Learning Objectives

When you have finished studying this chapter, you should be able to:

- Understand the need of labour cost control,
- Understand the attendance and the payroll procedure
- Describe the meaning and accounting treatment of idle time and overtime
- Understand the concept of labour turnover and the various methods of computing the same
- Understand various types of systems of wage payment and incentives
- Describe the efficiency rating procedures.

3.1 Introduction

Labour cost after material cost is another significant element of cost not only because the wages bill in a modern organisation is generally substantial but also because it has certain peculiar characteristics which other elements of cost do not have. A good cost accountant must understand the special features of labour cost, the most important of which is that there is almost no limit to the increase of output of this most important and wonderful factor of production.

3.2 Classification of Labour Cost

Labour cost may be broadly classified as direct labour cost and indirect labour cost.

3.2.1 Direct Labour Cost: Labour cost that is expended in production of a product and easily identified and allocated to a cost unit i.e. a specific job, contract, work order or any other unit of cost.

3.2.2 Indirect Labour Cost: Labour cost that is expended on the wages of workmen who are not directly engaged in the production process and can be easily identified with a cost unit.
### 3.2 Cost Accounting

#### Distinction between Direct and Indirect Labour Cost:

<table>
<thead>
<tr>
<th>Direct labour cost</th>
<th>Indirect labour cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is the cost incurred in payment of labour who are directly engaged in the production process</td>
<td>2. Cost incurred for payment of labour who are not directly engaged in the production process.</td>
</tr>
<tr>
<td>2. Direct labour cost can be easily identified and allocated to cost unit.</td>
<td>2. Indirect labour cost is apportioned on some appropriate basis.</td>
</tr>
<tr>
<td>3. Direct labour cost varies with the volume of production and has positive relationship with the volume.</td>
<td>3. Indirect labour cost may not vary with the volume of production.</td>
</tr>
</tbody>
</table>

#### 3.3 Labour Cost Control

Labour costs are associated with human beings. To control labour costs one has to understand human behavior. Labour cost control means control over the cost incurred on labour. Control over labour costs does not imply control over the size of the wage bill; it also does not imply that wages of each worker should be kept as low as possible.

The aim should be to keep the wages cost per unit of output as low as possible. This can only be brought about by giving workers optimum wages and then harnessing their energies to optimise output.

A well motivated team of workers can bring about wonders. Each concern should, therefore, constantly strive to raise the productivity of labour. The efforts for the control of labour costs should begin from the very beginning. There has to be a concerted effort by all the concerned departments. In a large organisation, generally the following departments are involved in the control of labour costs:

<table>
<thead>
<tr>
<th>Department</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personal Department</td>
<td>i) On receipt of labour requisition from the various departments it searches for the required skills and qualification.</td>
</tr>
<tr>
<td></td>
<td>ii) It ensures that the persons recruited posses the requisite qualification and skills required for the job.</td>
</tr>
<tr>
<td></td>
<td>iii) Arranges proper training for the newly recruited workers and workshops for existing workers.</td>
</tr>
<tr>
<td></td>
<td>iv) Maintains all personal and job related records of the employees.</td>
</tr>
</tbody>
</table>
v) Evaluation of performance from time to time

2. Engineering and Work Study Department
   i) Prepares plans and specifications for each job
   ii) Providing training and guidance to the employees
   iii) Supervises production activities
   iv) Conducts time and motion studies
   v) Undertakes job analysis.
   vi) Conducts job evaluation.

3. Time-keeping Department
   This Department is primarily concerned with the maintenance of attendance records of the employees and the time spent by them on various jobs, etc.

4. Payroll Department
   i) The preparation of payroll of the employees.
   ii) It disburses salary and wage payments.

5. Cost Accounting Department
   This department is responsible for the accumulation and classification etc. of all type of costs. All such data pertaining to labour costs are also collected, analysed and allocated to various jobs, processes, departments, etc., by this department.

3.3.1 Important Factors for the Control of Labour Cost: To exercise an effective control over the labour costs, the essential requisite is efficient utilisation of labour and allied factors. The main points which need consideration for controlling labour costs are the following:

(i) Assessment of manpower requirements.
(ii) Control over time-keeping and time-booking.
(iii) Time & Motion Study.
(iv) Control over idle time and overtime.
(v) Control over labour turnover.
(vi) Wage systems.
(vii) Incentive systems.
(viii) Systems of wage payment and incentives.
(ix) Control over casual, contract and other workers.
(x) Job Evaluation and Merit Rating.
(xi) Labour productivity.
3.4 Cost Accounting

3.3.2 Collection of Labour Costs: The task of collecting labour costs is performed by the Cost Accounting Department which record separately wages paid to direct and indirect labour. It is the duty of this department to ascertain the effective wages per hour in each department and to analyse the total payment of wages of each department into:

(i) the amount included in the direct cost of goods produced or jobs completed;
(ii) the amount treated as indirect labour and thus included in overheads; and
(iii) the amount treated as the cost of idle time and hence loss.
(iv) the amount treated as abnormal loss/gain and to be transferred to profit and loss account.

Through this process costs of various jobs are ascertained. Naturally, in this the proper recording of time spent by the workers is essential. Labour cost per hour may be collected through the use of the form given below:

A.B.C. Co. Ltd.

<table>
<thead>
<tr>
<th>Department</th>
<th>Labour Cost Report</th>
<th>Week ended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the employee</td>
<td>Section</td>
<td>Day Work Hrs.</td>
</tr>
<tr>
<td>A.</td>
<td>B.</td>
<td>C.</td>
</tr>
<tr>
<td>(₹)</td>
<td>(₹)</td>
<td>(₹)</td>
</tr>
</tbody>
</table>

3.4 Attendance & Payroll Procedures

3.4.1 Attendance Procedure / Time-keeping: It refers to correct recording of the employees' attendance time. Students may note the difference between “time keeping” and “time booking”. The latter refers to break up of time on various jobs while the former implies a record of total time spent by the workers in a factory.

Objectives of Time-keeping: Correct recording of employees' attendance time is of utmost importance where payment is made on the basis of time worked.

Where payment is made by results viz; straight piece work, it would still be necessary to correctly record attendance for the purpose of ensuring that proper discipline and adequate rate of production are maintained. In fact the various objectives of time-keeping are as follows:

(i) For the preparation of payrolls.
(ii) For calculating overtime.
(iii) For ascertaining and controlling labour cost.
(iv) For ascertaining idle time.
(v) For disciplinary purposes.
(vi) For overhead distribution.

**Methods of Time-keeping:** There are two methods of time-keeping. They are the manual methods and the mechanical methods. The choice of a particular method depends upon the requirements and policy of a firm. But whichever method is followed, it should make a correct record of the time incurring the minimum possible expenditure and should minimise the risk of fraudulent payments of wages.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
</tr>
<tr>
<td>(a) Attendance Register Method</td>
<td>It is the oldest method of recording time. Under this method, an attendance register is kept in the time office adjacent to the factory gate or in each department for workers employed therein. The time of arrival and departure, may be noted down by an employee know as time-keeper. This method is simple and inexpensive and can be used in small firms where the number of workers is not large. This method may lead to dishonest practice of recording wrong time because there is possibility of collusion between some of the workers and the time-keeper. However, for recording the time of workers who work at customers' premises and places which are situated at a distance from the factory, this may be the only suitable method.</td>
</tr>
</tbody>
</table>
| (b) Metal Disc Method | Under this method, each worker is allotted a metal disc or a token with a hole bearing his identification number. As the workers enter the factory gate, they remove their respective discs or tokens and place them in a box or tray kept near the board. Immediately after the scheduled time for entering the factory, the box is removed and the late comers will have to give their tokens to the time-keeper personally so that the exact time of their arrival could be recorded. It has certain disadvantages as given below: 1. There are chances that a worker may try to remove his companion’s token from the board in order to get his presence marked when he is absent. 2. There are chances of disputes regarding the exact time of arrival of a worker because the time-keeper...
3.6 Cost Accounting

| Marking the attendance can commit mistakes deliberately or through carelessness. There is no authentic proof of the presence or absence of the workers.
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3. There are chances of inclusion of dummy or ghost workers by the time-keeper.</td>
</tr>
</tbody>
</table>

**Mechanical**

<table>
<thead>
<tr>
<th>(a) Time Recording Clocks</th>
<th>The time recording clock is a mechanical device which automatically records the time of the workers. Under this method, each worker is given a Time Card and are serially arranged in a tray near the factory gate and as the worker enters the gate, he picks up his card from the tray, puts it in the time recording clock which prints the exact time of arrival in the proper space against the particular day. This process is repeated for recording time of departure for lunch, return from lunch and time of leaving the factory in the evening. Late arrivals, early leavings and overtime are printed in red to attract the attention of the management.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages:</strong></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>There are no chances of disputes arising in connection with recording of time of workers because time is recorded by the time recording clock and not by the time-keeper.</td>
</tr>
<tr>
<td>ii</td>
<td>There is no scope for partiality or carelessness of the time-keeper as it is in case of manual methods.</td>
</tr>
<tr>
<td><strong>Disadvantages:</strong></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>There are chances that a worker may try to get his friend’s time card from the tray in order to get him marked present in time when he is actually late or get his presence marked when he is absent. This drawback can be removed if the time-keeper does not show carelessness.</td>
</tr>
<tr>
<td>ii</td>
<td>Sometimes, the time recording clock goes out of order and the work of recording of time is dislocated.</td>
</tr>
</tbody>
</table>

| (b) Dial Time Records | The dial time recorder is a machine which has a dial around the clock. This dial has a number of holes (usually about 150) and each hole bears a number corresponding to the identification number of the worker concerned. There is one radial arm at the centre of the |
As a worker enters the factory gate, he is to press the radial arm after placing it at the hole of his number and his time will automatically be recorded on a paper inside the dial time recorder against the number. The sheet on which the time is recorded provides a running account of the worker’s time.

**Advantages:**
1. This machine allows greater accuracy and can itself transcribe the number of hours to the wages sheets.
2. This machine can also calculate the wages of the workers and thus avoids much loss of time.

**Disadvantages:**
The high installation cost of the dial time recorder and its use for only a limited of workers are the drawbacks of this method.

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**Punch Card attendance system**

One of the most popular time clock attendance systems is punch card attendance system. A punch card is a flat and stiff paper with notches cut in it and contains digital information. In punch card attendance system, employees use this punch or proximity card for in and/or out. To use a punch card, employees just need to wave the card near a reader, which then ensures whether the correct person is logging in and/or out.

**Advantages:**
1. Punch card attendance system prevents the proxy attendance and records the accurate in and/or out time of each employee.
2. Employees just need to punch their cards and their attendance along with the time gets recorded so in short manual intervention is not there which avoids any kind of misconception.
3. There is no scope of editing and manipulation in records so it keeps utmost transparency in the organization.

**Disadvantages:**
Like all good things come along with bad things, punch card attendance system also has a few disadvantages, it has a complex software and hardware and needs expensive machines to install.

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**Bio Metric Attendance**

Biometrics has unique recognizing features which are based on physical or behavioral traits of an individual.
Recognizing an individual on the basis of physical traits include identification based on his fingerprint, face, DNA, eyes, iris, palm, etc while behavioral traits identification refers to voice or rhythm recognition. Based on this technology different recognition systems have been designed depending on different traits.

**Fingerprint recognition system** - An automated method of verifying a match between human fingerprints. As fingerprint of every person is unique, it offers a very secure and reliable attendance monitoring. No buddy punching/ proxy attendance is possible.

**Face recognition** - Based on automatic identification and verification of face by digital image or video frame and matching it with facial database present in it software. Mainly used in security systems.

**Time and attendance Tracking technology** – Time and attendance technology helps the companies to keep a track on the attendance and working hours of the employee in order to make their payment. This technology has proved to be a real time and money saver for all types of business. This technology has replaced all the paper sheets and other manual systems at rapid speed. It has two types of systems. One is web-based and the other is PC-based. It depends on the type of business whether which system suits it.

### Requisites of a Good Time-keeping System:

A good time-keeping system should have following requisites:

1. System of time-keeping should be such which should not allow proxy for another worker under any circumstances.
2. There should also be a provision of recording of time of piece workers so that regular attendance and discipline may be maintained. This is necessary to maintain uniformity of flow of production.
3. Time of arrival as well as time of departure of workers should be recorded so that total time of workers may be recorded and wages may be calculated accordingly.
4. As far as possible, method of recording of time should be mechanical so that chances of disputes regarding time may not arise between workers and the time-keeper.
5. Late-comers should record late arrivals. Any relaxation by the time-keeper in this regard will encourage indiscipline.
6. The system should be simple, smooth and quick. Unnecessary queuing at the factory gate should be avoided. Sufficient clocks should be installed keeping in view the number
of workers so that workers may not have to wait for a long period for recording their time of arrivals and departures.

7. A responsible officer should pay frequent visits at the factory gate to see that proper method of recording of time is being followed.

**Time-Booking** - The clock card is required, essentially, for the correct determination of the amount of wages due to a worker on the basis of time he has put in the factory.

It merely records day by day and period by period the total time spent by each individual worker in the factory. But it does not show how that time was put to use in the factory—how an individual worker utilised his time in completing jobs entrusted to him and how long he was kept waiting for one reason or another due to lack of work, lack of material and supplies, lack of instructions, machine breakdowns, power failures and the like. These are all vital pieces of information necessary for the proper collection of cost data and for effective controlling of costs. For the collection of all such information, a separate record, generally known as Time (or Job) card, is kept.

The time (or job) card can be of two types—

- **One containing analysis of time with reference to each job**: A separate job card is employed in respect of a job undertaken; where a job involves several operations, a separate entry is made in respect of each operation.

  Thus the job card would record the total time spent on a particular job or operation. If a number of people are engaged on the same job or operation, the time of all those workers would be booked on the same card.

  One advantage of this method is that it provides complete data on the labour content of job or operation collectively so that the computation of labour cost is greatly facilitated.

  But this method has drawbacks as well. Since a worker’s job timing is scattered over a number of job cards the time spent on all these jobs and idle time must be abstracted periodically for finding each worker’s total time spent on different jobs and the time for which he remained idle during the period. The total of these two times (job and idle) must obviously equal his total attendance time, as shown by his clock card or attendance register.

  Thus, it would be seen that if the job cards are made out according to job or operation a separate summary has to be prepared for reconciling each worker’s job and idle time with his gate time. It would be quite obvious that such a reconciliation is of great importance from the point of view of labour costs.

- **The other with reference to each worker**: In this case, it would greatly facilitate reconciliation of the worker’s job time with his gate time.

  Under this system, a card would be issued to each worker for each day or for each week and the time which he spends on different jobs (and also any idle time) would be recorded in the same card so that the card would have a complete history on it as to how his time had been spent during the period. Since all the details would be on one card the total time accounted for in the job card would be readily tallied with the total time put in
3.10 Cost Accounting

the Gate Card or attendance register. In this case however, a Labour Abstract for
different jobs would have to be prepared from the card of individual worker so that total
hours (and/or their value) put in by different workers on different jobs during the period
could be ascertained and aggregated. It would thus be seen that according to either of
the method a process of abstraction and reconciliation is necessary

Specimens of two types of job cards are given below:

<table>
<thead>
<tr>
<th>JOB CARD (1st type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description ..........</td>
</tr>
<tr>
<td>Department ............</td>
</tr>
<tr>
<td>Worker’s Start Stop Elapsed Actual time Rate Amount</td>
</tr>
<tr>
<td>No. time taken</td>
</tr>
<tr>
<td>Supervisor’s initial</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JOB (OR TIME) CARD (2nd type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No..........................</td>
</tr>
<tr>
<td>Name of the worker ..........</td>
</tr>
<tr>
<td>Department..................</td>
</tr>
<tr>
<td>Operation...................</td>
</tr>
<tr>
<td>Job Start Stop Time Time Rate Amount</td>
</tr>
<tr>
<td>No. Elapsed</td>
</tr>
<tr>
<td>Supervisor’s initial</td>
</tr>
</tbody>
</table>

Reconciliation of gate and job cards - An advantage of the introduction of job card is that:-

i It enables a reconciliation to be made of the time spent by the worker in each
department with the time paid for as per the attendance record.

ii Reconciliation not only helps in locating wastage of time, but also in preventing dummy
workers being put on the payroll of workers paid for time not worked by them.

The two sets of records serve separate purposes.

Where payment to labour is on the time rate basis, the Gate Card is a record of the hours of
work that should be paid for. Since the Gate Card merely records the hours during which the
worker has been within the premises of the factory and it does not contain any details as to
how those hours have been put to use by the worker in his department, a job card must be prepared to provide the necessary information. As we have already seen, the job card may be prepared either worker-wise or job-wise.

**Objectives of Time-Booking** - Objectives of time-booking are as follows:

1. To ensure that time paid for, according to time keeping, has been properly utilised on different jobs or work orders.
2. To ascertain the cost of each job or work order.
3. To provide a basis for the apportionment of overhead expenses over various jobs/work orders when the method for the allocation of overhead depends upon time spent on different jobs.
4. To calculate the amount of wages and bonus payable under the wage incentive system.
5. To ascertain the labour hours spent on each job and the idle labour hours.

**3.4.2 Payroll procedure:** Steps included in this process are as under:

1. **Attendance and Time details:** A detailed sheet of number of days or hours worked by each employee (in case of time based payment) and units or percentage of work (in case...
3.12 Cost Accounting

of piece rate) as reflected by the time keeping methods are sent to the payroll department by the time keeping department. Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to the employees.

2. **List of employees and other details:** A list of employees on roll and the rate at which they will be paid is sent by the personnel/ HR department. Payroll department should ensure that no unauthorized person can paid.

3. **Computation of wages and other incentives:** Payroll department based on the details provided by the time keeping department and personnel department calculate wages/salary to be paid to the employees. Payroll department prepares pay slip for all employees authorized by the personnel department and forward the same to the cost/accounting department for further deductions and payment.

4. **Payment to the employees:** Cost/accounting department deduct all statutory deduction such as employee’s contribution to provident fund and employee state insurance (ESI) scheme, TDS on salary etc. After all deductions wages/salary is paid to the employees.

5. **Deposit of all statutory liabilities:** All statutory deduction made from the employees alongwith employer’s contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies.

6. **Investigation:** Should a clock card (attendance sheet) for an employee not listed on the payroll sheet be found, investigation of its propriety is required. Likewise, there should be an explanation for any missing clock cards deductions: After the gross earnings (that is, the total amount earned by an employee before any deductions are taken into consideration) have been calculated for every employee, deductions are entered on the payroll sheet, and the net pay of each employee is determined.

**The followings are generally deducted from the payroll**

<table>
<thead>
<tr>
<th>Type of deductions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statutory Deductions</strong></td>
<td></td>
</tr>
<tr>
<td>1. Provident fund</td>
<td>Employee’s contribution to the Provident fund is deducted from the salary/wages of the concerned employee. Employee’s contribution to the fund shall be equal to contribution payable by the employer.</td>
</tr>
<tr>
<td>2. Employee State Insurance Scheme (ESI)</td>
<td>Employee’s contribution to the ESI is deducted from the salary/wages. Currently, the employee’s contribution rate (w.e.f. 1.1.97) is 1.75% of the wages</td>
</tr>
<tr>
<td>3. Tax Deduction at Source (TDS)</td>
<td>Employer is obliged to deduct tax at source if it will be paying to the employee net salary exceeding maximum exemption</td>
</tr>
</tbody>
</table>
4. Professional Tax

In India, the professional tax is imposed at the state level. Business owners, working individuals, merchants and people carrying out various occupations comes under the purview of this tax. Professional tax is deducted based on predetermined slabs.

<table>
<thead>
<tr>
<th>Other Deductions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Voluntary contribution to Provident fund</td>
<td>If any employee so desires may contribute over and above the contribution payable by the employer.</td>
</tr>
<tr>
<td>2. Contribution to any benevolent fund.</td>
<td>An employee may contribute to any benevolent fund voluntarily by putting a request to the payroll department.</td>
</tr>
<tr>
<td>3. Loan deductions</td>
<td>Installments of any loan taken by the employee.</td>
</tr>
<tr>
<td>4. Other advances and dues</td>
<td>Other advances like festival advance and unadjusted advances taken.</td>
</tr>
</tbody>
</table>

### 3.5 Idle Time

It is a time during which no production is carried out because the worker remains idle even though they are paid. Idle time can be normal idle or abnormal idle time.

**Normal idle time**: It is the time which can not be avoided or reduced in the normal course of business.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The time lost between factory gate and the place of work</td>
<td>It 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.</td>
</tr>
<tr>
<td>2. The interval between one job and another</td>
<td>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</td>
</tr>
<tr>
<td>3. The setting up time for the machine</td>
<td></td>
</tr>
<tr>
<td>4. Normal fatigue etc.</td>
<td></td>
</tr>
</tbody>
</table>

**Abnormal idle time**: Apart from normal idle time, there may be factors which give rise to abnormal idle time.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Idle time may also arise due to abnormal factors like lack of coordination</td>
<td>Abnormal idle time cost is not included as a part of production cost and is shown as a separate item in the Costing Profit and Loss Account.</td>
</tr>
<tr>
<td>2. Power failure, Breakdown of machines</td>
<td></td>
</tr>
</tbody>
</table>

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3. Non-availability of raw materials, strikes, lockouts, poor supervision, fire, flood etc.

4. The causes for abnormal idle time should be further analysed into controllable and uncontrollable.
   
   i) **Controllable abnormal idle time** refers to that time which could have been put to productive use had the management been more alert and efficient. All such time which could have been avoided is controllable idle time.
   
   ii) **Uncontrollable abnormal idle time** refers to time lost due to abnormal causes, over which management does not have any control e.g., breakdown of machines, flood etc. may be characterised as uncontrollable idle time.

The cost of abnormal idle time should be further categorised into controllable and uncontrollable. For each category, the break-up of cost due to various factors should be separately shown. This would help the management in fixing responsibility for controlling idle time.

Management should aim at eliminating controllable idle time and on a long-term basis reducing even the normal idle time. This would require a detailed analysis of the causes leading to such idle time.

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**Illustration 1: (Calculation of effective hourly cost)**

‘X’ an employee of ABC Co. gets the following emoluments and benefits:

(a) Basic pay ₹ 1,000 p.m.

(b) Dearness allowance ₹ 200 p.m.

(c) Bonus 20% of salary and D.A.

(d) Other allowances ₹ 250 p.m.

(e) Employer’s contribution to P.F. 10% of salary and D.A.

‘X’ works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to find out the effective hourly cost of employee ‘X’.

**Solution**

**Statement showing computation of effective hourly cost of employee ‘X’**

(i) **Earning of Employee ‘X’**:

<table>
<thead>
<tr>
<th></th>
<th>Per month</th>
<th>Per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic pay</td>
<td>₹ 1,000</td>
<td>₹ 12,000</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Allowance</th>
<th>Amount 1</th>
<th>Amount 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dearness Allowance</td>
<td>200</td>
<td>2,400</td>
</tr>
<tr>
<td>Bonus</td>
<td>240</td>
<td>2,880</td>
</tr>
<tr>
<td>Employer’s contribution to provident fund</td>
<td>120</td>
<td>1,440</td>
</tr>
<tr>
<td>Other allowance</td>
<td>250</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,810</strong></td>
<td><strong>21,720</strong></td>
</tr>
</tbody>
</table>

(ii) Effective working hours:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual working hours</td>
<td>2,400</td>
</tr>
<tr>
<td>Less: Normal idle time</td>
<td>400</td>
</tr>
<tr>
<td>Effective working hours</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Effective hourly cost of ‘X’ = ₹21,720/2,000 = 10.86

### 3.6 Overtime

**Overtime premium:** 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.

*As per the Factories Act 1948 *Where a worker works in a factory for more than nine hours in any day or for more than fortyeight hours in any week, he shall, in respect of overtime work, be entitled to wages at the rate of twice his ordinary rate of wages.*"

Where any workers in a factory are paid on a piece-rate basis, the time rate shall be deemed to be equivalent to the daily average of their full-time earnings for the days on which they actually worked on the same or identical job during the month immediately preceding the calendar month during which the overtime work was done, and such time rates shall be deemed to be the ordinary rates of wages of those workers.

**Ordinary rate of wages** means the basic wages plus such allowances, including the cash equivalent of the advantage accruing through the concessional sale to workers of food grains and other articles, as the worker is for the time being entitled to, but does not include a bonus and wages for overtime work.

Occasional overtime is a healthy sign since it indicates that the firm has the optimum capacity and that the capacity is being fully utilised. But persistent overtime is rather a bad sign because it may indicate either (a) that the firm needs larger capacity in men and machines, or (b) that men have got into the habit of postponing their ordinary work towards the evening so that they can earn extra money in the form of overtime wages.

*Causes overtime and treatment of overtime premium in cost accounting*
### Causes and Treatment of Overtime

<table>
<thead>
<tr>
<th>Causes</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) The customer may agree to bear the entire charge of overtime because of urgency of work.</td>
<td>(1) If overtime is resorted to at the desire of the customer, then overtime premium may be charged to the job directly.</td>
</tr>
<tr>
<td>(2) Overtime may be called for to make up any shortfall in production due to some unexpected development.</td>
<td>(2) If overtime is required to cope with general production programmes or for meeting urgent orders, the overtime premium should be treated as overhead cost of the particular department or cost centre which works overtime.</td>
</tr>
<tr>
<td>(3) Overtime work may be necessary to make up a shortfall in production due to some fault of management.</td>
<td>(3) If overtime is worked in a department due to the fault of another department, the overtime premium should be charged to the latter department.</td>
</tr>
<tr>
<td>(4) Overtime work may be resorted to, to secure an out-turn in excess of the normal output to take advantage of an expanding market or of rising demand</td>
<td>(4) Overtime worked on account of abnormal conditions such as flood, earthquake etc., should not be charged to cost, but to Costing Profit and Loss Account.</td>
</tr>
</tbody>
</table>

**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 costs of production.
5. Gives rise to associated costs. (wear and tear of machinery, power etc.)

**Steps for controlling overtime:** To keep overtime to its minimum, it is necessary to exercise proper control over the overtime work. The suitable procedure which may be adopted for controlling overtime comprises the following steps:
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 be prepared along with justifications, at appropriate places for putting up before the 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 workers in respect of overtime.

Illustration 2: (Calculation of earnings)

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:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Basic Wages</td>
<td>₹100</td>
</tr>
<tr>
<td>(ii)</td>
<td>Dearness Allowance</td>
<td>50%</td>
</tr>
<tr>
<td>(iii)</td>
<td>Contribution to provident Fund (on basic wages)</td>
<td>8%</td>
</tr>
<tr>
<td>(iv)</td>
<td>Contribution to Employee’s State Insurance (on basic wages)</td>
<td>2%</td>
</tr>
<tr>
<td>(v)</td>
<td>Overtime</td>
<td>Hours 10</td>
</tr>
</tbody>
</table>

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 rates with employees contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

<table>
<thead>
<tr>
<th></th>
<th>Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Worker A</td>
<td>40%</td>
</tr>
<tr>
<td>Worker B</td>
<td>50%</td>
</tr>
</tbody>
</table>

Overtime was done on job Y.
3.18 Cost Accounting

Answer

Statement showing Earnings of Workers A and B

<table>
<thead>
<tr>
<th>Workers</th>
<th>A (₹)</th>
<th>B (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Wages</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>Dearness Allowance (50% of Basic Wages)</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>Overtime Wages (Refer to Working Note 1)</td>
<td>15</td>
<td>--</td>
</tr>
<tr>
<td>Gross Wages earned</td>
<td>165</td>
<td>240</td>
</tr>
</tbody>
</table>

Less: Provident Fund – 8% of Basic Wages
– ESI – 2% of Basic Wages = Total 10% of basic Wages
Net Wages paid 155 224

Statement of Labour Cost

| Gross Wages (excluding overtime) | 150   | 240   |
| Employers contribution to P.F. and E.S. I. | 10    | 16    |
| | 160   | 256   |
| Ordinary wages Labour Rate per hour | 0.80  | 1.28  |
| | (₹ 160/200) | (₹ 256/200) |

Statement Showing Allocation of Wages to Jobs

<table>
<thead>
<tr>
<th>Total Wages: (₹)</th>
<th>X (₹)</th>
<th>Y (₹)</th>
<th>Z (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary Wages (4:3:3)</td>
<td>160</td>
<td>64</td>
<td>48</td>
</tr>
<tr>
<td>Overtime</td>
<td>15</td>
<td>--</td>
<td>15</td>
</tr>
<tr>
<td>Worker B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary Wages(5:2:3)</td>
<td>256</td>
<td>128</td>
<td>51.20</td>
</tr>
<tr>
<td></td>
<td>431</td>
<td>192</td>
<td>114.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>124.8</td>
</tr>
</tbody>
</table>

Working Notes

1. Normal Wages are considered as basic wages

\[
\text{Over time} = \frac{2 \times (\text{Basic wage} + \text{DA}) \times 10 \text{ hours}}{200} = \frac{2 \times (\frac{150}{200}) \times 10 \text{ hours}}{1.50 \times 10 \text{ hours}} = \frac{15}{16}
\]
Illustration 3: (Calculation of overtime premium)

It is seen from the job card for repair of the customer’s equipment that a total of 154 labour hours have been put in as detailed below:

<table>
<thead>
<tr>
<th>Worker</th>
<th>Monday (hours)</th>
<th>Tuesday (hours)</th>
<th>Wednesday (hours)</th>
<th>Thursday (hours)</th>
<th>Friday (hours)</th>
<th>Saturday (hours)</th>
<th>Total (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘A’</td>
<td>10.5</td>
<td>8.0</td>
<td>10.5</td>
<td>9.5</td>
<td>10.5</td>
<td>----</td>
<td>49.0</td>
</tr>
<tr>
<td>‘B’</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>48.0</td>
</tr>
<tr>
<td>‘C’</td>
<td>10.5</td>
<td>8.0</td>
<td>10.5</td>
<td>9.5</td>
<td>8.0</td>
<td>8.0</td>
<td>57.0</td>
</tr>
</tbody>
</table>

In terms of an award in a labour conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ ₹ 968 for the relevant month. The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 4 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 4 hours worked).

Workers are paid overtime according to the Factories Act, 1948. Excluding holidays the total number of hours works out to 176 in the relevant month. The company’s contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads.

Work out the wages payable to each worker.

Solution

(1) Calculation of hours to be paid for worker A:

<table>
<thead>
<tr>
<th>Normal hours</th>
<th>Extra hours</th>
<th>Overtime hours</th>
<th>Equivalent normal hours for overtime worked</th>
<th>Total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>Tuesday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Wednesday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>Thursday</td>
<td>8</td>
<td>1</td>
<td>½</td>
<td>10</td>
</tr>
<tr>
<td>Friday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>Saturday</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>4</td>
<td>5</td>
<td>54</td>
</tr>
</tbody>
</table>
3.20 Cost Accounting

Calculation of hours to be paid for worker B:

<table>
<thead>
<tr>
<th></th>
<th>Normal hours</th>
<th>Extra hours</th>
<th>Overtime hours</th>
<th>Equivalent normal hours for overtime worked</th>
<th>Total normal hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Tuesday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Wednesday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Thursday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Friday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Saturday</td>
<td>4</td>
<td>4*</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>4</td>
<td>---</td>
<td>---</td>
<td>48</td>
</tr>
</tbody>
</table>

(*Worker-B has neither worked more than 9 hours in any day nor more than 48 hours in the week)

Calculation of hours to be paid for worker C:

<table>
<thead>
<tr>
<th></th>
<th>Normal hours</th>
<th>Extra hours</th>
<th>Overtime hours</th>
<th>Equivalent normal hours for overtime worked</th>
<th>Total normal hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Tuesday</td>
<td>8</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>8</td>
</tr>
<tr>
<td>Wednesday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Thursday</td>
<td>8</td>
<td>1</td>
<td>½</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Friday</td>
<td>8</td>
<td>1</td>
<td>1½</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Saturday</td>
<td>4</td>
<td>---</td>
<td>4*</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>4</td>
<td>9</td>
<td>18</td>
<td>66</td>
</tr>
</tbody>
</table>

(*Worker-C has worked more than 48 hours in the week)

(a) Wages payable:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Wages per hour (₹)</td>
<td>25.00</td>
<td>12.50</td>
<td>37.50</td>
</tr>
<tr>
<td>Dearness allowance per hour (₹)</td>
<td>5.50</td>
<td>5.50</td>
<td>5.50</td>
</tr>
<tr>
<td>Hourly rate (₹)</td>
<td>30.50</td>
<td>18.00</td>
<td>43.00</td>
</tr>
<tr>
<td>Total normal hours</td>
<td>54.0</td>
<td>48.0</td>
<td>66.0</td>
</tr>
<tr>
<td>Total Wages payable (₹)</td>
<td>1,647.00</td>
<td>864.00</td>
<td>2,838</td>
</tr>
</tbody>
</table>

Illustration 4: (Calculation of labour cost chargeable to a job)

In a factory, the basic wage rate is ₹ 10 per hour and overtime rates are as follows:
Labour 3.21

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before and after normal working hours</td>
<td>175% of basic wage rate</td>
</tr>
<tr>
<td>Sundays and holidays</td>
<td>225% of basic wage rate</td>
</tr>
<tr>
<td>During the previous year, the following hours were worked</td>
<td></td>
</tr>
<tr>
<td>Normal time</td>
<td>1,00,000 hours</td>
</tr>
<tr>
<td>Overtime before and after working hours</td>
<td>20,000 hours</td>
</tr>
<tr>
<td>Overtime on Sundays and holidays</td>
<td>5,000 hours</td>
</tr>
<tr>
<td>Total</td>
<td>1,25,000 hours</td>
</tr>
</tbody>
</table>

The following hours have been worked on job ‘Z’:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1000 hours</td>
</tr>
<tr>
<td>Overtime before and after working hrs.</td>
<td>100 hours</td>
</tr>
<tr>
<td>Sundays and holidays</td>
<td>25 hours</td>
</tr>
<tr>
<td>Total</td>
<td>1125 hours</td>
</tr>
</tbody>
</table>

You are required to calculate the labour cost chargeable to job ‘Z’ and overhead in each of the following instances:

(a) Where overtime is worked regularly throughout the year as a policy due to the labour shortage.

(b) Where overtime is worked irregularly to meet the requirements of production.

(c) Where overtime is worked at the request of the customer to expedite the job.

**Solution**

**Workings**

**Computation of average inflated wage rate (including overtime premium):**

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic wage rate</td>
<td>₹ 10 per hour</td>
</tr>
<tr>
<td>Overtime wage rate before and after working hours</td>
<td>₹ 10 × 175% = ₹ 17.50 per hour</td>
</tr>
<tr>
<td>Overtime wage rate for Sundays and holidays</td>
<td>₹ 10 × 225% = ₹ 22.50 per hour</td>
</tr>
<tr>
<td>Annual wages for the previous year for normal time</td>
<td>1,00,000 hrs. × ₹ 10 = ₹ 10,00,000</td>
</tr>
<tr>
<td>Wages for overtime before and after working hours</td>
<td>20,000 hrs. × ₹ 17.50=₹ 3,50,000</td>
</tr>
<tr>
<td>Wages for overtime on Sundays and holidays</td>
<td>5,000 hrs. × ₹ 22.50 = ₹ 1,12,500</td>
</tr>
<tr>
<td>Total wages for 1,25,000 hrs.</td>
<td>₹ 14,62,500</td>
</tr>
</tbody>
</table>

Average inflated wage rate = \(\frac{₹14,62,500}{1,25,000\text{ hours}} = ₹ 11.70\)

(a) **Where overtime is worked regularly as a policy due to labour shortage**, the overtime premium is treated as a part of labour cost and job is charged at an inflated wage rate.
3.22 Cost Accounting

Hence,

Labour cost chargeable to job Z = Total hours × Inflated wage rate
= 1,125 hrs. × ₹ 11.70 = ₹ 13,162.50

(b) Where overtime is worked irregularly to meet the requirements of production, basic wage rate is charged to the job and overtime premium is charged to factory overheads as under:

Labour cost chargeable to
Job Z: 1,125 hours @ ₹ 10 per hour = ₹ 11,250.00
Factory overhead: 100 hrs. × ₹ (17.50 – 10) = ₹ 750.00
25 hrs. × ₹ (22.50 – 10) = ₹ 312.50
Total factory overhead = ₹ 1,062.50

(c) Where overtime is worked at the request of the customer, overtime premium is also charged to the job as under:

Job Z labour cost 1,125 hrs. @ ₹ 10 = 11,250.00
Overtime premium 100 hrs. @ ₹ (17.50 – 10) = 750.00
25 hrs. @ ₹ (22.50 – 10) = 312.50
Total = 12,312.50

3.7 Labour Turnover

Labour turnover in an organisation 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 locality or the labour turnover rate for a past period may be taken as the index or norm against which actual turnover rate is compared.

There are three methods of calculating labour turnover which are given below:

(i) Replacement method: This method takes into consideration actual replacement of labour irrespective of number of persons leaving

\[
\text{Replacement method} = \frac{\text{Number of employees replaced}}{\text{Average number of employees on roll}} \times 100
\]

New labour appointed on account of expansion not to be included in number of replacements

(ii) Separation method: In this method labour turnover is measured by dividing the total number of separations during the period by the average total number of workers on payroll during the same period
(iii) **Flux method:** This method takes into account both the number of replacements as well as the number of separations during the period

\[
\text{Flux method} = \frac{\text{Number of employees separated} + \text{Number of employees replaced}}{\text{Average number of employees on roll during the period}} \times 100
\]

**Labour turnover due to new recruitment:** Workers joining a business concern on account of its expansion do not account for labour turnover. But these newly recruited workers are certainly responsible for a change in the composition of labour force, due to this feature, some cost accountants measure workers to the extent of new (excluding replacements) joining the labour force as follows:

\[
\Rightarrow \frac{\text{No. of new workers joining in a period (excluding replacements)}}{\text{Average number of workers on the roll in a period}} \times 100
\]

The total number of workers joining, including replacements, is called **accessions.** The labour turnover rate, in such a case, may also be computed in respect of total number of workers joining (accessions) the business concern, during a given period both on account of replacements and because of expansion as under:

\[
\Rightarrow \frac{\text{No. of accessions in a period}}{\text{Average number of workers in a period}} \times 100
\]

When number of accessions are considered for measuring labour turnover, the labour turnover rate by flux method may be computed by using any one of the following expressions:

**Labour turnover rate (Flux method) =**

\[
\frac{\text{No. of separations} + \text{No. of replacements} + \text{No. of new recruitments}}{\text{Average number of workers}} \times 100
\]

\[
\text{OR} \quad \frac{\text{No. of separations} + \text{No. of accessions}}{\text{Average number of workers}} \times 100
\]

The above rate of labour turnover indicates the total effect of number of workers separated, number of workers replaced and number of new workers recruited and joined the concern on account of its expansion, etc.

If in the above computations, the data given is for a period other than a year, the labour turnover rate so computed may be converted into equivalent annual labour turnover rate by the following formula:
Equivalent annual labour turnover rate = \frac{\text{Turnover rate for the period}}{\text{Number of days in the period}} \times 365

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

(a) **Personal Causes**;
(b) **Unavoidable Causes**; and
(c) **Avoidable Causes**.

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

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

In all the above cases the employee leaves the organization at his will and, therefore, it is difficult to suggest any possible remedy in the first three cases.

But the last one can be overcome by creating conditions leading to a healthy working environment. For this, officers should play a positive role and make sure that their subordinates work under healthy working conditions.

*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 organization; 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;
(vi) Marriage (generally in the case of women).

*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:

(1) Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,
(2) Strained relationship with management, supervisors or fellow workers;
(3) Lack of training facilities and promotional avenues;
(4) Lack of recreational and medical facilities;
(5) Low wages and allowances.

Proper and timely management action can reduce the labour turnover appreciably so far as avoidable causes are concerned.

**Effects of Labour Turnover:** High labour turnover increases the cost of production in the following ways:

(i) Even flow of production is disturbed;
(ii) Efficiency of new workers is low; productivity of new but experienced workers is low in the beginning;
(iii) There is increased cost of training and induction;
(iv) New workers cause increased breakage of tools, wastage of materials, etc.

In some companies, the labour turnover rates are as high as 100%; it means that on the average, all the work is being done by new and inexperienced workers. This is bound to reduce efficiency and production and increases the cost of production.

(v) Cost of recruitment and training increases.

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

(a) **Preventive costs:** These include costs incurred to keep the labour turnover at a low level, *i.e.* cost of medical services, welfare schemes and pension schemes. If a company incurs high preventive costs, the rate of labour turnover is usually low.

(b) **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 good work, additional costs will have to be incurred on new workers, *i.e.*, cost of employment, training and induction, abnormal breakage and scrap and extra wages and overheads due to the inefficiency of 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, work out the optimum level of labour turnover keeping in view its personnel policies and the behaviour of replacement cost and preventive costs at various levels of labour turnover rates.

**Remedial Steps To Minimise Labour Turnover** - The following steps are useful for minimising labour turnover.

1. **Exit interview:** An interview be arranged with each outgoing employee to ascertain the reasons of his leaving the organisation.

2. **Job analysis and evaluation:** Before recruiting workers, job analysis and evaluation may be carried out to ascertain the requirements of each job.
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3. **Scientific system of recruitment, placement and promotion:** The organisation should make use of a scientific system of recruitment, selection, placement and promotion for employees.

4. **Enlightened attitude of management:** The management should introduce the following steps for creating a healthy working atmosphere:

   (i) Service rules should be framed, discussed and approved among management and workers, before their implementation.

   (ii) Provide facilities for education and training of workers.

   (iii) Introduce a procedure for settling worker’s grievances.

5. **Use of committee:** Issues like control over workers, handling their grievances etc., may be dealt by a committee, comprising of members from management and workers.

**Illustration 5: (Calculation of cost of labour turnover)**

The management of Bina and Rina Ltd. are worried about their increasing labour turnover in the factory and before analyzing the causes and taking remedial steps, they want to have an idea of the profit foregone as a result of labour turnover in the last year.

Last year sales amounted to ₹ 83,03,300 and P/V ratio was 20 per cent. The total number of actual hours worked by the Direct Labour force was 4.45 Lakhs. As a result of the delays by the Personnel Department in filling vacancies due to labour turnover, 1,00,000 potentially productive hours were lost. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive.

The costs incurred consequent on labour turnover revealed, on analysis, the following:

- Settlement cost due to leaving: ₹ 43,820
- Recruitment costs: ₹ 26,740
- Selection costs: ₹ 12,750
- Training costs: ₹ 30,490

Assuming that the potential production lost as a consequence of labour turnover could have been sold at prevailing prices, find the profit foregone last year on account of labour turnover.

**Solution**

**Determination of contribution foregone**

<table>
<thead>
<tr>
<th>Actual hours worked (given)</th>
<th>4,45,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less : Unproductive training hours</td>
<td>15,000</td>
</tr>
<tr>
<td>Actual productive hours</td>
<td>4,30,000</td>
</tr>
</tbody>
</table>

The potentially productive hours lost are 1,00,000.
Sales lost for 1,00,000 hours = ₹ 83,03,300 \times \frac{1,00,000 \text{ hrs}}{4,30,000 \text{ hrs}} = ₹ 19,31,000

Contribution lost for 1,00,000 hrs.

\[= \frac{₹ 19,31,000}{100} \times 20 = ₹ 3,86,200\]

Statement showing profit foregone last year on account of labour turnover of Bina and Rina Ltd.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution foregone (as calculated above)</td>
<td>3,86,200</td>
</tr>
<tr>
<td>Settlement cost due to leaving</td>
<td>43,820</td>
</tr>
<tr>
<td>Recruitment cost</td>
<td>26,740</td>
</tr>
<tr>
<td>Selection cost</td>
<td>12,750</td>
</tr>
<tr>
<td>Training costs</td>
<td>30,490</td>
</tr>
<tr>
<td>Profit foregone</td>
<td>5,00,000</td>
</tr>
</tbody>
</table>

Illustration 6: (Calculation of workers recruited, joined and discharged)

The Cost Accountant of Y Ltd. has computed labour turnover rates for the quarter ended 31st March, 2011 as 10%, 5% and 3% respectively under ‘Flux method’, ‘Replacement method’ and ‘Separation method’ respectively. If the number of workers replaced during that quarter is 30, find out the number of:

(1) workers recruited and joined and (2) workers left and discharged.

Solution

Working Note:

Average number of workers on roll:

Labour turnover rate under replacement method = \frac{\text{No. of replacements}}{\text{Average number of workers on roll}} \times 100

Or, \frac{5}{100} = \frac{30}{\text{Average number of workers on roll}}

Or Average number of workers on roll = \frac{30 \times 100}{5} = 600

(1) Number of workers recruited and joined:

Labour turnover rate (Flux method) = \frac{\text{No. of separations} \times (S) + \text{No. of accessions(A)}}{\text{Average number of workers on roll}} \times 100

Or \frac{10}{100} = \frac{18 \times A}{600}
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Or \[ A = \begin{bmatrix} 6000 \\ 100 \\ -18 \end{bmatrix} = 42 \]

No. of workers recruited and joined 42.

(2) Number of workers left and discharged:

Labour turnover rate (Separation method) = \( \frac{\text{No. of separations}(S)}{\text{Average number of workers on roll}} \times 100 \)

\[ \frac{3}{100} = \frac{S}{600} \]

Or \[ S^* = 18 \]

Hence, number of workers left and discharged comes to 18.

3.8 Incentive System

3.8.1 Important factors necessary for introducing an incentive system: An incentive can be defined as the stimulation for effort and effectiveness by offering monetary inducement or enhanced facilities. It may be provided individually or collectively.

It may be monetary in the form of a bonus where the employee gets a reward for his efforts directly or non-monetary tending to improve living and working conditions where a group of employees or individuals share the reward arising out of their combined effort in equitable production.

The main factors that should be taken into account before introducing a scheme of incentives are stated below:

(i) System of Quality Control: The need for producing goods of high quality or those having very good workmanship or finish and the manner this can be ensured. Only if a system of quality control can be relied upon to maintain the quality of goods of the standard required, an incentive scheme should be introduced; otherwise, workers should be paid on time basis.

(ii) Maxime production: The need to maximise production—thus required incentives to be given to workers. But sometimes workmanship is more important than quantity of output; in such cases, incentive schemes of wage payment are not suitable.

(iii) Precision in measuring quantity of Work: Where the quantity of work done cannot be measured precisely, incentive schemes cannot be offered.

(iv) Role of Management in Incentive Schemes: The role of management and workers in achieving greater efficiency, if it is unnecessary for the management to constantly plan work, for example, when the work is repetitive, workers should be offered good incentives to achieve high efficiency; but in case management is constantly required to plan the work, as in the case of job work, the management should share the fruits of extra efficiency achieved. This factor determines the choice of a particular incentive scheme.
(v) **Effort of Workers:** Whether the quantity of output is within the control of the worker and if so, to what extent. Sometimes, as in the case of chain assembly work the output is not dependent on the effort put in by workers; incentive schemes in such cases are not suitable.

(vi) **Standards of Performance:** The exactitude with which standards of performance can be laid down. Fixation of standard is necessary for the introduction of a scheme of incentives. When this requires heavy expenditure, incentive schemes may be rather costly.

(vii) **No Discrimination:** The effect of an incentive scheme for one set of workers on other workers. If for instance, an incentive scheme makes it possible for unskilled workers to earn high wages, the wage rates for skilled workers must also be raised (if they are paid on time basis) to avoid dissatisfaction among them. In that event, the incentive scheme may raise labour cost instead of lowering it.

(viii) **Comparative Study:** The system of wage payment prevailing in other areas and industries or similar occupations. If possible, there should be uniformity.

(ix) **Attitude of Workers:** The attitude of labour and trade unions towards incentive schemes. Workers usually like to have a certain guaranteed time-basis wage but also like to earn extra through an incentive scheme.

On the whole, the system of wage payment should be such as would increase production without lowering quality. This will increase the surplus and will enable the employer to pay higher wages which, in turn, will lead to higher output.

### 3.8.2 Main principles for a sound system of wage incentive

The objective of wage incentives is to improve productivity and increase production so as to bring down the unit cost of production.

In order to make the incentive scheme effective and useful, the following general principles have to be considered while designing a sound system of wage incentives.

(i) **Just and Fair:** The reward for a job should be linked with the effort involved in that job and the scheme should be just and fair to both employees and employers. This involves the following:

   (a) The standard required of the workers should be carefully set, if possible through proper time and motion studies.

   (b) If the work is of repetitive type, the entire benefit of the time saved should be available to the worker but, in the case of non-standardised work or where precise standards cannot be set, the benefit of the time saved, if any, should be shared by the employer, the supervisor and the worker.

(ii) **Well defined scheme:** The scheme should be clearly defined and be capable of being understood by the employees easily. The standards set should be such that they can be
achieved even by average employees. While standards are being set, the workers concerned should be consulted.

(iii) **Worker’s Expectations:** As far as possible, no limit should be placed on the amount of additional earnings; otherwise it will dampen the initiative of the workers. In this regard, what is important is not what actually prevails but what the workers think—if they think, even wrongly, that the employer will stop wages from rising beyond a certain limit, the incentive scheme may not be really effective.

(iv) **Stability:** The scheme should be reasonable and stable, and should not be changed or modified too often without consulting the employees.

(v) **Charge on employees:** The scheme should take care that the employees are not penalised for reasons beyond their control.

(vi) **Incentive based on quality:** The scheme should provide for inspection of output so that only good pieces qualify for incentives. It would even be better not to introduce any incentive scheme if workmanship is of vital importance in sales.

(vii) **Adequate Resources:** The management should ensure that there is no cause for complaint by the workers that they are sitting idle, say for want of tools or materials. Management has to see that there is, as far as practicable, no interruption of production.

(viii) **Limited Costs:** The operation of the scheme should not entail heavy clerical costs. In fact the scheme should facilitate the introduction of budgetary control and standard costing.

(ix) **Morale booster:** It should be capable of improving the morale of the employees and it should be in conformity with the local trade union agreements and other government regulations.

(x) **Guaranteed wages:** There should be a guaranteed wage on time basis which generally works as a good psychological boost to incentive scheme.

(xi) **Equality in payment:** the effect of incentive scheme on those who cannot be covered should be gauged and taken note of. Sometimes, highly skilled workers have perforce to be paid on time basis whereas semiskilled or unskilled workers may be put on incentive scheme. If the latter earn more than former, the incentive schemes on the whole prove harmful.

**Essential characteristics of a good incentive system:** to recapitulate

(i) It should be just both to the employer and to the employee. It should be positive and not unnecessarily punitive and so operated as to promote confidence.

(ii) It should be strong both ways i.e. it should have a standard task and a generous return. The latter should be in direct proportion to employee’s efforts. It should reflect the employer’s contribution to the success of the company.

(iii) It should be unrestricted as to the amount of the earning.

(iv) It should be reasonable, apart from being simple, for employee to figure out his incentive in relation to his individual performance, as far as practicable.

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(v) It should be flexible and intimately related to other management controls.

(vi) It should automatically assist supervision and, when necessary, aid team work.

(vii) It should have employee’s support and in no way should it be paternalistic.

(viii) It should have managerial support in so far as production material, quality control, maintenance and non-financial incentives are concerned.

(ix) It should not be used temporarily and dropped in recession times as means of wage reduction.

(x) There should be correct measurement of the effort made for incentive purpose. Measurement of effort is made by time and motion study and based on job evaluation; the rates of wages are fixed for different operations.

### 3.9 Labour Utilisation

For identifying utilisation of labour a statement is prepared (generally weekly) for each department / cost centre. This statement should show the actual time paid for, the standard time (including normal idle time) allowed for production and the abnormal idle time analysed for causes thereof.

#### 3.9.1 Identification of utilisation of labour with cost centres

For the identification of utilisation of labour with the cost centre a wage analysis sheet is prepared.

*Wage analysis sheet* is a columnar statement in which total wages paid are analysed according to cost centre, jobs, work orders etc. The data for analysis is provided by wage sheet, time card, piece work cards and job cards.

The preparation of such sheet serves the following purposes:

(i) It analyse the labour time into direct and indirect labour by cost centres, jobs, work orders.

(ii) It provides details of direct labour cost comprises of wages, overtime to be charged as production cost of cost centre, jobs or work orders.

(iii) It provides information for treatment of indirect labour cost as overhead expenses.

#### Wage Analysis Sheet

<table>
<thead>
<tr>
<th>No. week-ending</th>
<th>Department/ cost centre</th>
<th>Total Work in progress</th>
<th>Factory Overhead control A/c</th>
<th>Administration Overhead control A/c</th>
<th>Selling &amp; Distribution overhead control A/c</th>
</tr>
</thead>
</table>

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3.9.2 Identification of labour hours with work order or batches or capital job: For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted:

(i) The direct labour hours can be identified with the particular work order or batches or capital job or overhead work orders on the basis of details recorded on source document such as time sheet or job cards.

(ii) The indirect labour hours cannot be directly identified with the particular work order or batches or capital jobs or overhead work orders. Therefore, they are traced to cost centre and then assigned to work order or batches or capital jobs or overhead work orders by using overhead absorption rate.

3.10 Systems of Wage Payment and Incentives

There exist several systems of employee wage payment and incentives, which can be classified under the following heads:

The formulas for different wage payment and incentive systems are given below:

SYSTEMS OF WAGE PAYMENT & INCENTIVES

- Time Rate Systems
  - High Wage Plan
  - Measured Day Work
  - Differential Time Rate
  - Straight Piece Work
  - Differential Piece Work
    - Tylor System
    - Merrick System
    - Emerson’s efficiency System

- Payment by Results
  - Combin ation of time and Piece Work
  - Premium Bonus Methods
  - Group system of wage payment
  - System Incentive Schemes for Indirect Workers
    - Halsey and Halsey Weir Systems
    - Rowan System
    - Barth System
  - Accelerated Premium system

- Beadaux Syst.
- Haynes Syst.
1 **Time Rate System**

Earnings = Hours worked × Rate per hour

2 **Straight Piece Rate System**

Earnings = Number of units × Piece rate per unit

3 **Differential piece Rate System**

3.1 **F.W. Taylor’s System**

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100%</td>
<td>83% of the normal piece rate or 80% of piece rate when below standard</td>
</tr>
<tr>
<td>Either 100% or more than 100%</td>
<td>125% of the normal piece rate or 120% of piece rate when at or above standard</td>
</tr>
</tbody>
</table>

3.2 **Merrick Differential Piece Rate System**

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 83%</td>
<td>Ordinary piece rate</td>
</tr>
<tr>
<td>83% to 100%</td>
<td>110% of ordinary piece rate (10% above the ordinary piece rate)</td>
</tr>
<tr>
<td>Above 100%</td>
<td>120% or 130% of ordinary piece rate (20% to 30% of ordinary piece rate)</td>
</tr>
</tbody>
</table>

4 **Combination of Time and Piece Rate**

4.1 **Gantt Task and Bonus System**

<table>
<thead>
<tr>
<th>Output</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output below standard</td>
<td>Guaranteed time rate</td>
</tr>
<tr>
<td>Output at standard</td>
<td>120% of time rate</td>
</tr>
<tr>
<td>Output above standard</td>
<td>120% of piece rate</td>
</tr>
</tbody>
</table>

4.2 **Emerson Efficiency System**

Earning is calculated as follows:

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 66-2/3%</td>
<td>No bonus, only guaranteed time rate is paid.</td>
</tr>
<tr>
<td>66-2/3% to 100%</td>
<td>Worker is paid by hourly rate for the time he actually worked plus in increase in bonus according to degree of efficiency on the basis of step bonus rates. Bonus rate can be up to 20%.</td>
</tr>
<tr>
<td>Above 100%</td>
<td>120% of time wage rate plus additional bonus of 1% for each 1% increase in efficiency.</td>
</tr>
</tbody>
</table>

4.3 **Bedaux Point System**

Earnings = Hours worked × Rate per hour +
4.4 **Haynes Manit Systems**
This system is similar to Bedaux Point system. Instead of Bedaux 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

4.5 **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

5 **Premium Bonus Plan**

5.1 **Halsey Premium Plan**

\[ \text{Earnings} = \text{Hours worked} \times \text{Rate per hour} + \left( \frac{50}{100} \times \text{Time saved} \times \text{Rate per hour} \right) \]

5.2 **Halsey-Weir Premium Plan**

\[ \text{Earnings} = \text{Hours worked} \times \text{Rate per hour} + \left( \frac{30}{100} \times \text{Time saved} \times \text{Rate per hour} \right) \]

5.3 **Rowan System**

\[ \text{Earnings} = \text{Hours worked} \times \text{Rate per hour} + \left( \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour} \right) \]

5.4 **Barth Sharing Plan**

\[ \text{Earnings} = \text{Rate per hour} \times \sqrt{\text{Standard hours} \times \text{Hours worked}} \]
### 5.5 Scanlan Plan

Bonuses Percentage = \( \frac{\text{Average Annual Salaries and Wages}}{\text{Average Annual Sales Revenue}} \)

One should remember that Provident Fund, Employees State Insurance Scheme Premium and bonus are payable on the basic wages, dearness allowance and value of food concession.

#### 3.10.1 Time Rate System

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Suitability</th>
</tr>
</thead>
</table>
| Under this system, the worker is paid by the hour, day, week, or month. The amount of wages due to a worker are arrived at by multiplying the time worked (as shown by the gate card) by the appropriate time rate. | (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. |

#### Merits

(i) Simple to understand and to calculate wages.  
(ii) Reduces temptation on the part of workers to increase the output at the cost of quality.  
(iii) Unity in labour, no distinction between efficient and inefficient labour due to quality of production.  
(iv) Stability in wages

#### Demerits

(i) No monetary incentive to raise the level of production.  
(ii) No distinction between the slow and the efficient worker.  
(iii) The tendency is for the fall in output; this raises the cost per unit (because both labour and fixed expenses will be spread over a smaller number of units).  
(iv) A firm cannot be sure of labour costs per unit under this method and, hence, may suffer a loss on quotations if already submitted.

#### 3.10.1 (i) High wage plan:

This plan was first introduced by Ford Motor Company (in USA) in order to induce workers to exercise extra effort in their work.

Under this plan a worker is paid a wage rate which is substantially higher than the rate prevailing in the area or in the industry. In return, he is expected to maintain a very high level
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of performance, both quantitative and qualitative. As a result, high rate men are not as costly or expensive as they might appear at first sight.

High wage plan is suitable where high quality of work and also increased productivity are required.

The advantage which may accrue from the implementation of this plan are:

1. It is simple and inexpensive to operate.
2. It helps in attracting highly skilled and efficient workers by providing suitable incentive.
3. It reduces the extent of supervision.
4. Increased productivity may result in reduction of unit labour cost.

3.10.1. (ii) Measured day work: According to this method the hourly rate of the time worker consists of two parts viz, fixed and variable. The fixed element is based on the nature of the job i.e. the rate for this part is fixed on the basis of job requirements. The variable portion varies for each worker depending upon his merit rating and the cost of living index. The aggregate of fixed and variable part for a day is termed as Measured day's work rate of a worker.

As the rate is based on two different elements, there are separate time rates not only for each worker but also for each job. This method does not find much favour with workers due to the following:

1. The rates fixed are not easily understood by the workers.
2. Merit rating tends to be arbitrary and unless changed at rapid intervals, the ratings will not reflect the correct ranking of the qualities of a worker.

3.10.1.(iii) Differential time rate: According to this method, different hourly rates are fixed for different levels of efficiency. Up to a certain level of efficiency the normal time or day rate is paid. Based on efficiency level the hourly rate increases gradually. The following table shows different differential rates:

<table>
<thead>
<tr>
<th>Efficiency Level</th>
<th>Rate Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to, say 75% efficiency</td>
<td>Normal (say ₹ N per hr.)</td>
</tr>
<tr>
<td>From 76% to 80% efficiency</td>
<td>1.10 × N</td>
</tr>
<tr>
<td>From 81% to 90% efficiency</td>
<td>1.20 × N</td>
</tr>
<tr>
<td>From 91% to 100% efficiency</td>
<td>1.30 × N</td>
</tr>
<tr>
<td>From 101% to 120% efficiency</td>
<td>1.40 × N</td>
</tr>
</tbody>
</table>

As this method is linked with the output and efficiency of workers, therefore, it cannot be strictly called as a time rate method of wage payment. This method in fact is similar to differential piece work system.

3.10.2 Payment by result: Under this system the payment made has a direct relationship with the output given by a worker. The attendance of the worker or the time taken by him for doing a job has no bearing on the payment. The system of payment by results may be classified into the following four categories:

(a) Systems in which the payment of wages is directly proportionate to the output given by workers.
(b) Systems in which the proportion of the wage payment to the worker increases progressively with increase in production.

(c) Systems in which payment rate decreases with the increase in output.

(d) Systems with earnings varying in proportions which differ at different levels of production.

3.10.2. (i) Straight piece work system

Under this system of wage payment, each operation, job or unit of production is termed a piece. A rate of payment, known as the piece rate or piece work rate is fixed for each piece. The wages of the worker depend upon his output and rate of each unit of output; it is in fact independent of the time taken by him. The wages paid to a worker are calculated as:

\[
\text{Wages} = \text{Number of units produced} \times \text{Piece rate per unit.}
\]

Considerable care and judgment are called for fixing the piece rate. If the rate fixed is too high or too low, it would operate to the disadvantage of either the employer or the employee. Any attempt on the part of the management to revise a piece rate, erroneously set too high, is likely to lead to friction and conflict with labour. If on the other hand, it is too low, it would fail in its objective. The only way all this may be avoided is by employing scientific methods of job evaluation and time and motion study for the purpose of setting the rates.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The system is simple to operate and also easy to understand.</td>
<td>1. The quality of output usually suffers.</td>
</tr>
<tr>
<td>2. The incentive provided is quite effective as the workers get the full benefit of any increase in production and the employer also gains by saving on overhead costs.</td>
<td>2. Maintenance of detailed statistics as regards production of individual workers is necessary.</td>
</tr>
<tr>
<td>3. Labour cost per unit being constant, these can be calculated in advance and quotations can be confidently submitted.</td>
<td>3. Maintenance of satisfactory discipline in the matter of arrival and departure of workers becomes somewhat difficult.</td>
</tr>
<tr>
<td></td>
<td>4. In the anxiety to produce as large a quantity as possible, workers may damage the machines and may also increase wastage of materials.</td>
</tr>
<tr>
<td></td>
<td>5. Skilled workers and supervisors (who are often paid on time basis) may resent higher wages to unskilled workers paid on the piece basis.</td>
</tr>
</tbody>
</table>

3.10.2 (ii) Differential piece work system: This system provide for higher rewards to more efficient workers. The main feature of all differential piece-work systems is that several piece rates on a slab scale are fixed for a job or operation which is put on piece-work. For different levels of output below and above the standard, different piece rates are applicable. Taylor Differential Piece Work System and Merrick Differential Piece Rate System are two important differential piece work systems discussed briefly as below:

(a) Taylor's differential piece work system - The Taylor's Differential Piece Rate System
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aims at rewarding efficient workers by providing increased piece rate beyond certain level of output.

Under this system two widely differing piece-rates are prescribed for each job. The lower rate is 83% of the normal piece rate and the higher rate is 125% of the normal piece rate. In other words the higher rate is 150% of the lower rate. The lower rate is given to a worker when his efficiency level is less than 100%. The higher rate is offered at efficiency level of either 100% or more. Due to the existence of the two piece rates, the system is known as differential piece rate system.

**Note:** Some authors also use 80% and 120% of the piece rates as lower and higher rates respectively at the efficiency levels, as indicated in the above paragraph.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is simple to understand and operate.</td>
<td>This system is quite harsh to workers, as a slight reduction in output may result in a large reduction in the wages earned by them. This system is no longer in use in its original form, though the main idea behind it is used in many wage schemes.</td>
</tr>
<tr>
<td>2. The incentive is very good and attractive for efficient workers.</td>
<td></td>
</tr>
<tr>
<td>3. It has a beneficial effect where overheads are high as increased production has the effect of reducing their incidence per unit of production.</td>
<td></td>
</tr>
</tbody>
</table>

Illustration 7: (Calculation of earnings under Taylor’s differential piece rate system)

*Using Taylor’s differential piece rate system, find the earnings of the Amar, Akbar and Ali from the following particulars:*

- **Standard time per piece:** 20 minutes
- **Normal rate per hour (in an 8 hours day):** ₹ 9.00
- **Amar produced:** 23 units
- **Akbar produced:** 24 units
- **Ali produced:** 30 units

**Solution**

**Earnings under Differential piece rate system**

<table>
<thead>
<tr>
<th>Workers</th>
<th>Amar</th>
<th>Akbar</th>
<th>Ali</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard output per day (units)</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>(8 hours x 60 minutes)/ 20 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual output per day (units)</td>
<td>23</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>Efficiency (%)</td>
<td>95.83%</td>
<td>100%</td>
<td>125%</td>
</tr>
</tbody>
</table>
Labour 3.39

\[
\begin{array}{ccc}
\text{Actual output} & \times 100 & \text{Standard output} \\
\frac{\text{23 unit}}{\text{24 unit}} & \times 100 & \frac{\text{24 unit}}{\text{24 unit}} \times 100 \\
\text{30 unit} & \times 100 & \frac{\text{24 unit}}{\text{24 unit}}
\end{array}
\]

* Earning rate per unit

\[
\begin{array}{ccc}
83\% & 125\% & 125\% \\
\text{of the piece} & \text{of the piece} & \text{of the piece} \\
\text{rate} & \text{rate} & \text{rate}
\end{array}
\]

Earning rate per unit (₹)

\[
\begin{array}{ccc}
2.49 & 3.75 & 3.75 \\
(83\% \text{ of ₹3}) & (125\% \text{ of ₹3}) & (125\% \text{ of ₹3})
\end{array}
\]

Earnings (₹)

\[
\begin{array}{ccc}
57.27 & 90.00 & 112.50 \\
(23 \text{ units } \times \text{ ₹2.49}) & (24 \text{ units } \times \text{ ₹3.75}) & (30 \text{ units } \times \text{ ₹3.75})
\end{array}
\]

* Under Taylor’s Differential price rate system, two widely differing price rates are prescribed for each job. The lower rate is 83% of the normal piece rate and is applicable if efficiency of the worker is below 100%. The higher piece rate is 125% of the normal piece rate and is applicable if work completed is at efficiency level of 100% and above.

**Working Note:**

Normal rate per hour = ₹ 9.00

Normal rate per unit = \( \frac{9.00}{3 \text{ units}} = \frac{9.00}{3} = ₹ 3 \)

\( \)Standard production per hour

(b) **Merrick differential piece rate system** - Under this system three piece rates for a job are fixed. None of the fixed rates is below the normal. These three piece rates are as below:

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Piece rate applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 83%</td>
<td>Normal rate,</td>
</tr>
<tr>
<td>Above 83% and upto 100%</td>
<td>10% above normal rate,</td>
</tr>
<tr>
<td>Above 100%</td>
<td>20% or 30% above normal rate.</td>
</tr>
</tbody>
</table>

This system is an improvement over Taylor’s Differential Piece Rate System.

**Illustration 8 (Calculation of earnings under Merrick differential piece rate system)**

Refer to the statement of previous Illustration and compute the earnings of workers under Merrick Differential Piece Rate System

**Solution**

<table>
<thead>
<tr>
<th>Workers</th>
<th>Amar</th>
<th>Akbar</th>
<th>Ali</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Earning rate per unit</td>
<td>10% above</td>
<td>10% above</td>
<td>20% above</td>
</tr>
<tr>
<td>(Refer to previous illustration)</td>
<td>the normal rate</td>
<td>the normal rate</td>
<td>the normal rate</td>
</tr>
</tbody>
</table>

or

30% above the normal
3.40 Cost Accounting

<table>
<thead>
<tr>
<th>Earning rate per unit (₹)</th>
<th>3.30</th>
<th>3.30</th>
<th>3.60 or 3.90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings (₹)</td>
<td>75.90</td>
<td>79.20</td>
<td>108 or 117</td>
</tr>
</tbody>
</table>

(23 units × ₹ 3.30) (24 units × ₹ 3.30) (30 units × ₹ 3.60) or (30 units × ₹ 3.90)

Illustration 9: (Calculation of earnings under Taylor’s differential piece rate system)

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

- Standard time per piece: 12 minutes
- Normal rate per hour (in an 8 hours day): ₹20
- A produced: 37 units

Solution:

Actual output = 37 units

Standard output = \[
\frac{8 \text{ hrs.} \times 60 \text{ minutes}}{12 \text{ minutes per piece}} = 40 \text{ units}
\]

Efficiency = \[
\frac{37 \text{ units}}{40 \text{ units}} \times 100 = 92.5\%
\]

Under Taylor’s differential piece rate system, a worker is paid lower piece rate of 83%, since his efficiency is less than 100%.

Normal production per hour = 60 minutes/12 minutes = 5 units

Normal Rate per hour = ₹20

Normal piece rate per unit = ₹20/5 units = ₹4

Lower piece rate per unit = ₹4 × 83/100 = ₹3.32

Total earnings = 37 units × ₹3.32 = ₹122.84

Illustration 10: (Calculation of earnings under Merrick differential piece rate system)

Calculate the earnings of workers A, B and C under Straight Piece Rate System and Merrick’s Piece Rate System from the following particulars:

- Normal Rate per Hour = ₹5.40
- Standard Time per Unit = 1 Minute

Output per day is as follows:

- Worker A – 390 Units
- Worker B – 450 Units
Labour 3.41

Worker C – 600 Units

Working hours per day are 8.

Solution:

Earnings of Workers under Straight Piece Rate System:

Worker A = 390 units $\times$ \(\text{₹} \ 0.09 = \text{₹} \ 35.10\)

Worker B = 450 units $\times$ \(\text{₹} \ 0.09 = \text{₹} \ 40.50\)

Worker C = 600 units $\times$ \(\text{₹} \ 0.09 = \text{₹} \ 54.00\)

Earnings of Workers under Merrick’s Multiple Piece Rate System

<table>
<thead>
<tr>
<th>Particulars</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency level</td>
<td>81.25%</td>
<td>93.75%</td>
<td>125%</td>
</tr>
<tr>
<td>(Refer to working note ii)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable wage rate per unit</td>
<td>0.09</td>
<td>0.099</td>
<td>0.108*</td>
</tr>
<tr>
<td>Earnings (₹)</td>
<td>35.10</td>
<td>44.55</td>
<td>64.80</td>
</tr>
<tr>
<td>(390 units $\times$ 0.09)</td>
<td>(450 units $\times$ 0.099)</td>
<td>(600 units $\times$ 0.108)</td>
<td></td>
</tr>
</tbody>
</table>

Note : *Some author suggests an increase of 30% over normal piece rate at an efficiency level of 120% or more. In such a case the rate per unit would be \(\text{₹} \ 0.117\) and total earnings would come to \(\text{₹} \ 70.20\).

Working Notes :

(i) Normal wage rate per unit = Normal Rate per Hour/Standard output per hour

= \(\text{₹} \ 5.40/60 = 9\) Paise

(ii) Efficiency level

<table>
<thead>
<tr>
<th>Workers</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual output per day (units)</td>
<td>390</td>
<td>450</td>
<td>600</td>
</tr>
<tr>
<td>Standard output per day (units)</td>
<td>480</td>
<td>480</td>
<td>480</td>
</tr>
</tbody>
</table>

Efficiency level achieved

\[
= \frac{\text{Actual output units}}{\text{Standard output units}} \times 100
\]

\[
= \frac{390}{480} \times 100 = \frac{450}{480} \times 100 = \frac{600}{480} \times 100
\]

= 81.25% = 93.75% = 125%

3.10.3 Gantt task and bonus system: This system is a combination of time and piece work 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.

If the standards are achieved or exceeded, the payment to the concerned worker is made at a higher piece rate. The piece rate fixed under this system also includes an element of bonus
the extent of 20%. The figure of bonus to such workers is calculated over the time rate of the workers.

Thus in its essence, the system consists of paying a worker on time basis if he does not attain the standard and on piece basis if he does. Wages payable to workers under this plan are calculated as under:

<table>
<thead>
<tr>
<th>Output</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Output below standard</td>
<td>Guaranteed time rate.</td>
</tr>
<tr>
<td>(ii) Output at standard</td>
<td>Time rate plus bonus of 20% (usually) of time rate.</td>
</tr>
<tr>
<td>(iii) Output above standard</td>
<td>High piece rate on worker’s whole output.</td>
</tr>
</tbody>
</table>

It is so fixed, so as to include a bonus of 20% of the time rate.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The guaranteed time rate may have the effect of weakening the urge of slower worker to increase his output.</td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

Illustration 11: (Calculation of wages under the Gantt system)

In a factory the standard time allowed for completing a given task (50 units), is 8 hours. The guaranteed time wages are ₹ 20 per hour. If a task is completed in less than the standard time, the high rate of ₹ 4 per unit is payable. Calculate the wages of a worker, under the Gantt system, if he completes the task in (i) 10 hours; (ii) 8 hours, and (iii) in 6 hours. Also ascertain the comparative rate of earnings per hour under the three situations.

Solution

(i) When the worker performs the task in 10 hours, his earnings will be at the time wage rate i.e. 10 hours × ₹ 20 per hour = ₹ 200.

(ii) When the worker performs the task is standard time i.e. in 8 hours, his earning will be:

\[
\begin{align*}
8 \text{ hours} \times ₹ 20 & = ₹ 160 \\
\text{Bonus @ 20% of time wages} & = ₹ 32 \\
\text{Total earnings} & = ₹ 192
\end{align*}
\]

(iii) When the worker performs the task in less than the standard time his earning will be at piece rate i.e.

\[
50 \text{ units} \times ₹ 4 \text{ per unit} = ₹ 200
\]
The comparative rate of earnings per hour under the above three situations is:

(i) ₹ 200/10 hrs. = ₹ 20 per hour  
(ii) ₹ 192/8 hrs. = ₹ 24 per hour  
(iii) ₹ 200/6 hrs. = ₹ 33.33 per hour

3.10.4 **Emerson’s efficiency system**: Under this system minimum time wages are guaranteed. But beyond a certain efficiency level, bonus in addition to minimum day wages is given.

A worker who is able to attain efficiency, measured by his output equal to 2/3rd of the standard efficiency, or above, is deemed to be an efficient worker deserving encouragement. The scheme thus provides for payment of bonus at a rising scale at various levels of efficiency, ranging from 66.67% to 150%.

The levels are as mentioned below:

(i) For a performance below 66.67% only time rate wages without any bonus are paid.
(ii) 66⅔% to 100% efficiency, bonus varies between 0.01% and 20%.
(iii) Above 100% efficiency bonus of 20% of basic wages plus 1% for each 1% increase in efficiency is admissible.

This system is superior to one to the differential piece rate in so far as it encourages the slow worker to do a little better than before. Also it does not pre-suppose a high degree of average performance. Wages on time basis are guaranteed.

**Illustration 12: (Earnings under Emerson Efficiency System)**

From the following information you are required to calculate the bonus and earnings under Emerson Efficiency System. The relevant information is as under:

- **Standard working hours**: 8 hours a day
- **Standard output per hour in units**: 5
- **Daily wage rate**: ₹ 50

**Actual output in units**

- **Worker A**: 25 units
- **Worker B**: 40 units
- **Worker C**: 45 units

**Solution**

<table>
<thead>
<tr>
<th>Workers</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual output in units</td>
<td>25</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>Standard output in units</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>
3.44 Cost Accounting

Efficiency level (%) = \[
\frac{\text{Actual output}}{\text{Standard output}} \times 100
\]

<table>
<thead>
<tr>
<th>Rate of bonus</th>
<th>No bonus</th>
<th>20%</th>
<th>32.50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time wages (₹)</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Bonus (₹)</td>
<td>Nil</td>
<td>10</td>
<td>16.25</td>
</tr>
</tbody>
</table>

| Total earnings (₹) | 50 | 60 | 66.25 |

3.10.5 Points scheme or Bedeaux system: Under this scheme, firstly the quantum of work that a worker can perform is expressed in Bedeaux points or B’s. These points represent the standard time in terms of minutes required to perform the job. The standard numbers of points in terms of minutes are ascertained after a careful and detailed analysis of each operation or job. Each such minute consists of the time required to complete a fraction of the operation or the job, and also an allowance for rest due to fatigue.

Workers who are not able to complete tasks allotted to them within the standard time are paid at the normal daily rate.

Those who are able to improve upon the efficiency rate are paid a bonus, equal to the wages for time saved as indicated by excess of B’s earned (standard minutes for work done) over actual time. Workers are paid 75% of the time saved.

Illustration 13: (Calculation of earnings under Bedeaux system)

Calculate the earnings of worker from the following information under Bedeaux system:

Standard time for a product A-30 seconds plus relaxation allowance of 50%.
Standard time for a product B-20 second plus relaxation allowance of 50%.

During 8 hour day for

| Actual output of product A | 500 units. |
| Actual output of product B | 300 units |
| Wage rate                  | ₹ 10 per hour |

Solution

Bedeaux point per unit of product A:

\[
\frac{30 \text{ seconds} + 15 \text{ seconds}}{60} = \frac{45}{60} = 0.75 \text{ B’s}
\]
Bedaux point per unit of product B:

\[
\frac{20 \text{ seconds} + 10 \text{ seconds}}{60} = \frac{30}{60} = 0.50 \text{ B's}
\]

Total production in terms of B's:

\[
500 \times 0.75 + 300 \times 0.50 = 525 \text{ B's}
\]

Standard B's (8 hours \times 60) = 480 B's

No. of B’s saved (525 B’s – 480 B's) = 45 B’s

Earnings = Hrs. worked \times rate per hour + \frac{75}{100} \times \frac{45}{60} \times ₹ 10

\[
= 8 \text{ hours} \times ₹10 + \frac{75}{100} \times \frac{45}{60} \times ₹ 10
\]

\[
= ₹ 80 + ₹ 5.63 = ₹ 85.63
\]

3.10.6 Hayne’s system: Under this system also the standard is set in minutes. The standard time for the job is expressed in terms of the standard man-minutes called as “MANIT”. Manit stands for man-minute. In the case of repetitive work the time saved is shared between the worker and the foreman in the ratio 5 : 1. If the work is of non-repetitive nature, the worker, the employer and the foreman share the value of time saved in the ratio of 5 : 4 : 1. Each worker is paid according to hourly rate for the time spent by him on the job.

3.10.7 Accelerated premium system: Under this system earnings increase with output; the rate of increase of earnings itself increases progressively with output; in fact the earnings increase in greater proportion than the increase in production. This system acts as a strong incentive for skilled workers to earn high wages by increasing output and for production beyond standard.

3.10.8 Premium bonus methods: Under these methods, standard time is established for performing a job. The worker is guaranteed his daily wages (except in Barth System), if his output is below and up to standard. In case the task is completed in less than the standard time, the saved time is shared between the employee and the employer.

There are two types of time-sharing plans in use viz., constant sharing plans and variable sharing plans.

3.10.9 Halsey and Halsey Weir systems:

Under Halsey system a standard time is fixed for each job or process.

If there is no saving on this standard time allowance, the worker is paid only his day rate.

He gets his time rate even if he exceeds the standard time limit, since his day rate is guaranteed.

If, however, he does the job in less than the standard time, he gets a bonus equal to 50 percent of the wages of time saved; the employer benefits by the other 50 percent. The scheme also is
sometimes referred to as the Halsey fifty percent plan.

*Formula for calculating wages under Halsey system*

\[= \text{Time taken} \times \text{Time rate} + 50\% \times \text{Time saved} \times \text{Time rate}\]

The *Halsey Weir System* is the same as the Halsey System except that the bonus paid to workers is 30% of the time saved i.e.

\[= \text{Time taken} \times \text{Time rate} + 30\% \times \text{Time saved} \times \text{Time rate}\]

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Time rate is guaranteed while there is opportunity for increasing earnings by increasing production.</td>
<td>1. Incentive is not so strong as with piece rate system. In fact the harder the worker works, the lesser he gets per piece.</td>
</tr>
<tr>
<td>2. The system is equitable in as much as the employer gets a direct return for his efforts in improving production methods and providing better equipment.</td>
<td>2. The sharing principle may not be liked by employees.</td>
</tr>
</tbody>
</table>

**Illustration 14:** (Calculation of earning under Halsey System)

*Calculate the earning of a worker under Halsey System. The relevant data is as below :*

- **Time Rate (p.h.)**: ₹ 6
- **Time allowed**: 8 hours
- **Time taken**: 6 hours
- **Time saved**: 2 hours

**Solution**

*Calculation of total earnings :*

6 hrs. \(\times\) ₹ 6 \(+\) 1/2 \(\times\) (2 hrs. \(\times\) ₹ 6) or ₹ 36 \(+\) ₹6 = ₹ 42

Of his total earnings, ₹ 36 is on account of the time worked and ₹6 is on account of his share of the premium bonus.

3.10.10 Rowan system: According to this system a standard time allowance is fixed for the performance of a job and bonus is paid if time is saved.

Under Rowan System the bonus is that proportion of the time wages as time saved bears to the standard time.

*Formula for calculating wages under Rowan system*
= Time taken × Rate per hour + \( \frac{\text{Time Saved}}{\text{Time allowed}} \) × Time taken × Rate per hour

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is claimed to be a fool-proof system in as much as a worker can never double his earnings even if there is bad rate setting.</td>
<td>1. The system is a bit complicated.</td>
</tr>
<tr>
<td>2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan.</td>
<td>2. The incentive is weak at a high production level where the time saved is more than 50% of the time allowed.</td>
</tr>
<tr>
<td>3. The sharing principle appeals to the employer as being equitable.</td>
<td>3. The sharing principle is not generally welcomed by employees.</td>
</tr>
</tbody>
</table>

Illustration 15: (Calculation of earnings under Rowan System)

Calculate the earnings of a worker under Rowan System. The relevant data is given as below:

<table>
<thead>
<tr>
<th>Time rate (per Hour)</th>
<th>Time allowed</th>
<th>Time taken</th>
<th>Time saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>₹6</td>
<td>8 hours.</td>
<td>6 hours.</td>
<td>2 hours.</td>
</tr>
</tbody>
</table>

Solution

Calculation of total earnings:

\[
= \text{Time taken} \times \text{Rate per hour} + \frac{\text{Time Saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}
\]

\[
= 6 \text{ hours} \times ₹6 + \frac{2 \text{ hours}}{8 \text{ hours}} \times 6 \text{ hours} \times ₹6 = ₹36 + ₹9 = ₹45
\]

Illustration 16: (Calculation of earnings and effective hourly rate under Halsey scheme)

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹30 per hour. The standard time per unit for a particular product is 4 hours. P, a machineman, has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of ₹37.50 on the manufacture of that particular product.

Required: What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?
3.48 Cost Accounting

Solution:
Total earnings (under 50% Halsey Scheme) = Hours worked \times Rate per hour + \frac{1}{2} \times time saved \times Rate per hour
= 3 \text{ hours} \times \ ₹30 + \frac{1}{2} \times 1 \text{ hour} \times \ ₹30 = \ ₹105

Effective hourly rate = \frac{\text{Total earnings}}{\text{Hours taken}} = \frac{\ ₹105}{3 \text{ hours}} = \ ₹35

Working Note:
Let T hours be the total time worked in hours by the skilled workers (machine man P), \ ₹30 is the rate per hour; standard time is 4 hours per unit and effective hourly earnings rate is \ ₹37.50 then

Earning (under Rowan plan) = \text{Hours worked} \times \text{Rate per hr} + \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hr}
\ ₹37.5 T = T \times \ ₹30 + \frac{4-T}{4} \times T \times \ ₹30
\ ₹37.5 = \ ₹30 + (4-T) \times \ ₹7.5
or, \ ₹7.5 T = \ ₹22.5
or, T = 3 \text{ hours.}

Illustration 17: (Comparison of earnings between Halsey plan and Rowan plan)
(a) Bonus paid under the Halsey Plan with bonus at 50% for the time saved equals the bonus paid under the Rowan System. When will this statement hold good? (Your answer should contain the proof).
(b) The time allowed for a job is 8 hours. The hourly rate is \ ₹8. Prepare a statement showing:
   i. The bonus earned
   ii. The total earnings of labour and
   iii. Hourly earnings.

   Under the Halsey System with 50% bonus for time saved and Rowan System for each hour saved progressively.

Solution:
(a) Bonus under Halsey Plan = \frac{50}{100} \times (\text{SH} \times \text{AH}) \times R \quad (i)

Bonus under Rowan Plan: = \frac{\text{AH}}{\text{SH}} \times (\text{SH} \times \text{AH}) \times R \quad (ii)

Bonus under Halsey Plan will be equal to the bonus under Rowan Plan when the following condition holds good:
\[
\frac{50}{100} \times (SH \times AH) \times R = \frac{AH}{SH} \times (SH \times AH) \times R
\]

\[
\frac{50}{100} = \frac{AH}{SH}
\]

Hence, when the actual time taken (AH) is 50% of the time allowed (SH), the bonus under Halsey and Rowan Plans is equal.

(b) Statement of Bonus, total earnings of labour and hourly earnings under Halsey and Rowan Systems.

<table>
<thead>
<tr>
<th>SH</th>
<th>AH</th>
<th>Time saved</th>
<th>Basic wages (AH × ₹8)</th>
<th>Bonus under Halsey System</th>
<th>Bonus under Rowan system</th>
<th>Total Earnings under Halsey System D+E</th>
<th>Total Earnings under Rowan System D+F</th>
<th>Hourly Earnings under Halsey System H/B</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>50</td>
<td>50×(SH×AH)</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
<td>(\frac{AH}{SH})×(SH×AH)×R</td>
</tr>
</tbody>
</table>

Illustration 18: (Preparation of Comparison statement of earnings)

Two workmen, '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 the Rowan system, while 'B' is paid bonus according to the Halsey system. 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 man-hour actually worked. The factory cost for the product for 'A' is ₹3,490 and for 'B' it is ₹3,600.

Required:

(a) Compute the normal rate of wages;

(b) Compute the cost of materials cost;

(c) Prepare a statement comparing the factory cost of the products as made by the two workmen.

Solution:

Step 1: Let X be the cost of material and Y be the normal rate of wages per hour.
3.50 Cost Accounting

Step 2 : Factory Cost of Workman ‘A’

<table>
<thead>
<tr>
<th></th>
<th>(₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Material Cost</td>
<td>X</td>
</tr>
<tr>
<td>B. Wages</td>
<td>30 Y</td>
</tr>
<tr>
<td>C. Bonus = $\frac{AH}{SH} \times (SH - AH) \times R$</td>
<td>$\frac{30}{50} \times (50 - 30) \times Y$</td>
</tr>
<tr>
<td>Bonus</td>
<td>$\frac{30}{50} \times (50 - 30) \times Y$</td>
</tr>
<tr>
<td>D. Overheads (30 × ₹5)</td>
<td>150</td>
</tr>
<tr>
<td>E. Factory Cost</td>
<td>$X + \frac{30Y}{12} + \frac{12Y}{150}$ + $\frac{150}{200}$</td>
</tr>
</tbody>
</table>

or, $X + \frac{30Y}{12} + \frac{12Y}{150} = ₹3,490$ (Given) – ₹150 = ₹3,340

Equation (I)

Step 3 : Factory Cost of Workman ‘B’

<table>
<thead>
<tr>
<th></th>
<th>(₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Material Cost</td>
<td>X</td>
</tr>
<tr>
<td>B. Wages</td>
<td>40 Y</td>
</tr>
<tr>
<td>C. Bonus = 50% of $(SH - AH) \times R$</td>
<td>5 Y</td>
</tr>
<tr>
<td>D. Overheads (40 × ₹5)</td>
<td>200</td>
</tr>
<tr>
<td>E. Factory Cost</td>
<td>$X + \frac{40Y}{20} + \frac{5Y}{200}$ + $\frac{200}{200}$</td>
</tr>
</tbody>
</table>

or, $X + \frac{40Y}{20} + \frac{5Y}{200} = ₹3,600$ (Given) – ₹200 = ₹3,400

Equation (II)

Step 4 : Subtracting Eq. (I) from Eq. (II)

3Y = ₹60

Y = ₹ 60/3 = ₹ 20 per hour.

(a) The normal rate of wages: ₹ 20 per hour

(b) The cost of material: $X + \frac{45}{20} = ₹3,400$

X = ₹3,400 – ₹900 = ₹2,500

(c) Comparative Statement of the Factory Cost of the product made by the two workmen.

<table>
<thead>
<tr>
<th></th>
<th>‘A’ (₹)</th>
<th>‘B’ (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material cost</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Direct Wages</td>
<td>(30 × ₹20) 600</td>
<td>(40 × ₹20) 800</td>
</tr>
<tr>
<td>Bonus</td>
<td>(12 × ₹20) 240</td>
<td>(5 × ₹20) 100</td>
</tr>
<tr>
<td>Factory Overhead</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Factory Cost</td>
<td>3,490</td>
<td>3,600</td>
</tr>
</tbody>
</table>
Illustration 19: (Appropriate incentive scheme)

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 are 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 the 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:

(i) Time allowed = 4 hours
   Time taken = 3 hours
   Time saved = 1 hour
   Rate = ₹ 5 per hour

   Bonus = \( \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} \)
   \[ \frac{3\text{ hours}}{4\text{ hours}} \times 1\text{ hour} \times ₹ 5 = ₹ 3.75 \]

   In the above illustration time saved is 1 hour and, therefore, total gain is ₹ 5. Out of ₹ 5 according to Rowan Plan only ₹ 3.75 is given to the worker in the form of bonus and the remaining ₹ 1.25 remains with the management. 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 hour
3.52 Cost Accounting

respectively are as below:

\[
\text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate}
\]

\[
= \frac{2 \text{ hours}}{4 \text{ hours}} \times 2 \text{ hours} \times ₹ 5 = ₹ 5
\]

\[
= \frac{1 \text{ hour}}{4 \text{ hours}} \times 3 \text{ hours} \times ₹ 5 = ₹ 3.75
\]

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 figure fell by ₹ 1.25. Hence, it is quite apparent to workers that it is of no use to increase speed of work. This feature of Rowan Plan thus protects 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:

\[
\text{Bonus} = \frac{3 \text{ hours}}{10 \text{ hours}} \times 7 \text{ hours} \times ₹ 5 = ₹ 10.50
\]

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 time setting department of the concern.
3.10.11 Barth system

The formula used for calculating the remuneration under this system is as follows:

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

The system is particularly suitable for trainees and beginners and also for unskilled workers. The reason is that for low production efficiency, the earnings are higher than in the piece-work system but as the efficiency increases, the rate of increase in the earnings falls.

This system is not suitable for workers having more than 100% efficiency as it does not provide incentive on working at more than 100% efficiency.

Illustration 20: (Selection of appropriate incentive scheme)

Mr. A. is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme - either Halsey Scheme (with 50% bonus) or Rowan Scheme - of wage payment for increasing the labour productivity to cope with the increased demand for the product by 25%. He feels that if the 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 and he has accordingly given this assurance to the workers.

As a result of the assurance, the increase in productivity has been observed as revealed by the following figures for the current month:

- Hourly rate of wages (guaranteed)  \text{₹} 2.00
- Average time for producing 1 piece by one worker at the previous performance 2 hours (This may be taken as time allowed)
- No. of working days in the month 25
- No. of working hours per day for each worker 8
3.54 Cost Accounting

Actual production during the month 1,250 units

Required:
1. Calculate effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.
2. Calculate the savings to Mr. A in terms of direct labour cost per piece under the schemes.
3. Advise Mr. A about the selection of the scheme to fulfill his assurance.

Solution

Working Notes:
1. Total time wages of 10 workers per month:
   \[
   \text{Total time wages} = \text{No. of working days in the month} \times \text{No. of working hours per day of each worker} \times \text{Hourly rate of wages} \times \text{No. of workers}
   \]
   \[
   = 25 \text{ days} \times 8 \text{ hrs.} \times 2 \times 10 \text{ workers} = ₹ 4,000
   \]

2. Time saved per month:
   - Time saved per piece by a worker = 2 hours
   - No. of units produced during the month by 10 workers = 1,250 pieces
   - Total time allowed to produce 1,250 pieces (1,250 \times 2 hours) = 2,500 hours
   - Actual time taken to produce 1,250 pieces = 2,000 hours
   - Time saved = 500 hours

3. Bonus under Halsey scheme to be paid to 10 workers:
   \[
   \text{Bonus} = (50\% \text{ of time saved}) \times \text{hourly rate of wages}
   \]
   \[= \frac{50}{100} \times 500 \text{ hours} \times ₹ 2 = ₹ 500
   \]
   Total wages to be paid to 10 workers are (₹ 4,000 + ₹ 500) ₹ 4,500, if Mr. A considers the introduction of Halsey Incentive Scheme to increase the labour productivity.

4. Bonus under Rowan Scheme to be paid to 10 workers:
   \[
   \text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{hourly rate}
   \]
   \[= \frac{2,000 \text{ hours}}{2,500 \text{ hours}} \times 500 \text{ hours} \times ₹ 2 = ₹ 800
   \]
   Total wages to be paid to 10 workers are (₹ 4,000 + ₹ 800) ₹ 4,800, if Mr. A considers the introduction of Rowan Incentive Scheme to increase the labour productivity.

1. (i) Effective hourly rate of earnings under Halsey scheme:
   (Refer to Working Notes 1, 2 and 3)
Labour 3.55

\[
\text{Total time wages of 10 workers + Total bonus under Halsey scheme} \\
\text{Total hours worked}
\]
\[
\frac{\text{₹4,000} + \text{₹500}}{2,000 \text{ hours}} = \text{₹2.25}
\]

(ii) **Effective hourly rate of earnings under Rowan scheme:**

(Refer to Working Notes 1, 2 and 4)

\[
\frac{\text{Total time wages of 10 workers + Total bonus under Rowan scheme}}{\text{Total hours worked}}
\]
\[
\frac{\text{₹4,000} + \text{₹800}}{2,000 \text{ hours}} = \text{₹2.40}
\]

2. (i) **Saving in terms of direct labour cost per piece under Halsey scheme:**

(Refer to Working Note 3)

Labour cost per piece (under time wage scheme) = 2 hours × ₹2 = ₹4.

Labour cost per piece (under Halsey scheme)

\[
\frac{\text{Total wages paid under the scheme}}{\text{Total number of units produced}} = \frac{\text{₹4,500}}{1,250} = \text{₹3.60}
\]

Saving per piece : (₹4 – ₹3.60) = ₹0.40.

(ii) **Saving in terms of direct labour cost per piece under Rowan Scheme:**

(Refer to Working Note 4)

Labour cost per piece under Rowan scheme = ₹4,800/1,250 units = ₹3.84

Saving per piece = ₹4 – ₹3.84 = ₹0.16.

3. From the labour cost per piece under Halsey scheme (₹3.60) and Rowan scheme (₹3.84), it is quite clear that Halsey scheme brings about more saving than Rowan scheme to the concern. But Halsey scheme does not fulfill the assurance given to the workers about 20% increase in their earnings as it secures only 12.5% [500/4,000 × 100] increase.

On the other hand, Rowan scheme secures 20% [800/4,000 × 100] increase in the earnings and it fulfills the assurance. Therefore, Rowan scheme may be adopted.

**Illustration 21: (Calculation of earnings under different schemes)**

*Wage negotiations are going on with the recognised Labour Union and the Management wants you as the Cost Accountant of the Company to formulate an incentive scheme with a view to increase productivity.*

*The case of three typical workers Achyuta, Ananta and Govida who produce respectively 180, 120 and 100 units of the company’s product in a normal day of 8 hours is taken up for study.*
3.56 Cost Accounting

Assuming that day wages would be guaranteed at 75 paise per hour and the piece rate would be based on a standard hourly output of 10 units, calculate the earnings of each of the three workers and the labour cost per 100 pieces under (i) Day wages, (ii) Piece rate, (iii) Halsey scheme, and (iv) The Rowan scheme.

Also calculate under the above schemes the average cost of labour for the company to produce 100 pieces.

Solution

Calculation of earnings of each of the three workers and the labour cost per 100 pieces under different wage schemes.

(i) Day wages

<table>
<thead>
<tr>
<th>Name of workers</th>
<th>Day wages (₹)</th>
<th>Actual output (units)</th>
<th>Labour cost per 100 pieces (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achyuta</td>
<td>6.00</td>
<td>180</td>
<td>3.33</td>
</tr>
<tr>
<td>Ananta</td>
<td>6.00</td>
<td>120</td>
<td>5.00</td>
</tr>
<tr>
<td>Govinda</td>
<td>6.00</td>
<td>100</td>
<td>6.00</td>
</tr>
<tr>
<td>Total</td>
<td>18.00</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

Average cost of labour for the company to produce 100 pieces:

\[
\frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{₹18}{400} \times 100 = ₹4.50
\]

(ii) Piece rate

<table>
<thead>
<tr>
<th>Name of workers</th>
<th>Actual output (units)</th>
<th>Piece rate (₹)</th>
<th>Wages earned (₹)</th>
<th>Labour cost per 100 pieces (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achyuta</td>
<td>180</td>
<td>0.075</td>
<td>13.50</td>
<td>7.50</td>
</tr>
<tr>
<td>Ananta</td>
<td>120</td>
<td>0.075</td>
<td>9.00</td>
<td>7.50</td>
</tr>
<tr>
<td>Govinda</td>
<td>100</td>
<td>0.075</td>
<td>7.50</td>
<td>7.50</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>30.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average cost of labour for the company to produce 100 pieces:

\[
= \frac{₹30}{400} \times 100 = ₹7.50
\]
### (iii) Halsey Scheme

<table>
<thead>
<tr>
<th>Name of workers</th>
<th>Actual output (units)</th>
<th>Std. time for actual output Hrs.</th>
<th>Actual time for actual output Hrs.</th>
<th>Time saved (Hrs.)</th>
<th>Bonus Hrs.</th>
<th>Bonus (50% including wages) of time savedBonus*</th>
<th>Total wages including 100 pieces Bonus*</th>
<th>Labour cost per pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achyuta</td>
<td>180</td>
<td>18</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>9.75</td>
<td>5.42</td>
<td></td>
</tr>
<tr>
<td>Ananta</td>
<td>120</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>7.50</td>
<td>6.25</td>
<td></td>
</tr>
<tr>
<td>Govinda</td>
<td>100</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>6.75</td>
<td>6.75</td>
<td></td>
</tr>
</tbody>
</table>

Average cost of labour for the company to produce 100 pieces = \(\frac{24}{400} \times 100 = \text{₹} 6.00\)

*Total wages = (Actual hours worked + bonus hours) \times \text{Rate per hour}*

Hence total wages of Achyuta are: \((8 + 5) \times \text{₹} 0.75 = \text{₹} 9.75\)

Similarly, the total wages of Ananta and Govinda are \text{₹} 7.50 and \text{₹} 6.75 respectively.

### (iv) Rowan Scheme

| Name of workers | Actual output (units) | Std. time taken hours | Actual time taken (hours) | Time saved (hours) | Bonus* Wages for actual hrs. @75 P/hr. Bonus @ 75 P earnings per hour Bonus per 100 pieces Total earnings Labour cost per pieces |
|-----------------|-----------------------|-----------------------|--------------------------|-------------------|----------------------------------|---------------------------------|---------------------------------|
| Achyuta         | 180                   | 18                    | 8                        | 10                | 4.44                             | 6.00                            | 3.33                            | 9.33                           | 5.18 |
| Ananta          | 120                   | 12                    | 8                        | 4                 | 2.67                             | 6.00                            | 2.00                            | 8.00                           | 6.67 |
| Govinda         | 100                   | 10                    | 8                        | 2                 | 1.6                              | 6.00                            | 1.20                            | 7.20                           | 7.20 |

Average cost of labour to the company for 100 pieces = \(\frac{24.53}{400} \times 100 = \text{₹} 6.13\)

*Bonus hours = \frac{\text{Time taken} \times \text{Time saved}}{\text{Time allowed}}*

Bonus hours of Achyuta = \(\frac{8 \times 10}{18} = 4.44\)
Similarly, bonus hours of Ananta and Govinda are ₹2.67 hours and ₹1.6 hours respectively.

3.10.12 Group System of wage payment: Certain jobs or operations are required to be performed collectively by a number of workers. Under such cases each man’s work depends on the work performed by one or more of his colleagues and as such it is not possible to measure separately the output of each worker.

The workers constituting a group or a team here are considered as a composite unit and the combined output of such a unit is measured for the purpose of wage calculation. The methods usually used for distributing wages to each worker are the following:

1. Equally, if all the workers of the group are of the same grade and skill, same rate of pay and has worked for same duration.
2. Pro-rata to the time-rate of each worker where the time spent by the individual worker is the same.
3. On the basis of the time rates and attendance of each worker.
4. On a specified percentage basis; the percentage applicable to a worker is pre-determined on the basis of the skill, rate of pay etc.
5. In a group of unskilled and skilled workers, a method of distribution is to pay the unskilled workers at their time rates. The balance amount remaining out of the total earnings after payment to the unskilled workers is distributed among the skilled workers by any of the methods discussed above.

Group Bonus - Group Bonus refers to the bonus paid for the collective efforts made by a group of workers. The amount of bonus is distributed among the individual members of the group on some agreed basis.

Group Bonus Schemes - Under a group bonus scheme, bonus is paid to a team/group of employees working together.

Such a scheme is introduced generally where individual efficiency cannot be established for the payment of bonus.

For example, in the construction work, it is the team work of masons and labourers which produces results. If any incentive is to be offered, it should be offered to the team as a whole and not to an individual. Group bonus is based on the combined output of the team as a whole. The quantum of bonus is determined on the basis of the productivity of the team and the bonus is shared by individual workers in specified proportions, often in the proportion of wages on time basis.

Objectives of Group Bonus Schemes: The objectives of a group bonus scheme are the following:-

(i) To create collective interest and team spirit among workers.
(ii) To create interest among supervisors to improve performance.
(iii) To reduce wastage in materials and idle time.
(iv) To achieve optimum output at minimum cost.
(v) To encourage individual members of the group, team where only the output of the team as a whole can be measured.

Advantages of Group Bonus Schemes:
1. They create a sense of team spirit since all the workers in a group realise that their personal incentives are dependent upon group effort.
2. A spirit of healthy competition amongst various groups doing identical jobs is also created. This results is the elimination of excessive waste of materials.
3. The operators and supervisors also feel interested in raising the production to higher levels.
4. The scheme is usually easier to understand and entails less costing and accounting work. It is easier to set up group activity targets, since the performance unit is large.

Schemes of group bonus - There are five schemes of group bonus as discussed below:

(1) Priestman’s Production Bonus: This method was adopted by Priestman Bros. Ltd., in 1917. According to this method when the actual production in units or points exceeds the standard fixed, a bonus is paid to the workers as additional wages equivalent to the percentage of actual output over the standard output.

(2) Cost Efficiency Bonus: Under this scheme, the amount of bonus is calculated when the cost is reduced below the normal established targets. Targets of cost, for example, material cost, labour cost and overhead cost etc., per unit are fixed. If the measurement of actual performance shows a saving in the total labour and material cost or a reduction in the total cost per unit, a fair percentage of the saving is distributed among the staff.

Three popular schemes usually used for calculating the amount to be distributed to workers as Bonus are as below:

(i) Nunn-Bush Plan: According to this plan a norm of direct labour cost is fixed and expressed as a percentage of the sales value.

The amount calculated at this percentage is credited to a fund. The actual labour cost is debited to this fund and the balance remaining to the credit of this fund is distributed as bonus to all the workers and employees.

(ii) Scanlon Plan: Here also a fund is created for the normal cost of wages and salaries. This fund is debited with the actual labour costs. Two-thirds to three-fourths of the credit balance, if any, is distributed as bonus, the balance is kept as reserve for future set-backs.

(iii) Rucker Plan: This plan is quite similar to Nunn-Bush Plan except that the percentage for crediting the fund is based on the total value added by manufacturer (i.e. the total cost less the value of the material) and not on total sales value.
3.60 Cost Accounting

(3) **Town Gain Sharing Plan**: Under this plan bonus is dependent upon a saving in the labour cost as compared to standard. The bonus is calculated at 50% of the saving achieved.

(4) **Budgeted Expense Bonus**: Bonus is determined in advance and paid as a percentage of savings effected in the actual total expenses as compared to the budgeted expense. It is payable to indirect workers also.

(5) **Waste Reduction Bonus**: Bonus becomes payable under this scheme if the team of workers brings about a reduction in the percentage of material wastages as compared to the standard set. It is applicable to industries where the material cost assumes a greater proportion of the total cost.

Many times group bonus schemes do not enjoy the approval of workers. Some workers tend to feel that their personal incentives are low merely because some members of the group are lazy or inefficient. Such workers believe that it is better to provide incentives on individual basis, if it is possible.

3.10.13 **System of Incentive schemes for Indirect Workers**: Since the setting of work standards and measurement of output in the case of indirect workers is not an easy task in respect of maintenance, internal transport, inspection, packing and cleaning, therefore the introduction of a system of payment by results for indirect workers is difficult.

In spite of the aforesaid difficulty, it has been felt necessary to provide for incentives to indirect workers, due to the following reasons:

1. **Dissatisfaction**: Payment of incentive bonus to direct workers and time rate to indirect workers leads to dissatisfaction and labour unrest.

2. **Entitlement**: Indirect workers are as much entitled to bonus as direct workers.

3. **Team Spirit**: Bonus payment to indirect workers creates team spirit.

4. **Increase in efficiency**: An incentive system for indirect workers assists in maintaining the efficiency of services such as plant repairs, stores maintenance, material handling etc.

5. **Dependence on indirect labour**: The efficiency of direct workers is reduced where their work is dependent upon the service rendered by the indirect workers.

A few examples of incentive schemes to indirect workers are as below:

(i) Incentive to supervisors and foremen: Supervisors and foremen are an important link between the management and the workers. Incentive payment to these persons would assist in maintaining all round efficiency. Incentive to supervisors and foremen may be provided in the form of non-financial benefits.

Incentive can also be provided to these workers in the form of Bonus. The extent of bonus which will be distributed as incentive will depend on the savings effected over the standards.

(ii) Incentive to maintenance and repairs staff: Under mass production work, repair and maintenance duties can be considered as routine and repetitive for which percentage of
efficiency can be evaluated. In case such an evaluation is not possible or practicable, a group bonus system may be established, on the basis of reduction in breakdown or on the number of complaints.

Illustration 22: (Calculation of earnings of each worker under group task)

A, B and C were engaged on a group task for which a payment of ₹ 725 was to be made. A’s time basis wages are ₹ 8 per day, B’s ₹ 6 per day and C’s ₹ 5 per day. A worked for 25 days; B worked for 30 days; and C for 40 days. Distribute the amount of ₹ 725 among the three workers.

Solution

Total wages on time basis : (₹)

<table>
<thead>
<tr>
<th>Worker</th>
<th>Wages on time basis</th>
<th>Group task Bonus 25%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25 @ ₹ 8</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>B</td>
<td>30 @ ₹ 6</td>
<td>45</td>
<td>225</td>
</tr>
<tr>
<td>C</td>
<td>40 @ ₹ 5</td>
<td>50</td>
<td>250</td>
</tr>
</tbody>
</table>

Payment for the task

Bonus : (₹ 725 – ₹ 580) 145

or, 25% of the time-basis wages. 725

Illustration 23: (Calculation of bonus earned by direct and indirect labour)

Both direct and indirect labours of a department in a factory are entitled to production bonus in accordance with a group incentive scheme, the outline of which is as follows:

(a) For any production in excess of the standard rate fixed at 16,800 tonnes per month (of 28 days) a general incentive of ₹ 15 per tonne is paid in aggregate. The total amount payable to each separate group is determined on the basis of an assumed percentage of such excess production being contributed by it, namely @ 65% by direct labour, @ 15% by inspection staff, @ 12% by maintenance staff and @ 8% by supervisory staff.

(b) Moreover, if the excess production is more than 20% above the standard, direct labour also get a special bonus @ ₹ 5 per tonne for all production in excess of 120% of standard.

(c) Inspection staff are penalized @ ₹ 20 per tonne for rejection by customer in excess of 2% of production.

(d) Maintenance staff are also penalized @ ₹ 20 per hour for breakdown.
3.62 Cost Accounting

From the following particulars for a month, work out production bonus earned by each group:

(a) Actual working days : 25
(b) Production : 21,000 tonnes
(c) Rejection by customer : 500 tonnes
(d) Machine breakdown : 40 hours

Solution

1. Standard output per day = \[
\frac{\text{Standard output per month}}{\text{Budgeted number of days in a month}}
\] = \[
\frac{16,800 \text{ tonnes}}{28 \text{ days}} = 600 \text{ tonnes}
\]

2. Standard output for 25 days = \[
600 \text{ tonnes} \times 25 \text{ days} = 15,000 \text{ tonnes}
\]

(a) General Incentive

(i) Standard output : 15,000 tonnes
(ii) Actual output : 21,000 tonnes
(iii) Excess output over standard : 21,000 – 15,000 = 6,000 tonnes
(iv) Percentage of excess : 40% of production to standard output : \[
\frac{6,000 \text{ tonnes}}{15,000 \text{ tonnes}} \times 100 = 40%
\]
(v) Aggregate general incentive : = Excess output × \$15 = 6,000 \text{ tonnes} \times \$15 = \$90,000
(vi) Allocation of general incentive

<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct labour</td>
<td>65%</td>
<td>$58,500</td>
</tr>
<tr>
<td>Inspection staff</td>
<td>15%</td>
<td>$13,500</td>
</tr>
<tr>
<td>Maintenance staff</td>
<td>12%</td>
<td>$10,800</td>
</tr>
<tr>
<td>Supervisory staff</td>
<td>8%</td>
<td>$7,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>$90,000</td>
</tr>
</tbody>
</table>

(b) Special bonus to direct workers

(i) 20% is the excess output over 120% of standard output or 3,000 tonnes (15,000 tonnes \times 20%)
(ii) Special incentive = 3,000 tonnes \times \$5 = \$15,000

(c) Penalty imposed on inspection staff

(i) Normal rejection = 2% of production = 2% of 21,000 tonnes
Labour 3.63

= 420 tonnes

(ii) Actual rejection = 500 tonnes

(iii) Excess rejection over normal rejection = 500 – 420 = 80 tonnes

(iv) Penalty = 80 tonnes \(\times 20\) per tonne = ₹ 1,600

(d) Penalty imposed on maintenance staff

(i) Breakdown hours = 40 hours

(ii) Penalty = 40 hours \(\times 20\) per hour = ₹ 800

Statement of production bonus earned by each group

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Direct inspection staff</th>
<th>Maintenance staff</th>
<th>Supervisory staff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>₹</td>
<td>₹</td>
<td>₹</td>
<td>₹</td>
</tr>
<tr>
<td>Aggregate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General incentive</td>
<td>58,500</td>
<td>13,500</td>
<td>10,800</td>
<td>90,000</td>
</tr>
<tr>
<td>Special bonus</td>
<td>15,000</td>
<td></td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>Penalty</td>
<td></td>
<td>(1,600)</td>
<td>(800)</td>
<td></td>
</tr>
<tr>
<td>Production bonus</td>
<td>73,500</td>
<td>11,900</td>
<td>10,000</td>
<td>1,02,600</td>
</tr>
</tbody>
</table>

3.10.14 Profit-sharing and Co-partnership schemes: A profit-sharing scheme implies that the net profit of business would be shared between the workers and the shareholders or the partners in a pre-determined ratio.

Co-partnership, on the other hand, implies that the workers shall own the business jointly with the shareholders. In this case, usually the workers share of profits is given in the form of shares.

Some employers in our country originally introduced profit-sharing schemes with a view of stimulating interest among workers for increasing production. But the schemes have not been successful on account of unwillingness on the part of the management to consult workers. Even a demand for copies of final accounts of the business to be shown to them has been considered by some employers to be an unwarranted interference. The question of bonus has thus been one of the major causes of industrial disputes in recent years. (Payment of compulsory bonus is now governed by the payment of Bonus Act.)

Though profit sharing has become a normal feature of the industrial life in this country, co-partnership is comparatively unknown. Nevertheless it must be pointed out that in England and other Western countries, a number of successful concerns have been allotting shares to their workers in proportion to their shares of bonus. Some of them have advanced loans to them to purchase shares. Both these forms of benefit have been quite popular with labour.
3.64 Cost Accounting

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Employees are made to feel that they</td>
<td>(i) Profit may fluctuate from year to year; there</td>
</tr>
<tr>
<td>too have a stake in the well-being of the</td>
<td>is thus an element of uncertainty in such schemes.</td>
</tr>
<tr>
<td>undertaking and have a contribution to make in</td>
<td>(ii) Profit depends upon many factors of which</td>
</tr>
<tr>
<td>earning of profits by improving production,</td>
<td>labour efficiency is only one. Insufficiency of</td>
</tr>
<tr>
<td>efficiency and operations.</td>
<td>bonus may lead to dissatisfaction instead of</td>
</tr>
<tr>
<td>(ii) Labour turnover may be reduced,</td>
<td>promoting good relations, if the good work done</td>
</tr>
<tr>
<td>particularly if a minimum period of service</td>
<td>by labour is nullified by other factors.</td>
</tr>
<tr>
<td>is laid down as a condition for participating</td>
<td>(iii) The reward may be too remote to sustain</td>
</tr>
<tr>
<td>in such schemes.</td>
<td>continued interest in and zeal for work.</td>
</tr>
<tr>
<td>(iii) Better team work and better cooperation.</td>
<td>(iv) There may be doubt and suspicion about the</td>
</tr>
<tr>
<td></td>
<td>profit disclosed.</td>
</tr>
<tr>
<td></td>
<td>(v) Since all are entitled to participate in such</td>
</tr>
<tr>
<td></td>
<td>schemes, there is no recognition of individual</td>
</tr>
<tr>
<td></td>
<td>merit.</td>
</tr>
<tr>
<td></td>
<td>(vi) The individual share of profit may be too</td>
</tr>
<tr>
<td></td>
<td>meagre to be appealing.</td>
</tr>
<tr>
<td></td>
<td>(vii) Since in practice bonus has to be fought</td>
</tr>
<tr>
<td></td>
<td>in India, so it has become an important cause of</td>
</tr>
<tr>
<td></td>
<td>labour disputes.</td>
</tr>
</tbody>
</table>

Workers share in the net profits of the firm can be calculated by any of the following ways:

(i) A fixed percentage may be allowed to the worker as bonus at the end of the financial year.
(ii) The profit earned, can be department wise and hence a fixed percentage of the department’s profit can be allowed as profit sharing.
(iii) Profits may be computed per unit of output and a part of profit may be allowed to workers on this basis.

_Treatment in Costing:_ In foreign countries bonus is an ex-gratia payment and hence it is regarded as an appropriation of profit not to be included in costs. In fact trade unions there do not look upon bonus with favour.

In India however, payment of bonus is compulsory under the Payment of Bonus Act under which 8.33% of wages earned or ₹ 100 whichever is higher, is the minimum bonus payable, the maximum being 20%. Hence bonus must be treated as part of costs in India.

There can be two methods of dealing with bonus:

(i) It may be treated as part of overheads; in any case, this must be so for bonus paid to indirect workers.
(ii) In the case of direct workers the bonus payable may be estimated beforehand and wage rates for costing purposes suitably inflated by including the bonus that would be paid.

**Example:** A worker gets ₹ 800 p.m. as wages and it is expected that he will be paid two months' wages as bonus. His total earning will be ₹ 11,200 (₹ 9,600 + ₹ 1,600). If the worker works for 2,400 hours in a year the wage rate for costing purposes will be: ₹ 4.67, i.e., ₹ 11,200/2,400 hours.

**Illustration 24: (Calculation and verification of wages paid to the worker)**

During audit of account of G Company, your assistant found errors in the calculation of the wages of factory workers and he wants you to verify his work.

He has extracted the following information:

(i) The contract provides that the minimum wage for a worker is his base rate. It is also paid for downtimes i.e., the machine is under repair or the worker is without work. The standard work week is 40 hours. For overtime production, workers are paid 150 percent of base rates.

(ii) **Straight Piece Work** – The worker is paid at the rate of 20 paise per piece.

(iii) **Percentage Bonus Plan** – Standard quantities of production per hour are established by the engineering department. The workers' average hourly production, determined from his total hours worked and his production, is divided by the standard quantity of production to determine his efficiency ratio. The efficiency ratio is then applied to his base rate to determine his hourly earnings for the period.

(iv) **Emerson Efficiency Plan** – A minimum wages is paid for production upto 66-2/3% of standard output or efficiency. When the workers production exceeds 66-2/3% of the standard output, he is paid bonus as per the following table:

<table>
<thead>
<tr>
<th>Efficiency Level</th>
<th>Bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 66 2/3 %</td>
<td>Nil</td>
</tr>
<tr>
<td>66 2/3 % to 79 %</td>
<td>10%</td>
</tr>
<tr>
<td>80% – 99%</td>
<td>20%</td>
</tr>
<tr>
<td>100% – 125%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Your assistant has produced the following schedule pertaining to certain workers of a weekly pay roll:
Prepare a schedule showing whether the above computation of workers’ wages are correct or not. Give details.

Solution

<table>
<thead>
<tr>
<th>Workers</th>
<th>Wage Incentive Plan</th>
<th>Total Hours</th>
<th>Down Time</th>
<th>Units Produced</th>
<th>Standard Units</th>
<th>Base Rate</th>
<th>Gross Wages as per Book</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajesh</td>
<td>Straight piece work</td>
<td>40</td>
<td>5</td>
<td>400</td>
<td>—</td>
<td>1.80</td>
<td>85</td>
</tr>
<tr>
<td>Mohan*</td>
<td>Straight piece work</td>
<td>46</td>
<td>—</td>
<td>455</td>
<td>—</td>
<td>1.80</td>
<td>95</td>
</tr>
<tr>
<td>John</td>
<td>Straight piece work</td>
<td>44</td>
<td>—</td>
<td>425</td>
<td>—</td>
<td>1.80</td>
<td>85</td>
</tr>
<tr>
<td>Harish</td>
<td>Percentage bonus plan</td>
<td>40</td>
<td>4</td>
<td>250</td>
<td>200</td>
<td>2.20</td>
<td>120</td>
</tr>
<tr>
<td>Mahesh</td>
<td>Emerson</td>
<td>40</td>
<td>—</td>
<td>240</td>
<td>300</td>
<td>2.10</td>
<td>93</td>
</tr>
<tr>
<td>Anil</td>
<td>Emerson</td>
<td>40</td>
<td>—</td>
<td>600</td>
<td>500</td>
<td>2.00</td>
<td>126</td>
</tr>
</tbody>
</table>

(40 hours production)

* Total hours of Mohan include 6 overtime hours.

Schedule showing the correct figure of minimum wages, gross wages and wages to be paid

<table>
<thead>
<tr>
<th>Workers</th>
<th>Wage Incentive Plan</th>
<th>Minimum wages</th>
<th>Gross wages computed as per Incentive plan</th>
<th>Gross wage as per Book</th>
<th>Wages to be paid are Maximum of : minimum and gross computed wages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajesh</td>
<td>Straight piece work</td>
<td>72.00</td>
<td>80.00</td>
<td>85</td>
<td>80.00</td>
</tr>
<tr>
<td>Mohan*</td>
<td>Straight piece work</td>
<td>88.20</td>
<td>91.00</td>
<td>95</td>
<td>91.00</td>
</tr>
<tr>
<td>John</td>
<td>Straight piece work</td>
<td>82.80</td>
<td>85.00</td>
<td>85</td>
<td>85.00</td>
</tr>
<tr>
<td>Harish</td>
<td>Percentage bonus plan</td>
<td>88.00</td>
<td>110.00</td>
<td>120</td>
<td>110.00</td>
</tr>
<tr>
<td>Mahesh</td>
<td>Emerson</td>
<td>84.00</td>
<td>100.80</td>
<td>93</td>
<td>100.80</td>
</tr>
<tr>
<td>Anil</td>
<td>Emerson</td>
<td>80.00</td>
<td>116.00</td>
<td>126</td>
<td>116.00</td>
</tr>
</tbody>
</table>
Labour 3.67

Working notes:

1. Minimum wages = Total normal hours × rate per hour
   = 40 hours × ₹ 1.80 = ₹ 72

   Gross wages (computed) = No. of units × rate per unit
   as per incentive plan = 400 units × ₹ 0.20 = ₹ 80

2. Minimum wages = Total normal hours × Rate per hour + Overtime hours × Overtime rate per hour
   = 40 hours × ₹ 1.80 + 6 hours × ₹ 2.70
   = ₹ 72 + ₹ 16.20 = ₹ 88.20

   Gross wages (computed) as per incentive plan = 455 units × ₹ 0.20 = ₹ 91.00

3. Minimum wages
   = 40 hours × ₹ 1.80 + 4 hours × ₹ 2.70
   = ₹ 72 + ₹ 10.80 = ₹ 82.80

   Gross wages (computed) as per incentive plan = 425 units × ₹ 0.20 = ₹ 85

4. Minimum wages
   = 40 hours × ₹ 2.20 = ₹ 88

   Efficiency of worker = \( \frac{\text{Actual production per hour}}{\text{Standard production per hour}} \times 100 \)
   = \( \frac{250\text{ units/40 hours}}{200\text{ units/40 hours}} \times 100 = 125\% \)

   Hourly rate = Rate per hour × Efficiency of worker
   = ₹ 2.20 \times 125\% = ₹ 2.75

   Gross wages (computed) as percentage of bonus plan = 40 hours × ₹ 2.75 = ₹ 110/-

5. Minimum wages
   = 40 hours × ₹ 2.10 = ₹ 84

   Efficiency of worker = \( \frac{240\text{ units/40 hours}}{300\text{ units/40 hours}} \times 100 = 80\% \)

   Bonus (as per Emerson’s plan) = Total minimum wages × Bonus percentage
   = ₹ 84 × 20\% = ₹ 16.80

   Gross wages (computed) as per Emerson’s Efficiency plan = Minimum wages + Bonus
   = ₹ 84 + ₹ 16.80 = ₹ 100.80
6. Minimum wages = 40 hours × ₹ 2 = ₹ 80

Efficiency of worker = \( \frac{600}{500} \times 100 = 120\% \)

Bonus (as per Emerson’s plan) = ₹ 80 × 45% = ₹ 36

Gross wages (computed) as per Emerson’s Efficiency plan = ₹ 80 + ₹ 36 = ₹ 116

Illustration 25: (Evaluation of proposal)

The present output details of a manufacturing department are as follows:

Average output per week 48,000 units from 160 employees

Saleable value of output ₹ 6,00,000

Contribution made by output towards fixed expenses and profit ₹ 2,40,000

The Board of Directors plans to introduce more mechanisation into the department at a capital cost of ₹ 1,60,000. The effect of this will be to reduce the number of employees to 120, and increasing the output per individual employee by 60%. To provide the necessary incentive to achieve the increased output, the Board intends to offer a 1% increase on the piece work rate of ₹ 1 per unit for every 2% increase in average individual output achieved.

To sell the increased output, it will be necessary to decrease the selling price by 4%.

Calculate the extra weekly contribution resulting from the proposed change and evaluate for the Board’s information, the desirability of introducing the change.

Solution

1. Present average output per employee and total future expected output per week

Present average output per employees per week = \( \frac{\text{Total present output}}{\text{Total number of present employees}} \)

= \( \frac{48,000 \text{ units}}{160 \text{ employees}} \)

= 300 units

Total Future expected output per week = Total number of future employees

(present output + 60% of present output per employee)

= 120 employees (300 units + 60% × 300 units)

= 57,600 units
2. Present and proposed piece work rate

   Present piece work rate = ₹ 1.00 per unit
   Proposed piece work rate = Present piece work rate + 30% × ₹ 1
                            = ₹ 1.00 + 0.30 P
                            = ₹ 1.30 per unit

3. Present and proposed sale price per unit

   Present sales price per unit = ₹ 12.50
      (₹ 6,00,000/48,000 units)

   Proposed sale price per unit = ₹ 12
      (₹ 12.50 – 4% × ₹ 12.50)

4. Present marginal cost (excluding wages) per unit:

   \[
   \text{Present marginal cost} = \frac{\text{Present sales value} - \text{Fixed expenses & profit} - \text{Contribution towards present wages}}{\text{Present output (units)}}
   \]

   \[
   = \frac{₹ 6,00,000 - ₹ 2,40,000 - ₹ 48,000}{48,000 \text{ units}} = ₹ 6.50 \text{ per unit}
   \]

   Statement of extra weekly contribution

   (Information resulting from the proposed change of mechanisation meant for Board's evaluation)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected sales units</td>
<td>57,600</td>
</tr>
<tr>
<td>(Refer to Working note 1)</td>
<td></td>
</tr>
<tr>
<td>Sales value : (A) (57,600 units × ₹ 12)</td>
<td>₹ 6,91,200</td>
</tr>
<tr>
<td>(Refer to Working note 3)</td>
<td></td>
</tr>
<tr>
<td>Marginal costs (excluding wages) : (B) (57,600 units × ₹ 6.50)</td>
<td>₹ 3,74,400</td>
</tr>
<tr>
<td>(Refer to Working note 4)</td>
<td></td>
</tr>
<tr>
<td>Wages : (C) (57,600 units × ₹ 1.30)</td>
<td>₹ 74,880</td>
</tr>
<tr>
<td>(Refer to Working note 2)</td>
<td></td>
</tr>
<tr>
<td>Total marginal cost : (D) = (B) – (C)</td>
<td>₹ 4,49,280</td>
</tr>
<tr>
<td>Marginal contribution : [(A) – (D)]</td>
<td>₹ 2,41,920</td>
</tr>
<tr>
<td>Less : Present contribution</td>
<td>₹ 2,40,000</td>
</tr>
<tr>
<td>Increase in contribution (per week)</td>
<td>₹ 1,920</td>
</tr>
</tbody>
</table>

Evaluation: Since the mechanisation has resulted in the increase of contribution to the extent of ₹ 1,920 per week, therefore the proposed change should be accepted.
3.70 Cost Accounting

We have examined the advantages and disadvantages of various methods of remunerating labour, so we can summarise below that the best method of remuneration can be adjudged through the following points:

1. A minimum wage should be guaranteed to all workers.
2. Efficient workers are given incentives in the form of bonus so that they can work harder and produce more.
A share in profits of the firm is given to workers in addition to the minimum wages and bonus

3.11 Absorption of Wages

3.11.1 Elements of wages: In common parlance, the term ‘wages’ represents monetary payment which an employee receives at regular intervals for the services rendered. Strictly speaking, however, from the point of view of the employer and the cost to the industry, wages should be taken to include also non-monetary benefits which an employee receives by virtue of employment. Such non-monetary benefits may include:

(i) Medical facilities;
(ii) Educational and training facilities;
(iii) Recreational and sports facilities;
(iv) Housing and social welfare; and
(v) Cost of subsidised canteen and co-operative societies.

Such benefits are generally given in an industrial establishment. In some cases the provision of benefits is compulsory. Therefore, while computing the wage cost per worker, the monetary value of such non-monetary benefits should also be taken into account.

The monetary part of a worker’s remuneration includes the basic wages, dearness allowance, overtime wages, other special allowance, if any, production bonus, employer’s contribution to the provident fund, Employees State Insurance scheme premium, contribution to pension fund, leave pay, etc.

The basic wage is the payment for work done, measured in terms of hours attended or the units produced, as the case may be. The basic wage rate is not normally altered unless there is a fundamental change in the working conditions or methods of manufacture.

Dearness allowance is an allowance provided to cover the increase in cost of living from one period to another. This allowance is calculated either as percentage of the basic wage or as a fixed amount for the days worked. In either case, the percentage or the fixed amount is subject to revision whenever the cost of living index or consumer price index rises or falls by a certain figure as agreed to by the employer with the labour union. When permanent rise in the cost of living index occurs, a part of the dearness allowance is often absorbed in the basic wage.

Overtime allowance is an allowance paid for the extra hours worked at the rates laid down in
the Factories Acpt. In certain industries, where special allowance for the working conditions, tool maintenance, etc., are paid they are also considered as part of wages.

*Production Bonus* is an incentive payment made to workers for efficiency that results in production above the standard. There are different methods of computing incentives. Under the Payment of Bonus Act, a worker is entitled to compulsory bonus of 8.33% of wages earned in the relevant year or ₹ 100 (whichever is greater). The bonus may be up to 20% of wages depending upon the quantum of profits calculated as per the Act.

**3.11.2. Component of wages cost or wages for costing purposes:** In addition to wages (including allowances, such as D.A.) that are paid to workers, a firm may have to spend on many other items (such as premium to the ESI or provident fund or bonus).

Further, the worker does not spend all the time for which he is paid on productive work. This is because he is entitled to weekly holiday and various type of leave. There is also a certain amount of unavoidable idle time. The question is to what extent such additional payment or cost in respect of labour can be charged directly to unit of cost as part of direct labour cost? Of course, in the case of indirect labour, all such payments as also the wages paid to them, must be treated as part of overheads.

But in the case of direct workers, two alternatives are possible. The additional charges may be treated as overheads. Alternatively, the wage rates being charged to job may be computed by including such payments; automatically then, such payments will be charged to the work done alongwith wages of the worker. (It should be remembered that such wage rate will be only for costing purposes and not for payment to workers). The total of wages and additional payment should be divided by effective hours of work to get such wage rates for costing purposes.

**Illustration 26: (Calculation of wage rate per hour)**

A worker is paid ₹1000 per month and a dearness allowance of ₹ 200 p.m. Worker contribution to provident fund is @ 10% and employer also contributes the same amount as the employee. The Employees State Insurance Corporation premium is 6.5% of wages of which 1.75% is paid by the employees. It is the firm’s practice to pay 2 months’ wages as bonus each year.

The number of working days in a year are 300 of 8 hours each. Out of these the worker is entitled to 15 days leave on full pay. Calculate the wage rate per hour for costing purposes.

**Solution**

Wages paid to worker during the year (₹ 1,000 +200) x 12 = 14,400

Add: Employer Contribution to:

- Provident Fund @ 10% = 1,440
- E.S.I. Premium 4.75% (6.5 – 1.75) = 684

Bonus at 2 months’ wages (Basic + DA) = 2,400

Total = 18,924

Effective hours per year: 285 × 8 = 2,280

Wage-rate per hour (for costing purpose): ₹ 18,924/2,280 hours = ₹8.30
Illustration 27: (Calculation of earnings and labour cost)

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:

<table>
<thead>
<tr>
<th>Workers</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic wages</td>
<td>₹100</td>
<td>160</td>
</tr>
<tr>
<td>Dearness allowance (on basic wages)</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Contribution to provident fund (on basic wages plus DA)</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Contribution to employees' state insurance (on basic wages plus DA)</td>
<td>1.75%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Overtime</td>
<td>Hours</td>
<td>10</td>
</tr>
</tbody>
</table>

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 is 4.75% and Provident Fund are at equal rates of employees’ contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

<table>
<thead>
<tr>
<th>Jobs</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker A</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Worker B</td>
<td>50%</td>
<td>20%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Overtime was done on job Y.

Solution

Statement showing Earnings of Workers A and B

<table>
<thead>
<tr>
<th>Workers</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic wages</td>
<td>₹100.00</td>
<td>160.00</td>
</tr>
<tr>
<td>Dearness allowance (50% of basic wages)</td>
<td>50.00</td>
<td>80.00</td>
</tr>
<tr>
<td>Overtime wages (Refer to working note 1)</td>
<td>15.00</td>
<td>-</td>
</tr>
<tr>
<td>Gross wages earned</td>
<td>₹165.00</td>
<td>240.00</td>
</tr>
<tr>
<td>Less: - Provident fund-10%</td>
<td>15.00</td>
<td>24.00</td>
</tr>
<tr>
<td>- ESI-1.75%</td>
<td>2.63</td>
<td>4.20</td>
</tr>
<tr>
<td>Net wages paid</td>
<td>₹147.37</td>
<td>211.80</td>
</tr>
</tbody>
</table>

Statement of Labour cost

<table>
<thead>
<tr>
<th></th>
<th>₹</th>
<th>₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross wages (excluding overtime)</td>
<td>150.00</td>
<td>240.00</td>
</tr>
<tr>
<td>Employer’s contribution to P.F@10% and E.S.I.@ 4.75%</td>
<td>15.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Ordinary wages</td>
<td>7.12</td>
<td>11.40</td>
</tr>
<tr>
<td>Labour rate per hour</td>
<td>₹0.86</td>
<td>1.38</td>
</tr>
<tr>
<td>(₹172.12/200)</td>
<td>(₹ 275.40/200)</td>
<td></td>
</tr>
</tbody>
</table>
Statement showing allocation of wages to jobs

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Total Wages (₹)</th>
<th>X (₹)</th>
<th>Y (₹)</th>
<th>Z (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker A:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary wages: (4:3:3)</td>
<td>172.12</td>
<td>68.85</td>
<td>51.63</td>
<td>51.64</td>
</tr>
<tr>
<td>Overtime</td>
<td>15.00</td>
<td>—</td>
<td>15.00</td>
<td>—</td>
</tr>
<tr>
<td>Worker B:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary wages: (5:2:3)</td>
<td>275.40</td>
<td>137.70</td>
<td>55.08</td>
<td>82.62</td>
</tr>
<tr>
<td>Total</td>
<td>462.52</td>
<td>206.55</td>
<td>121.71</td>
<td>134.26</td>
</tr>
</tbody>
</table>

Working Notes-1
Normal wages are considered as basic wages
\[
\text{Overtime} = 2 \times \frac{(\text{Basic} + \text{D.A.})}{200} \times 10 \text{ hours}
\]
\[
= 2 \times \left(\frac{\text{₹} 150}{200}\right) \times 10 \text{ hours} = \text{₹} 15
\]

Illustration 28: (Treatment of abnormal idle time)
In a factory working six days in a week and eight hours each day, a worker is paid at the rate of ₹ 100 per day basic plus D.A. @ 120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to:
- Job X: 15 hrs.
- Job Y: 12 hrs.
- Job Z: 13 hrs.

The time not booked was wasted while waiting for a job. In Cost Accounting, how would you allocate the wages of the workers for the week?

Solution
Working notes:
(i) Total effective hours in a week:
\[
[(8 \text{ hrs.} - (30 \text{ mts.} + 10 \text{ mts.}.)] \times 6 \text{ days} = 44 \text{ hours}
\]
(ii) Total wages for a week:
\[
(\text{₹} 100 + 120\% \text{ of ₹ 100}) \times 6 \text{ days} = \text{₹} 1,320
\]
(iii) Wage rate per hour:
\[
= \text{₹} 30
\]
(iv) Time wasted waiting for job (Abnormal idle time):
\[
= 44 \text{ hrs.} - (15 \text{ hrs.} + 12 \text{ hrs.} + 13 \text{ hrs.})
= 4 \text{ hrs.}
\]

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3.11.3 Holiday and leave wages: One alternative to account for wages paid on account of paid holiday and leave can be to include them as departmental overheads. In such a case, it is necessary to record such wages separately from “worked for wages”. Such a segregation can be made possible by providing a separate column in the payroll for holiday and leave wages in the same way as there are columns for dearness allowance, provident fund deductions, etc. If, however, a separate or additional column cannot be provided for this purpose it would be necessary to analyse the payroll periodically to ascertain how much of the total payment pertains to “worked for wages” and how much is attributed to leave and holiday wages.

Another way could be to inflate the wage rate for costing purposes to include holiday and leave wages. This can be done only in the case of direct workers.

Illustration 29: (Calculation of leave wages)

Calculate the labour hour rate of a worker X from the following data:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic pay</td>
<td>₹ 1,000 p.m.</td>
</tr>
<tr>
<td>D.A.</td>
<td>₹ 300 p.m.</td>
</tr>
<tr>
<td>Fringe benefits</td>
<td>₹ 100 p.m.</td>
</tr>
</tbody>
</table>

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

Solution

(a) (i) Effective working days in a year 300

Less: Leave days on full pay 20

Effective working days 280 days

Total effective working hours (280 days × 8 hours) 2,240

(ii) Total wages paid in a year (₹)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic pay</td>
<td>12,000</td>
</tr>
<tr>
<td>D.A.</td>
<td>3,600</td>
</tr>
<tr>
<td>Fringe benefits</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Total 16,800

(iii) Hourly rate: ₹ 16,800/2,240 hours ₹ 7.50
3.11.4 **Night shift allowance:** In some cases, workers get extra payment if they work at night. Since the extra payment is not for any particular job, therefore such a payment should be treated as part of overheads.

3.11.5 **Principles of remuneration:** The term ‘remuneration’ has been defined as the reward for labour and service. It is the result of the agreement between the employer and the employee, whereby for a specified work or service rendered by the employee the employer agrees to pay a specified sum of money. Apart from this an employee by virtue of the fact that he is an employee becomes entitled to certain non-monetary benefits.

The method of remuneration adopted varies from industry to industry and, in certain cases, even among different units in the same industry. Whatever be the variation, the method of fixing remuneration payable to the various categories of employees has to be based on certain accepted principles. These are:

(i) **Geographical Area Based:** Wage-rates in an industry should be fixed in conformity with the general wage-levels in the geographical area i.e. the rate should be more or less the same for similar efforts and skill. The wage-level in an area would in turn depend upon demand for labour, the availability of labour, the cost of living in the area, the wage levels in neighbouring industrial area, and the capacity of the particular industry to pay.

(ii) **Performance/Job Based:** Wage-rates should be related to the degree of skill, effort, initiative and responsibility that the employee is expected to assume in respect of the various jobs he may be called upon to perform. There should be generally equal pay for equal work.

(iii) **Minimum Wages:** Wage-rates should guarantee a minimum wage regardless of the existence of factors listed under (ii) above, particularly when the working conditions are difficult and dangerous.

(iv) **Maintain Standard of living:** Wage-rates are considered satisfactory only if they enable the workers to maintain a reasonable standard of living.

(v) **Separate wage rates for different classes of employees:** Separate wage rates should be fixed for different classes of employees since each class expects to maintain a different standard of living; also the education, physical and mental efforts and responsibility required for performing different jobs are not the same.

(vi) **Incentive as per output:** It should be possible for worker to increase his earnings through extra effort and by increasing output. If he alone is responsible, he should have the full benefit of the increased productivity. Otherwise, if increased output has resulted from co-operation between management and workers both should share the benefit.

It is important that these basic principles should be recognised in fixing the wage rate of workers; otherwise, there will be dissatisfaction among the employees and, consequently, there will be higher labour turnover. Satisfactory employer-employee relationship is a primary necessity for industrial development and this has to be ensured to a very great degree, by satisfactory schemes of remunerating labour.
The aim should be to keep labour cost per unit of output (or service) as low as possible. It is not the same as keeping wages at low levels.

There is a definite correlation between wages and productivity; high wages often lead to such an increase in productivity that wages per unit of output fall. However, this rule is also subject to diminishing returns—a point is reached at which any further increase in wage rates does not bring about a corresponding increase in efficiency. But generally, higher wages result in lower cost per unit.

Wages affect the national economy through cost of goods produced. If an increase in wages outpaces the corresponding increase in productivity, goods become costlier and cannot compete with those of other countries in the world markets.

From the point of view of an expert it is necessary to keep wages in check like other costs. The safe rule is to link up wages with productivity.

3.11.6 Absorption rates of labour cost: Labour cost as stated above include monetary compensation and non-monetary benefits to workers.

Monetary benefits include, basic wages, D.A., overtime pay, incentive or production bonus contribution to employee provident fund, House Rent Allowance, Holiday and vacation pay etc.

The non-monetary benefits include medical facilities, subsidized canteen services, subsidized housing, education and training facilities.

Accounting of monetary and non-monetary benefits to indirect workers does not pose any problems because the total of monetary and non-monetary benefits are treated as overhead and absorbed on the basis of rate per direct labour hour, if overheads are predominantly labour oriented.

For direct workers, the ideal method is to charge jobs or units produced by supplying per hour rate calculated as below:

\[
\text{Rate per hour} = \frac{\text{Total of estimated monetary benefits and cost of non-monetary benefits}}{\text{Budgeted direct labour hours} - \text{Normal idle time}}
\]

Another alternative method is to treat the monetary benefits other than basic wages and dearness allowance as well as cost of non-monetary benefits as overheads.

3.12 Efficiency Rating Procedures

Efficiency is usually related with performance and may be computed by comparing the time taken with the standard time allotted to perform the given job/task.

If the time taken by a worker on a job equals or less than the standard time, then he is rated efficient.

In case he takes more time than the standard time he is rated as inefficient.

\[
\text{Efficiency in } \% = \frac{\text{Time allowed as per std.}}{\text{Time taken}} \times 100
\]

For efficiency rating of employees the following procedures may be followed:
1. **Determining standard time/performance standards:** The first step is to determine the standard time taken by a worker for performing a particular job/task. The standard time can be determined by using Time & Motion study or Work study techniques. While determining the standard time for a job/task a heterogeneous group of workers is taken and contingency allowances are added for determining standard time.

2. **Measuring Actual Performance of workers:** For computing efficiency rating it is necessary to develop a procedure for recording the actual performance of workers. The system developed should record the output of each worker along with the time taken by him.

3. **Computation of efficiency rating:** The efficiency rating of each worker can be computed by using the above mentioned Formula.

3.12.1 **Need for efficiency rating**

1. As discussed earlier when a firm follows a system of payment by results, the payment has a direct relationship with the output given by a worker. The firm for making payment to worker is required to ascertain his efficiency level. For instance, under Taylor's differential piece work system the lower rate i.e. 83% of piece rate is given to a worker when his efficiency rating is less than 100% and higher rate viz., 125% of piece rate is offered at efficiency level of either 100% or more. Similarly under Emersion efficiency plans bonus is paid at rising scale at various level of efficiency, ranging from 66.67% to 150%.

2. The efficiency rating also helps the management in preparing labour requirement budget or for preparing manpower requirements. For example, let P Ltd. manufactures two products by using one grade of labour. The following estimates are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Budgeted production (units)</th>
<th>Std. hrs. allowed per product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product A</td>
<td>3,480</td>
<td>5</td>
</tr>
<tr>
<td>Product B</td>
<td>4,000</td>
<td>4</td>
</tr>
</tbody>
</table>

It is further worked out that the efficiency rating (efficiency ratio) for productive hours worked by direct workers in actually manufacturing the production is 80% then the exact standard labour requirement can be worked out as follows:

<table>
<thead>
<tr>
<th>Product A</th>
<th>Product B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted production (in units)</td>
<td>3,480</td>
<td>4,000</td>
</tr>
<tr>
<td>Std. hours allowed for budgeted production</td>
<td>17,400</td>
<td>16,000</td>
</tr>
<tr>
<td>Std. labour required for 100% efficiency level</td>
<td>$\left( \frac{33,400 \times 100}{80} \right) = 41,750$ hours</td>
<td></td>
</tr>
</tbody>
</table>
3.78 Cost Accounting

**Labour productivity**: Productivity is generally determined by the input/output ratio. In the case of labour it is calculated as below:

<table>
<thead>
<tr>
<th>Standard time for doing actual amount of work</th>
<th>Actual time taken to do work</th>
</tr>
</thead>
</table>

Labour productivity is an important measure for measuring the efficiency of individual workers. It is an index of efficiency and a sign of effectiveness in the utilisation of resources—men, materials, capital, power and all kinds of services and facilities.

It is measured by the output in relation to input. Productivity can be improved by reducing the input for a certain quantity or value of output or by increasing the output from the same given quantity or value of input.

**Factors for increasing labour productivity**: The important factors which must be taken into consideration for increasing labour productivity are as follows:

1. Employing only those workers who possess the right type of skill.
2. Placing a right type of man on the right job.
3. Training young and old workers by providing them the right types of opportunities.
4. Taking appropriate measures to avoid the situation of excess or shortage of labour at the shop floor.
5. Carrying out work study for the fixation of wage rate, and for the simplification and standardisation of work.

### 3.13 Summary

- **Labour Cost**: Cost incurred for hiring of human resource of employees
- **Direct Labour**: Any 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.
- **Idle Time**: The time for which the employer pays but obtains no direct benefit or for no productive purpose.
- **Normal Idle Time**: Time which cannot be avoided or reduced in the normal course of business. The cost of normal idle time should be charged to the cost of production.
- **Abnormal Idle Time**: It arises on account of abnormal causes and should be charged to Costing Profit and Loss account.
- **Time Keeping**: It refers to correct recording of the employees attendance time
- **Time Booking**: It is basically recording the details of work done and the time spent by workers on each job or process.
- **Overtime**: Payment to workers, when a worker works beyond the normal working hours. Usually overtime has to be paid at double the rate of normal hours.
- **Overtime Premium**: It’s the amount of extra payment paid to a worker under overtime.
• **Labour Turnover**: It is the rate of change in labour force during a specified period due to resignation, retirement and retrenchment. If the labour turnover is high, it’s a sign of instability and may affect the profitability of the firm.

- Labour turnover can be measured through the following methods:
  
  (i) **Replacement Method**:
      \[
      \text{Replacement Method} = \left( \frac{\text{Number of employees replaced}}{\text{Average number of employees on roll}} \right) \times 100
      \]

  (ii) **Separation Method**:
      \[
      \text{Separation Method} = \left( \frac{\text{Number of employees separated during the year}}{\text{Average number of employees on roll during the period}} \right) \times 100
      \]

  (iii) **Flux Method**:
      \[
      \text{Flux Method} = \left( \frac{\text{Number of employees separated} + \text{number of employees replaced}}{\text{Average number of employees on roll during the period}} \right) \times 100
      \]

  (iv) **Labour turnover due to new recruitment**:
      \[
      \text{Labour turnover due to new recruitment} = \frac{\text{No. of new workers joining in a period (excluding replacements)}}{\text{Average number of workers on the roll in a period}}
      \]

  (v) **Labour turnover including accessions**:
      \[
      \text{Labour turnover including accessions} = \frac{\text{No. of new workers joining in a period (excluding replacements)}}{\text{Average number of workers on the roll in a period}}
      \]

      OR
      \[
      \text{Labour turnover including accessions} = \frac{\text{No. of separations + No. of accessions}}{\text{Average number of workers}} \times 100
      \]

• **Incentives**: It is the simulation for effort and effectiveness by offering monetary inducement or enhanced facilities.

• **Time Rate System**: The amount of wages due to a worker are arrived at by multiplying the time worked by the appropriate time rate.

• **Differential Time Rate**: Different hourly rates are fixed for different levels of efficiency. Upto a certain level a fixed rate is paid and based on the efficiency level the hourly rate increases gradually.

• **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**: For different level of output below and above the standard,
different piece rates are applicable.

(i) Taylor's Differentials Piece Work system:

<table>
<thead>
<tr>
<th>Output/Efficiency</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100%</td>
<td>83% of normal rate</td>
</tr>
<tr>
<td>≥ 100%</td>
<td>125% of normal rate or 150% of lower rate</td>
</tr>
</tbody>
</table>

(ii) Merrick Differential Piece Work System:

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Piece rate applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 83%</td>
<td>Normal rate</td>
</tr>
<tr>
<td>Above 83% and upto 100%</td>
<td>10% above normal rate.</td>
</tr>
<tr>
<td>Above 100%</td>
<td>20% or 30% above normal rate.</td>
</tr>
</tbody>
</table>

- **Gantt Task and bonus system**

<table>
<thead>
<tr>
<th>Output</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output below standard</td>
<td>guaranteed time rate.</td>
</tr>
<tr>
<td>Output at standard</td>
<td>Time rate plus bonus of 20% (usually) of time rate.</td>
</tr>
<tr>
<td>Output above standard</td>
<td>High piece rate on worker’s whole output.</td>
</tr>
</tbody>
</table>

It is so fixed, so as to include a bonus of 20% of the time rate

- **Emerson's Efficiency system**

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;66.67%</td>
<td>Hourly Rate</td>
</tr>
<tr>
<td>66.67%-100%</td>
<td>Bonus varies from 1% to 20%</td>
</tr>
<tr>
<td>≥ 100%</td>
<td>Bonus of 20% of basic + 1% of every 1% increase in efficiency.</td>
</tr>
</tbody>
</table>

- **Halsey System**: \(\text{Time taken} \times \text{Time rate} + 50\% \text{ of time saved} \times \text{Time rate}\).

- **Halsey Weir Plan**: same as Halsey system but bonus is paid at 30%.

- **Rowan System**: \(\text{Time taken} \times \text{Rate per hour} + \frac{\text{Time Saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}\)

- **Barth System**: \(\text{Earnings} = \text{Hourly rate} \times \sqrt{\text{Standard hours} \times \text{Hours worked}}\)

- **Job Analysis**: A study of job in all phases for the purpose of laying down job description and job specifications.

- **Labour Productivity**: It is the index of labour efficiency and indicates the effectiveness in utilization of labour.
Labour 3.81

\[
\text{Standard time for doing actual amount of work} \quad \frac{\text{Actual time taken to do work}}{
\]

- **Efficiency Rating:** \( \frac{\text{Time allowed as per std.}}{\text{Time taken}} \times 100 \)

- **Rate of Absorption of Wages:**

\[
\frac{\text{Total of estimated monetary benefits and cost of non-monetary benefits}}{\text{Budgeted direct labour hours - Normal idle time}}
\]

- **Wage Abstract:** A summary giving details of wages to be charged to individual jobs, work orders or processes for a specific period.