worker under guaranteed hourly rate basis

Workers	Actual hours worked in a week	Hourly rate of wages (₹)	Wages (₹)
(a)	(b)	(c)	(d) = (b) × (c)
A	38	6.00	228.00
B	40	5.00	200.00
C	34	7.20	244.80

(ii) Computation of wages of each worker under piece work earnings basis

Product	Rate per unit	Worker A		Worker B		Worker C	
		Units	Wages (₹)	Units	Wages (₹)	Units	Wages (₹)
(a)	(b)	(c)	(d = b*c)	(e)	(f = b*e)	(g)	(h = b*g)
P	1.20	21	25.20	-	-	60	72
Q	1.80	36	64.80	-	-	135	243
R	3.00	46	138.00	25	75	-	-
			228.00		75.00		315.00

Since each worker has been guaranteed at 75% of basic pay, if his earnings are less than 50% of basic pay (guaranteed hourly rate), therefore, earning of the workers will be as follows Workers A and C will be paid the wages as computed viz., ₹ 228 and ₹ 315 respectively. The computed earnings under piece rate basis for worker B is ₹ 75 which is less than 50% of basic pay i.e., ₹ 100 (₹ 200 × 50) therefore he would be paid ₹ 150 i.e. 75% × ₹ 200 .

Working Notes:

1. Piece rate / per unit

Product	Standard time per unit in minutes	Piece rate each minute (₹)	Piece rate per unit (₹)
(a)	(b)	(c)	(d) = (b) × (c)
P	12	0.10	1.20
Q	18	0.10	1.80
R	30	0.10	3.00

2. Time allowed to each worker

$$\begin{aligned} \text{Worker A} &= (21 \text{ units} \times 12 \text{ minutes}) + (36 \text{ units} \times 18 \text{ minutes}) + (46 \text{ units} \times 30 \text{ minutes}) \\ &= 2,280 \text{ minutes or } 38 \text{ hours} \end{aligned}$$

Worker B = 25 units × 30 minutes

= 750 minutes or 12.5 hours

Worker C = (60 units × 12 minutes) + (135 units × 18 minutes)

= 3,150 minutes or 52.5 hours

(iii) Computation of wages of each worker under Premium bonus basis (where each worker receives bonus based on Rowan Scheme)

Workers	Time allowed hours	Time taken hours	Time saved hours	Wage rate/hour (₹)	Earnings (₹)	Bonus (₹)	Total of earning & bonus (₹)
A	38.00	38.00	-	6.00	228.00	-	228.00
B	12.50	40.00	-	5.00	200.00	-	200.00
C	52.50	34.00	18.50	7.20	244.80	86.26*	331.06

$$\begin{aligned}
 * \text{ Bonus under Rowan scheme} &= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour} \\
 &= \frac{18.5 \text{ hours}}{52.5 \text{ hours}} \times 34 \text{ hours} \times ₹ 7.20 \\
 &= ₹ 86.26
 \end{aligned}$$

Question-8

The finishing shop of a company employs 60 direct workers. Each worker is paid ₹ 400 as wages per week of 40 hours. When necessary, overtime is worked up to a maximum of 15 hours per week per worker at time rate plus one-half as premium. The current output on an average is 6 units per man hour which may be regarded as standard output. If bonus scheme is introduced, it is expected that the output will increase to 8 units per man hour. The workers will, if necessary, continue to work overtime up to the specified limit although no premium on incentives will be paid.

The company is considering introduction of either Halsey Scheme or Rowan Scheme of wages incentive system. The budgeted weekly output is 19,200 units. The selling price is ₹ 11 per unit and the direct material cost is ₹ 8 per unit. The variable overheads amount to ₹ 0.50 per direct labour hour and the fixed overhead is ₹ 9,000 per week.

Prepare a statement to show the effect on the company's weekly profit of the proposal to introduce (a) Halsey Scheme, and (b) Rowan Scheme.

3.29 Cost Accounting

Solution:

Working notes:

1. Total available hours per week (60 workers × 40 hours) 2,400
2. Total standard hours required to produce 19,200 units (19,200 units ÷ 6 units per hour) 3,200
3. Total labour hours required after the introduction of bonus scheme to produce 19,200 units (19,200 units ÷ 8 units per man hour) 2,400
4. Time saved in hours (3,200 hours – 2,400 hours) 800
5. Wage rate per hour (₹) (₹ 400 ÷ 40 hours) 10

6. Bonus:

$$(i) \quad \text{Halsey Scheme} = \frac{1}{2} \times \text{Time saved} \times \text{Wage rate per hour}$$

$$= \frac{1}{2} \times 800 \text{ hours} \times ₹ 10 = ₹ 4,000$$

$$(ii) \quad \text{Rowan Scheme} = \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Wage rate per hour}$$

$$= \frac{800 \text{ hours}}{3,200 \text{ hours}} \times 2,400 \text{ hours} \times ₹ 10 = ₹ 6,000$$

Statement showing the effect on the company's weekly present profit by the introduction of Halsey & Rowan schemes

	Present (₹)	Halsey (₹)	Rowan (₹)
Sales revenue: (A) (19,200 units × ₹11)	2,11,200	2,11,200	2,11,200
Direct material cost (19,200 units × ₹ 8)	1,53,600	1,53,600	1,53,600
Direct wages (Refer to working notes 2 & 3)	32,000 (3,200 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)
Overtime premium	4,000 (800 hrs. × ₹ 5)	-	-
Bonus (Refer to working notes 6 (i) & (ii))	-	4,000	6,000

Variable overheads	1,600 (3,200 hr. × ₹0.50)	1,200 (2,400 hr. × ₹0.50)	1,200 (2,400 hr. × ₹0.50)
Fixed overheads	9,000	9,000	9,000
Total cost : (B)	2,00,200	1,91,800	1,93,800
Profit: {(A)- (B)}	11,000	19,400	17,400

Question-9

The standard hours of job X is 100 hours. The job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours.

The bonus system applicable to the job is as follows:-

Percentage of time saved to time allowed (Slab rate)	Bonus
Saving upto 10%	10% of time saved
From 11% to 20%	15% of time saved
From 21% to 40%	20% of time saved
From 41% to 100%	25% of time saved

The rate of pay is ₹ 1 per hour, Calculate the total earnings of each worker and also the rate of earnings per hour.

Solution:

Statement of total earnings and rate of earning per hour

	Workers		
	Amar	Akbar	Anthony
Standard hours of Job	100 hours	100 hours	100 hours
Time taken on the Jobs (i)	60 hours	70 hours	95 hours
Time saved	40 hours	30 hours	5 hours
Percentage of time saved to time allowed	40%	30%	5%
Bonus hours (ii) (See Working Note 1)	6.5 hours	4.5 hours	0.5 hours
Total hours to be paid [(i) + (ii)]	66.5 hours	74.5 hours	95.5 hours
Total earning @ ₹ 1 per hour	₹ 66.5	₹ 74.5	₹ 95.5
Rate of earning per hour (See Working Note 2)	₹ 1.1083	₹ 1.0642	₹ 1.005

Note:

1. Bonus hours as percentage of time saved:

$$\text{Amar} : (10 \text{ hours} \times 10\%) + (10 \text{ hours} \times 15\%) + (20 \text{ hours} \times 20\%) = 6.5 \text{ hours}$$

3.31 Cost Accounting

Akbar : (10 hours × 10%) + (10 hours × 15%) + (10 hours × 20%) = 4.5 hours
Anthony : 5 hours × 10% = 0.5 hours

2. Rate of Earning per hour:

= $\frac{\text{Total earning}}{\text{Total time taken on the job}}$

Amar : $\frac{₹ 66.5}{60 \text{ hours}} = ₹ 1.1083$
Akbar : $\frac{₹ 74.5}{70 \text{ hours}} = ₹ 1.0642$
Anthony : $\frac{₹ 95.50}{95 \text{ hours}} = ₹ 1.005$

Question-10

The existing Incentive system of Alpha Limited is as under:

Normal working week : 5 days of 8 hours each plus 3 late shifts of 3 hours each

Rate of Payment : Day work: ₹ 160 per hour
Late shift: ₹ 225 per hour

Average output per operator for 49-hours week : 120 articles
i.e. including 3 late shifts

In order to increase output and eliminate overtime, it was decided to switch on to a system of payment by results. The following information is obtained:

Time-rate (as usual) : ₹ 160 per hour
Basic time allowed for 15 articles : 5 hours
Piece-work rate : Add 20% to basic piece-rate
Premium Bonus : Add 50% to time.

Required:

(i) Prepare a Statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:

- (a) Existing time-rate
- (b) Straight piece-work
- (c) Rowan system
- (d) Halsey premium system

Assume that 135 articles are produced in a 40-hour week under straight piece work, Rowan Premium system, and Halsey premium system above and worker earns half the time saved under Halsey premium system.

Solution:

Table showing Labour Cost per Article

Method of Payment	Hours worked	Weekly earnings (₹)	Number of articles produced	Labour cost per article (₹)
Existing time rate (WN-1)	49	8,425.00	120	70.21
Straight piece rate system (WN-2)	40	8,640.00	135	64.00
Rowan Premium System (WN-3)	40	9,007.41	135	66.72
Halsey Premium System (WN-4)	40	8,600.00	135	63.70

Working Notes:

1. Existing time rate

Weekly wages:

Normal shift	(40 hours × ₹ 160)	₹ 6,400
Late shift	(9 hours × ₹ 225)	₹ 2,025
		<u>₹ 8,425</u>

2. Piece Rate System

15 articles are produced in 5 hours

Therefore, to produce 135 articles, hours required is $\frac{5 \text{ hours}}{15 \text{ articles}} \times 135 \text{ articles} = 45 \text{ hours}$.

Cost of producing 135 articles:

At basic time rate (45 hours × ₹160) = ₹ 7,200

Add: Bonus @ 20% on basic Piece rate

$\left(\frac{₹7,200}{135 \text{ articles}} \times 20\% \times 135 \text{ articles} \right) =$ ₹ 1,440

Earning for the week ₹ 8,640

3. Rowan Premium System

(i) Time allowed for producing 135 articles $\left(\frac{5 \text{ hours}}{15 \text{ articles}} \times 135 \text{ articles} \times 150\% \right) = 67.5 \text{ hours}$

(ii) Time taken to produce 135 articles = 40.0 hours

3.33 Cost Accounting

(iii) Time Saved = 27.5 hours

Earnings under Rowan Premium system:

$$= (\text{Time taken} \times \text{Rate per hour}) + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour} \right)$$

$$= (40 \text{ hours} \times ₹160) + \left(\frac{27.5 \text{ hours}}{67.5 \text{ hours}} \times 40 \text{ hours} \times ₹160 \right) = ₹ 9,007.41$$

4. Halsey Premium System

$$= (\text{Time taken} \times \text{Rate per hour}) + \left(\frac{1}{2} \times \text{Time saved} \times \text{Rate per hour} \right)$$

$$= (40 \text{ hours} \times ₹160) + \left(\frac{1}{2} \times 27.5 \text{ hours} \times ₹160 \right) = ₹6,400 + ₹2,200 = ₹8,600$$

Question-11

'Under the Rowan Premium Bonus system, a less efficient worker can obtain same bonus as a highly efficient worker.' Discuss with suitable examples

Solution:

$$\text{Bonus under Rowan system} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate per hour}$$

The statement that under Rowan Premium bonus system, a less efficient worker and a highly efficient worker can obtain same amount of bonus, can be proved with the help of an example. Let time allowed for a job is 4 hours and Labour rate per hour is ₹ 5.

Case I : Less efficient worker, If time taken = 3 hours.

$$\text{Bonus} = \frac{3 \text{ hours}}{4 \text{ hours}} \times 1 \text{ hour} \times ₹ 5 = ₹ 3.75$$

Case II : Highly efficient worker, If time taken = 1 hour

$$\text{Bonus} = \frac{1 \text{ hour}}{4 \text{ hours}} \times 3 \text{ hours} \times ₹ 5 = ₹ 3.75$$

So, it can be concluded that under Rowan System, the less efficient worker and highly efficient worker can get the same bonus.

Question-12

Using Taylor's differential piece rate system, find the earning of Anderson from the following particulars:

Standard time per piece	12 minutes
Normal rate per hour	₹ 20
In a 8 hours day, Anderson produced	37 Units

Solution:

$$\text{Standard output per day} \left(\frac{8 \text{ hours} \times 60 \text{ minutes}}{12 \text{ minutes}} \right) = 40 \text{ units}$$

$$\text{Actual output} = 37 \text{ units}$$

$$\text{Efficiency (\%)} = \frac{37 \text{ units}}{40 \text{ units}} \times 100 = 92.5\%$$

Under the Taylor's differential piece rate system lower rate is 83% of the normal piece rate and is applicable if efficiency of worker is below 100%.

$$\text{Earning rate per unit} = 83\% \times \frac{₹20}{5 \text{ units}^*} = ₹ 3.32 \text{ per unit}$$

$$\text{Earning of Anderson} = 37 \text{ units} \times ₹ 3.32 = ₹122.84$$

$$* \text{ In one hour, production will be } = \frac{60 \text{ minutes}}{12 \text{ minutes}} = 5 \text{ units}$$

Question 13

Standard output in 10 hours is 240 units; actual output in 10 hours is 264 units. Wages rate is ₹ 10 per hour. Calculate the amount of bonus and total wages under Emerson efficiency Plan.

Solution:

$$\text{Efficiency (\%)} = \frac{264}{240} \times 100 = 110\%$$

As per Emerson efficiency plan, in case of above 100% efficiency, bonus of 20% of basic wages plus 1% for each 1% increase in efficiency is admissible.

$$\text{So, new bonus percentage} = 20 + (110 - 100) = 30$$

$$\text{Amount of Bonus} = \frac{30}{100} (\text{Hours worked} \times \text{Rate per hour})$$

$$= \frac{30}{100} \times 10 \text{ hours} \times ₹10 = ₹ 30$$

$$\text{Total wages} = (10 \text{ hours} \times ₹10) + ₹30 = ₹ 130.$$

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Question 14

Two workmen, Andrew and Baker, produce the same product using the same material. Andrew is paid bonus according to Halsey plan, while Baker is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. Andrew has taken 60 hours and Baker has taken 80 hours to complete the product. The normal hourly rate of wages of workman Andrew is ₹ 24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman Baker.

Solution:

	Andrew	Baker
Time allowed (Hours)	100	100
Time taken (Hours)	60	80
Time saved (Hours)	40	20
Let the rate of wages of the worker Baker is 'L' per hour		
Normal Wages	₹ 1,440 (60 hours × ₹24)	₹ 80 L (80 hours × L)
Bonus	₹ 480*	₹ 16 L**
Total earnings	₹ 1,920	₹ 96 L

$$\begin{aligned} * \text{ Bonus under Halsey system} &= \frac{1}{2} \times \text{Time saved} \times \text{Rate per hour} \\ &= \frac{1}{2} \times 40 \text{ hours} \times ₹24 = ₹480 \end{aligned}$$

$$\begin{aligned} ** \text{ Bonus under Rowan system} &= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time worked} \times \text{Rate per hour} \\ &= \frac{20 \text{ hours}}{100 \text{ hours}} \times 80 \text{ hours} \times L = 16 L \end{aligned}$$

According to the problem,

$$\begin{aligned} \text{Total earnings of Andrew} &= \text{Total earnings of Baker} \\ ₹ 1,920 &= ₹ 96 L \\ L &= ₹ 20 \end{aligned}$$

Therefore, Hourly rate of wages of Baker is ₹ 20 per hour.

Question 15

Standard Time for a job is 90 hours. The hourly rate of guaranteed wages is ₹ 50. Because of the saving in time a worker A gets an effective hourly rate of wages of ₹ 60 under Rowan

premium bonus system. For the same saving in time, calculate the hourly rate of wages a worker B will get under Halsey premium bonus system assuring 40% to worker.

Solution:

Increase in hourly rate of wages under Rowan Plan is ₹ 10 i.e. (₹ 60 – ₹ 50)

This is Equal to $\frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Rate per hour}$ (Please refer Working Note)

$$\text{Or, } \frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹ 50 = ₹ 10$$

$$\text{Or, } \frac{\text{Time Saved}}{90 \text{ hours}} \times ₹ 50 = ₹ 10$$

Therefore, Time Saved = 18 hours and Time Taken is 72 hours i.e. (90 hours – 18 hours)

Effective Hourly Rate under Halsey System:

Time saved = 18 hours

Bonus @ 40% = 18 hours × 40% × ₹ 50 = ₹ 360

Total Wages = (₹ 50 × 72 hours + ₹ 360) = ₹ 3,960

Effective Hourly Rate = ₹ 3,960 ÷ 72 hours = ₹ 55

Working Note:

$$\text{Effective hourly rate} = \frac{(\text{Time Taken} \times \text{Rate per hour}) + \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$$

$$\text{Or, } ₹ 60 = \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} + \frac{\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$$

$$\text{Or, } ₹ 60 - \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} = \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour} \times \frac{1}{\text{Time Taken}}$$

$$\text{Or, } ₹ 60 - ₹ 50 = \frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹ 50$$

Question 16

You are given the following information of a worker:

- (i) Name of worker : Mr. Roger
(ii) Ticket No. : 002

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- (iii) Work started : 1-4-14 at 8 a.m.
(iv) Work finished : 5-4-14 at 12 noon
(v) Work allotted : Production of 2,160 units
(vi) Work done and approved : 2,000 units
(vii) Time and units allowed : 40 units per hour
(viii) Wage rate : ₹ 25 per hour
(ix) Mr. Roger worked 9 hours a day.

You are required to calculate the remuneration of Mr. Roger on the following basis:

- (i) Halsey plan and
(ii) Rowan plan

Solution:

No. of units produced and approved = 2,000 units
Standard time = 40 units per hour
Hourly Wage Rate = ₹ 25

$$\text{Time allowed} = \frac{2,000 \text{ units}}{40 \text{ units}} = 50 \text{ hours}$$

$$\text{Time Taken} = (4 \text{ days} \times 9 \text{ hours}) + 4 \text{ hours} = 40 \text{ hours}$$

- (i) Calculation of Remuneration under Halsey Plan:

Standard time allowed for 2,000 units :	50 hours
Actual time taken for 2,000 units :	<u>40 hours</u>
Time saved	<u>10 hours</u>
Basic wages for time taken 40 hours @ ₹ 25	₹ 1,000
Bonus: 50% of time saved $(\frac{50}{100} \times 10 \text{ hours} \times ₹ 25)$	<u>₹ 125</u>
Total remuneration	<u>₹ 1,125</u>

- (ii) Calculation of Remuneration under Rowan Plan:

Wages for time taken 40 hours @ ₹ 25	₹ 1,000
Bonus = $\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Hourly rate}$	
= $\frac{10 \text{ hours}}{50 \text{ hours}} \times 40 \text{ hours} \times ₹ 25$	<u>= ₹ 200</u>
Total remuneration	<u>₹ 1,200</u>

Question 17

Mr. Michael executes a piece of work in 120 hours as against 150 hours allowed to him. His hourly rate is ₹ 10 and he gets a dearness allowance @ ₹ 30 per day of 8 hours worked in addition to his wages. You are required to calculate total wages received by Mr. Michael under the following incentive schemes:

- (i) Rowan Premium Plan, and
- (ii) Emerson's Efficiency Plan

Solution:

Time Allowed = 150 hours
 Time Taken = 120 hours
 Time Saved = 30 hours

(i) Rowan Premium Plan	(₹)
Normal wages (₹ 10 x 120 hours)	1,200
D.A. for 15 days i.e. $\frac{120\text{hours}}{8\text{hours}}$ (₹30 x 15 days)	450

$$\begin{aligned} \text{Bonus} &= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Hourly rate} \\ &= \frac{30\text{hours}}{150\text{hours}} \times 120\text{hours} \times ₹10 \end{aligned} \quad \underline{240}$$

Total Wages	<u>1,890</u>
(ii) Emerson's Efficiency Plan	
Normal wages (120 hours x ₹ 10)	1,200
D.A. (15 days x ₹ 30)	450
Bonus * = 45% x ₹1,200	<u>540</u>
Total Wages	<u>2,190</u>

$$* \text{ Efficiency} = \frac{\text{Time Allowed}}{\text{Time Taken}} \times 100 = \frac{150}{120} \times 100 = 125 \%$$

Rate of Bonus up to 100%	=	20%
From 101% to 125%	=	<u>25%</u>
		<u>45%</u>

Question 18

The management of a company wants to formulate an incentive plan for the workers with a view to increase productivity. The following particulars have been extracted from the books of company:

Piece Wage rate ₹ 10

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Weekly working hours 40

Hourly wages rate ₹ 40 (guaranteed)

Standard/normal time per unit 15 minutes.

Actual output for a week:

Worker A: 176 pieces

Worker B: 140 pieces

Differential piece rate: 80% of piece rate when output below normal and 120% of piece rate when output above normal.

Under Halsey scheme, worker gets a bonus equal to 50% of Wages of time saved.

Calculate:

- Earning of workers under Halsey's and Rowan's premium scheme.
- Earning of workers under Taylor's differential piece rate system and Emerson's efficiency plan.

Solution:

Calculation of earnings for workers under different incentive plans:

(i) Halsey's Premium Plan:

	Worker – A	Worker – B
Actual time taken	40 hours	40 hours
Standard time for actual Production	44 hours $(\frac{176 \text{ Pcs} \times 15 \text{ Min.}}{60 \text{ Min.}})$	35 hours $(\frac{140 \text{ Pcs} \times 15 \text{ Min.}}{60 \text{ Min.}})$
Minimum Wages	₹ 1,600 (40 hours x ₹ 40)	₹ 1,600 (40 hours x ₹ 40)
Bonus	₹ 80 {50% (44-40) x ₹40}	No bonus
Earning	<u>₹ 1,680</u>	<u>₹ 1,600</u>
Rowan's Premium Plan:		
Minimum Wages (as above)	₹ 1,600	₹ 1,600
Bonus	= ₹ 145.45 $(\frac{4 \text{ hours}}{44 \text{ hours}} \times 40 \text{ hours} \times ₹ 40)$	No bonus

Earning	<u>₹ 1,745.45</u>	<u>₹ 1,600</u>
(ii) Taylor's differential Piece rate		
Efficiency	110%	87.5%
	$(\frac{176 \text{ pcs.}}{160 \text{ pcs.}} \times 100)$	$(\frac{140 \text{ pcs.}}{160 \text{ pcs.}} \times 100)$
Earning	<u>₹ 2,112</u>	<u>₹ 1,120</u>
	(₹10 x 120% x 176 pcs.)	(₹10 x 80% x 140 pcs.)
Emerson's efficiency Plan		
Time Wages	1,600	1,600
	(₹ 40 x 40 hours)	(₹ 40 x 40 hours)
Bonus	480	320
	(20+10)% of (₹40x40 hrs)	(20% of 1,600)
Earning	<u>₹ 2,080</u>	<u>₹ 1,920</u>

Question 19

What are the main features of Halsey and Rowan method of payment of remuneration? State how Rowan Scheme is better than Halsey Scheme. Given time allowed of 30 hours for a job and the wage rate of ₹ 1.00 per hour, illustrate your answer by assuming your own figure for time taken to do the job.

Solution:

F.A. Halsey, an American engineer, brought out his plan in 1891. The main features of his plan were as follows:

- (i) Time rate is guaranteed.
- (ii) Standard time is fixed for the job or operation.
- (iii) In case a worker completes the job or operation in less time than allowed time (or standard time) he is paid a fixed percentage of saving in time, which is usually 50%.
- (iv) Under this plan, the employer is benefited to the extent of remaining 50% of time saved.

Employer is not protected against over speeding jobs by workers resulting in waste, damages etc.

Rowan Scheme was introduced by James Rowan in Glasgow in the year 1898. It is similar to Halsey Scheme but the premium concept here is different. The main features of Rowan Scheme are:

- (i) Time rate is guaranteed.

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- (ii) Bonus is based on time saved.
- (iii) Instead of fixed percentage of time saved, bonus is in proportion of time saved to time allowed.
- (iv) Protects employer against loose rate setting.
- (v) Employer shares the benefit of increased output.

The Rowan Scheme is better than Halsey Scheme because of the following reasons:

- (i) In Halsey Scheme, bonus is set at 50% of time saved. It does not serve as a strong incentive. If workers over speed, the quality of the products deteriorates.
- (ii) In Rowan Scheme, there is an automatic check on the earnings and thus over speeding is arrested. In Halsey Scheme if two third of the time is saved, the worker can double his earning per hour and in Rowan Scheme, this is not possible.
- (iii) The earning per hour in Rowan Scheme is higher upto 50% of time saved and falls thereafter whereas in Halsey Scheme the earnings per hour increases at a slow speed and can be doubled.

Consider the following example in which the time allowed for performing the job is 30 hours and the wage rate is ₹ 1.00 per hour. We will depict with the help of imaginary figures in the following example, how the earnings per hour under Halsey and Rowan plan will vary.

Example:

Time Allowed	Time taken	Wages (₹)	Bonus (₹)		Total Wages (₹)		Earning per hour(₹)	
			Halsey*	Rowan**	Halsey	Rowan	Halsey	Rowan
(1)	(2)	(3)=(2)×₹1	(4)	(5)	(6)=(3)+(4)	(7)=(3)+(5)	(8)= (6)/(2)	(9)= (7)/(2)
30	30	30	-	-	30.00	30.00	1.00	1.00
30	20	20	5.00	6.67	25.00	26.67	1.25	1.33
30	15	15	7.50	7.50	22.50	22.50	1.50	1.50
30	10	10	10.00	6.67	20.00	16.67	2.00	1.67
30	5	5	12.50	4.17	17.50	9.17	3.50	1.83

* Bonus under Halsey Plan = 50% of (Time Allowed – Time Taken) × Rate per hour

** Bonus under Rowan Plan = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate per hour}$

Question 20

A skilled worker is paid a guaranteed wage rate of ₹ 120 per hour. The standard time allowed for a job is 6 hour. He took 5 hours to complete the job. He is paid wages under Rowan Incentive Plan.

- (i) Calculate his effective hourly rate of earnings under Rowan Incentive Plan.
(ii) If the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings, calculate the time in which he should complete the job.

Solution:

- (i) Effective hourly rate of earnings under Rowan Incentive Plan

Earnings under Rowan Incentive plan =

$$(\text{Actual time taken} \times \text{wage rate}) + \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time taken} \times \text{Wage rate}$$

$$= (5 \text{ hours} \times ₹120) + \left(\frac{1 \text{ hour}}{6 \text{ hours}} \times 5 \text{ hours} \times ₹ 120 \right)$$

$$= ₹ 600 + ₹100 = ₹700$$

$$\text{Effective hourly rate} = ₹700/5 \text{ hours} = ₹ 140 /\text{hour}$$

- (ii) Let time taken = X

$$\therefore \text{Effective hourly rate} = \frac{\text{Earnings under Halsay Scheme}}{\text{Time Taken}}$$

Or, Effective hourly rate under Rowan Incentive plan =

$$\frac{(\text{Time taken} \times \text{Rate}) + 50\% \text{ Rate} \times (\text{Time allowed} - \text{Time taken})}{\text{Time Taken}}$$

$$\text{Or, } ₹140 = \frac{(X \times ₹120) + 50\% ₹120 \times (6 - X)}{X}$$

$$\text{Or, } 140X = 120X + 360 - 60X$$

$$\text{Or, } 80X = 360$$

$$\text{Or, } X = \frac{360}{80} = 4.5 \text{ hours}$$

Therefore, to earn effective hourly rate of ₹140 under Halsey Incentive Scheme worker has to complete the work in 4.5 hours.

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Question 21

A, B and C are three industrial workers working in Sports industry and are experts in making cricket pads. A, B and C are working in Mahi Sports, Virat Sports and Sikhar Sports companies respectively. Workers are paid under different incentive schemes. Company wise incentive schemes are as follows:

Company	Incentive scheme
Mahi Sports	Emerson's efficiency system
Virat Sports	Merrick differential piece rate system
Sikhar Sports	Taylor's differential piece work system

The relevant information for the industry is as under:

Standard working hours	8 hours a day
Standard output per hour (in units)	2
Daily wages rate	₹ 360
No. of working days in a week	6 days

Actual outputs for the week are as follows:

A	B	C
132 units	108 units	96 units

You are required to calculate effective wages rate and weekly earnings of all the three workers.

Solution:

Calculation of effective wages rate and weekly earnings of the workers A, B and C

Workers	A	B	C
Standard Output	96 units (8 hrs. × 2 units × 6 days)	96 units (8 hrs. × 2 units × 6 days)	96 units (8 hrs. × 2 units × 6 days)
Actual Output	132 units	108 units	96 units
Efficiency (%)	$\frac{132\text{units}}{96\text{units}} \times 100 = 137.5$	$\frac{108\text{units}}{96\text{units}} \times 100 = 112.5$	$\frac{96\text{units}}{96\text{units}} \times 100 = 100$
Daily wages Rate	₹ 360	₹ 360	₹ 360
Incentive system	Emerson's Efficiency System	Merrick differential piece rate system	Taylor's differential piece work system
Rate of Bonus	57.5% of time rate (20% + 37.5%)	20% of ordinary piece rate	25% of ordinary piece rate

Effective Wage Rate	₹ 70.875 per hour $\left(\frac{₹ 360}{8\text{hours}} \times 157.5\%\right)$	₹ 27 per piece $\left(\frac{₹ 360}{16\text{units}} \times 120\%\right)$	₹ 28.125 per piece $\left(\frac{₹ 360}{16\text{units}} \times 125\%\right)$
Total weekly earnings	₹ 3,402 (8 hours × 6 days × ₹ 70.875)	₹ 2,916 (108 units × ₹ 27)	₹ 2,700 (96 units × ₹ 28.125)

Question 22

Jigyasa Boutiques LLP. (JBL) takes contract on job works basis. It works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 2 hours for boutique work on a piece of garment. In the month of March 2014, two workers Margaret and Jennifer were given 30 pieces and 42 pieces of garments respectively for boutique work. The following are the details of their work:

	Margaret	Jennifer
Work assigned	30 pcs.	42 pcs.
Time taken	28 hours	40 hours

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹ 50 per hour. As per the new wages agreement the workers will be paid ₹ 55 per hour w.e.f. 1st April 2014. At the end of the month March 2014, the accountant of the company has calculated wages to these two workers taking ₹ 55 per hour.

- From the above information calculate the amount of loss that the company has incurred due to incorrect rate selection.*
- What would be the loss incurred by the JBL due to incorrect rate selection if it had followed Rowan scheme of bonus payment.*
- Amount that could have been saved if Rowan scheme of bonus payment was followed.*
- Do you think Rowan scheme of bonus payment is suitable for JBL?*

Solution:

	Margaret	Jennifer
No. of garments assigned (Pieces.)	30	42
Hour allowed per piece (Hours)	2	2
Total hours allowed (Hours)	60	84
Hours Taken (Hours)	28	40
Hours Saved (Hours)	32	44

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(i) Calculation of loss incurred due to incorrect rate selection.

(While calculating loss only excess rate per hour has been taken)

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140 (28 Hrs. × ₹ 5)	200 (40 Hrs. × ₹ 5)	340
Bonus (as per Halsey Scheme) (50% of Time Saved × Excess Rate)	80 (50% of 32 Hrs. × ₹ 5)	110 (50% of 44 Hrs. × ₹ 5)	190
Excess Wages Paid	220	310	530

(ii) Amount of loss if Rowan scheme of bonus payment were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140.00 (28 Hrs. × ₹ 5)	200.00 (40 Hrs. × ₹ 5)	340.00
Bonus (as per Rowan Scheme) $\left(\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Excess Rate} \right)$	74.67 $\left(\frac{28}{60} \times 32 \times ₹ 5 \right)$	104.76 $\left(\frac{40}{84} \times 44 \times ₹ 5 \right)$	179.43
Excess Wages Paid	214.67	304.76	519.43

(iii) Calculation of amount that could have been saved if Rowan Scheme were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Wages paid under Halsey Scheme	220.00	310.00	530.00
Wages paid under Rowan Scheme	214.67	304.76	519.43
Difference (Savings)	5.33	5.24	10.57

(iv) Rowan Scheme of incentive payment has the following benefits, which is suitable with the nature of business in which Jigyasa Boutique LLP operates:

- Under Rowan Scheme of bonus payment, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.
- If the rate setting department commits any mistake in setting standards for time to be taken to complete the works, the loss incurred will be relatively low.

Computation of Labour Cost

Question 23

Two workers 'A' and 'B' produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to Rowan scheme while 'B' is paid bonus according to Halsey scheme. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is ₹ 5 per person-hour actually worked. The factory cost of product manufactured by 'A' is ₹ 3,490 and for product manufactured by 'B' is ₹ 3,600.

Required:

- Compute the normal rate of wages.
- Compute the material cost.
- Prepare a statement comparing the factory cost of the product as made by two workers.

Solution:

Workings:

- Let 'M' be the cost of material and 'L' be the normal rate of wages per hour

	Worker A (₹)	Worker B (₹)
Material cost	M	M
Labour wages	30 L	40 L
Bonus	12 L*	5 L**
Overheads (30 hours × ₹5); (40 hours × ₹5)	150	200
Factory cost {M + (30 L + 12 L) + 150 = 3,490} {M + (40 L + 5 L) + 200 = 3,600}	M + 42 L = 3,340(i)	M + 45 L = 3,400.... (ii)

$$\begin{aligned}
 * \text{ Bonus under Rowan system} &= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time worked} \times \text{Rate per hour} \\
 &= \frac{20 \text{ hours}}{50 \text{ hours}} \times 30 \text{ hours} \times L = 12 L
 \end{aligned}$$

$$\begin{aligned}
 ** \text{ Bonus under Halsey system} &= \frac{1}{2} \times \text{Time saved} \times \text{Rate per hour} \\
 &= \frac{1}{2} \times 10 \text{ hours} \times L = 5 L
 \end{aligned}$$

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2. Solving (i) and (ii) to get the value of 'M' and 'L'

$$M + 42 L = 3,340 \dots\dots\dots (i)$$

$$M + 45 L = 3,400 \dots\dots\dots (ii)$$

$$- 3 L = - 60$$

$$L = 20$$

By substituting the value of 'L' in (i), we will get the value of M

$$M + 42 \times 20 = 3,340 \quad \text{or, } M = 2,500$$

(i) Normal rate of wages is ₹ 20 per hour. (Working Note – 2)

(ii) Cost of materials = ₹ 2,500. (Working Note – 2)

(iii) **Comparative Statement of factory cost**

	Worker A (₹)	Worker B (₹)
Material cost	2,500	2,500
Wages (30 hours × ₹ 20); (40 hours × ₹ 20)	600	800
Bonus (12 × 20); (5 × 20)	240	100
Overheads (30 hours × ₹ 5); (40 hours × ₹ 5)	150	200
Factory cost	3,490	3,600

Question 24

Calculate the earnings of A and B from the following particulars for a month and allocate the labour cost to each job X, Y and Z:

	A	B
(i) Basic Wages	₹ 100	₹ 160
(ii) Dearness Allowance	50%	50%
(iii) Contribution to provident Fund (on basic wages)	8%	8%
(iv) Contribution to Employees' State Insurance (on basic wages)	2%	2%
(v) Overtime	10 hours	

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state Insurance and Provident Fund are at equal rate with employees' contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

	Jobs		
	X	Y	Z
Worker A	40%	30%	30%
Worker B	50%	20%	30%

Overtime was done on job Y.

Solution:

Statement showing Earnings of Workers A and B

Workers	A (₹)	B (₹)
Basic Wages	100.00	160.00
Dearness Allowance (50% of Basic Wages)	50.00	80.00
Overtime Wages (Refer to Working Note 1)	15.00	----
Gross Wages earned	165.00	240.00
Less: Provident Fund (8% × ₹100); (8% × ₹160)	(8.00)	(12.80)
– ESI (2% × ₹100); (2% × ₹160)	(2.00)	(3.20)
Net Wages paid	155.00	224.00

Statement of Labour Cost

	A (₹)	B (₹)
Gross Wages (excluding overtime)	150.00	240.00
Employer's contribution to P.F. and E.S.I.	10.00	16.00
	160.00	256.00
Ordinary wages Labour Rate per hour (₹160 ÷ 200 hours); (₹256 ÷ 200 hours)	0.80	1.28

Statement Showing Allocation of Wages to Jobs

	Total Wages	Jobs		
		X	Y	Z
Worker A				
Ordinary Wages (4:3:3)	160.00	64.00	48.00	48.00
Overtime	15.00	--	15.00	--
Worker B				
Ordinary Wages(5:2:3)	256.00	128.00	51.20	76.80
	431.00	192.00	114.20	124.80

3.49 Cost Accounting

Working Notes

1. Normal Wages are considered as basic wages

$$\begin{aligned} \text{Over time} &= \frac{2x(\text{Basic wage} + \text{D.A.}) \times 10 \text{ hours}}{200 \text{ hours}} \\ &= 2x \frac{\text{₹}150}{200} \times 10 \text{ hours} \\ &= 1.50 \times 10 \text{ hours} = \text{₹}15 \end{aligned}$$

Question-25

An article passes through five hand operations as follows:

Operation No.	Time per article	Grade of worker	Wage rate per hour (₹)
1	15 minutes	A	0.65
2	25 minutes	B	0.50
3	10 minutes	C	0.40
4	30 minutes	D	0.35
5	20 minutes	E	0.30

The factory works 40 hours a week and the production target is 600 dozens per week. Prepare a statement showing for each operation and in total the number of operations required, the labour cost per dozen and the total labour cost per week to produce the total targeted output.

Solution:

Statement of number of operators required and labour cost per dozen and per week. Production target is 600 dozen or 7,200 article per week.

Particulars	Operation No.					Total
	1	2	3	4	5	
Time per article (minutes)	15	25	10	30	20	
Total time in hours for production of 600 dozen $\left(\frac{600 \text{ doz.} \times 12}{60 \text{ min.}} = 120\right)$	1,800 (120 × 15 min.)	3,000 (120 × 25 min.)	1,200 (120 × 10 min.)	3,600 (120 × 30 min.)	2,400 (120 × 20 min.)	
No. of operators	45	75	30	90	60	300

$\left(\frac{\text{Total time}}{40 \text{ hours}}\right)$						
Labour cost per dozen (₹) $\frac{\text{Total time} \times \text{Rate per hour}}{600 \text{ dozen}}$	1.95	2.50	0.80	2.10	1.20	8.55
Labour cost per week (₹) (Cost per doz. \times 600 doz.)	1,170	1,500	480	1,260	720	5,130

Question 26

Arnav Limited manufactures and sales plastic chairs. It pays wages under the differential piece rate system by following F.W. Taylor's System with a standard piece rate of ₹ 12.50 per unit of chair produced by the workers. Standard production per hour is 4 chairs. Each worker is supposed to work 8 hours a day from Monday to Friday and 5 hours on Saturday. Presently, there are 118 workers who are entitled for this plan.

The plant and machinery used to manufacture the chairs was purchased long back and does not match with the efficiency of the workers. Workers appraised their concerns to the management and demanded wages on the time rate basis i.e. ₹ 50 per hour and the incentive under the Halsey Premium plan.

The following production estimates has been made for the month of November, 2015 under the three scenarios:

Scenario	Worst case	Optimal case	Best case
Production (in units)	42,400	84,960	1,27,400

Required:

- Calculate total wages and average wages per worker per month, under the each scenario, when
 - Current system of wages and incentive payment system is followed
 - Workers' demand for time rate wages and Halsey premium plan is accepted.
- Mr. K, during the month of October 2015, has produced 1,050 units. What will be impact on his earning if he will be able to produce the same number of units in next month also. Should he support the workers' demand?
(Take 4 working weeks in a month)

3.51 Cost Accounting

Solution:

(a) Calculation of Total wages and average wages per worker per month.

(i) When Current system of wages and incentive payment system is followed:

		Worst case	Optimal case	Best case
I	Standard Production (in units) (45 hours × 4 units × 4 weeks × 118 workers)	84,960	84,960	84,960
II	No. of units to be produced	42,400	84,960	1,27,400
III	Efficiency $\{(II \div I) \times 100\}$	49.91%	100%	149.95%
IV	Differential piece rate*	₹10 (₹12.5 × 0.8)	₹15 (₹12.5 × 1.2)	₹15 (₹12.5 × 1.2)
V	Total Wages (II × IV)	₹4,24,000	₹12,74,400	₹19,11,000
VI	Average wages per worker (V ÷ 118)	₹3,593.22	₹10,800	₹16,194.92

*For efficiency less than 100%, 83% of piece rate and for efficiency more than or equals to 100%, 125% of piece rate may also be taken.

(ii) When workers' demand for time rate wages and Halsey premium plan is accepted:

		Worst case	Optimal case	Best case
I	No. of units expected to be produced (units)	42,400	84,960	1,27,400
II	Standard no. units in an hour (units)	4	4	4
III	Standard Hours (I ÷ II)	10,600	21,240	31,850
IV	Expected working hours (45 hours × 4 weeks × 118 workers)	21,240	21,240	21,240
V	Hours to be saved (III – IV)	--	--	10,610
VI	Time wages (IV × ₹50)	₹10,62,000	₹10,62,000	₹10,62,000
VII	Incentive under Halsey Premium Plan $\left(\frac{1}{2} \times \text{Time saved} \times ₹50\right)$	--	--	₹2,65,250
VIII	Total Wages (VI + VII)	₹10,62,000	₹10,62,000	₹13,27,250
IX	Average wages per worker (VIII ÷ 118)	₹9,000	₹9,000	₹11,247.88

(b) Calculation of gain or loss in the current monthly income of Mr. K:

	Wages earned in October 2015:	
	Standard production unit (45 hours × 4 weeks × 4 units)	720 units
	No. of units produced	1,050 units
	Efficiency	145.83%
	Differential piece rate (refer the above part)	₹15
I	Total wages (1,050 units × ₹15)	₹15,750
	Expected wages under the new scheme	
	Standard hours (1,050 units ÷ 4 units)	262.50 hours
	Expected hours to be taken (45 hours × 4 weeks)	180 hours
	Time saved	82.50 hours
	Time wages (180 hours × ₹50)	₹9,000
	Incentive $\left(\frac{1}{2} \times \text{Time saved} \times ₹50\right)$	₹2,062.50
II	Total expected wages	₹11,062.50
	Loss from the proposed scheme (II – I)	₹4,687.50

Supporting the demand of colleague workers will cost ₹4,687.50 in the next month to Mr. K.

Miscellaneous

Question 27

If the 'activity ratio' and 'capacity ratio' of a company is 104% and 96% respectively, find out its 'efficiency ratio'.

Solution:

Efficiency Ratio can be obtained by dividing the activity ratio by capacity ratio as follows:-

$$\begin{aligned} \text{Efficiency Ratio} &= \frac{\text{Activity ratio}}{\text{Capacity ratio}} \times 100 \\ &= \frac{104\%}{96\%} \times 100 = 108.33\% \end{aligned}$$

The inter – relationship is shown below:

$$\text{Activity Ratio} = \frac{\text{Std. hours for actual production}}{\text{Budgeted Hours}} \times 100$$

3.53 Cost Accounting

$$\text{Capacity ratio} = \frac{\text{Actual working hours}}{\text{Budgeted hours}} \times 100$$

$$\text{Efficiency ratio} = \frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$$

$$\begin{aligned} \text{i.e. Efficiency Ratio} &= \frac{\text{Activity Ratio}}{\text{Capacity Ratio}} \\ &= \frac{\text{Std. hours for actual production}}{\text{Budgeted hours}} \times \frac{\text{Budgeted hours}}{\text{Actual hours worked}} \\ &= \frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100 \end{aligned}$$

$$\text{Activity Ratio} = \text{Capacity Ratio} \times \text{Efficiency Ratio}$$
