



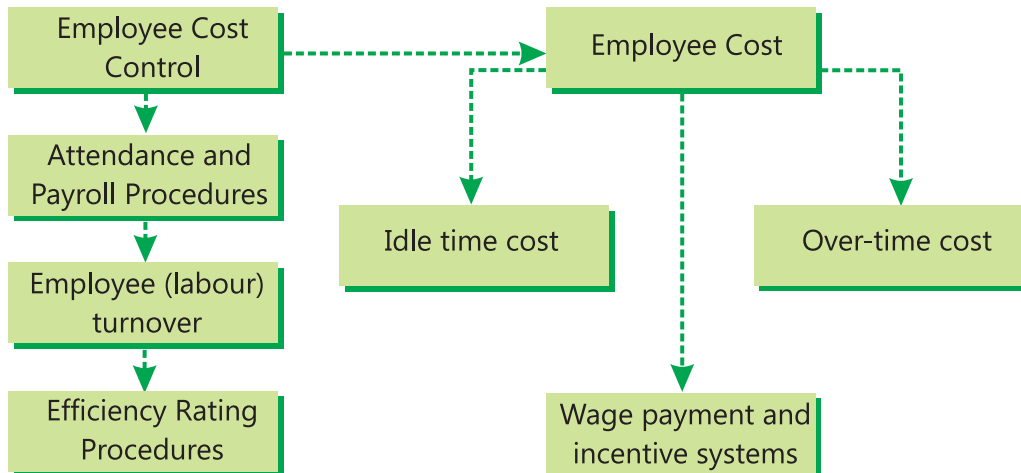
EMPLOYEE COST AND DIRECT EXPENSES



LEARNING OUTCOMES

- ☐ State the meaning and importance of employee (labour) cost in an organisation.
- ☐ Discuss the attendance and payroll procedures.
- ☐ State the meaning and treatment of idle time and overtime cost.
- ☐ Compute employee (labour) turnover, discuss its meaning, reasons, methods of measurement and cost impacts.
- ☐ Discuss and apply the various methods of remuneration and incentive system in calculation of wages, bonus etc.
- ☐ Discuss the efficiency rating procedures.

CHAPTER OVERVIEW



3.1 INTRODUCTION

To manufacture a product or to make provision for service, the role of human exertion is inevitable. The term used for human resources may include workers, employees, labourers, staffs etc. Whatsoever nomenclature may be used to denote them; they are required to be compensated for their exertions. The compensation so paid, either in monetary terms or in kind and facility is known as wages. Cost of paying wages to workers is popularly known as labour cost as it relates to labour (exertion) they put for manufacturing of product or provision of services; hence, employee cost is also interchangeably known as labour cost. In a nutshell, employee cost is wider term which includes wages, salary, bonus, incentives etc. paid to an employee and charged to a cost object as labour cost.

Unlike other costs, employee costs are influenced by human behavior. Due to this peculiarity, divergence in employee compensation is observed across the different industries. Wages are determined on both quantitative and qualitative factors like volume of work, skills required etc. Hence, it is necessary that employees should be monitored, measured, and compensated appropriately to achieve economy in cost, efficiency in performance and effectiveness in desired output.



3.2 EMPLOYEE (LABOUR) COST

Employee (Labour) cost : Benefits paid or payable to the employees of an entity, whether permanent, or temporary for the services rendered by them. Employee cost includes payments made in cash or kind. Employee cost includes the following:

- (i) Wages and salary;
- (ii) Allowances and incentives;
- (iii) Payment for overtimes;
- (iv) Employer's contribution to Provident fund and other welfare funds;
- (v) Other benefits (leave with pay, free or subsidised food, leave travel concession etc.) etc.

Classification of Employee (Labour) cost : Employee cost are broadly classified as direct and indirect employee cost.

(i) Direct Employee (Labour) Cost

Benefits paid or payable to the employees which can be attributed to a cost object in an economically feasible manner. This can be easily identified and allocated to an activity, contract, cost centre, customer, process, product etc.

(ii) Indirect Employee (Labour) Cost

Benefits paid or payable to the employees, which cannot be directly attributable to a particular cost object in an economically feasible manner.

Distinction between Direct and Indirect Employee Cost:

Direct employee cost	Indirect employee cost
1. It is the cost incurred in payment of employees who are directly engaged in the production process.	1. Cost incurred for payment of employee who are not directly engaged in the production process.
2. Direct employee cost can be easily identified and allocated to cost unit.	2. Indirect employee cost is apportioned on some appropriate basis.
3. Direct employee cost varies with the volume of production and has positive relationship with the volume.	3. Indirect employee cost may not vary with the volume of production.

3.3 EMPLOYEE (LABOUR) COST CONTROL

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

The aim should be to keep the wages per unit of output as low as possible. This can only be achieved by giving employees appropriate compensation to encourage efficiency so that optimum output can be achieved in effective manner.

A well-motivated team of employees can bring about wonders. Each concern should, therefore, constantly strive to raise the productivity of employee. The efforts for the control of employee costs should begin from the very beginning. There has to be a concerted effort by all the concerned departments.

Department	Functions
1. Personnel Department	i) On receipt of employee requisition from the various departments it searches for the required skills and qualification. ii) It ensures that the persons recruited possess the requisite qualification and skills required for the job iii) Arranges proper training for the newly recruited employees and workshops for existing employees. iv) Maintains all personal and job related records of the employees. 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	i) Concerned with the maintenance of attendance records i.e. time keeping and

4. Payroll Department	ii) Time spent by an employee on various jobs i.e. time booking etc. i) The preparation of payroll of the employees. ii) It disburses salary and wage payments.
5. Cost Accounting Department	i) Accumulation and classification employee costs. ii) Analysis and allocation of costs to various cost centres or cost objects

3.3.1 Important Factors for the Control of Employee Cost

To exercise an effective control over the employee costs, the essential requisite is efficient utilisation of employee and allied factors. The main points which need consideration for controlling employee 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 employee turnover.
- (vi) Wage and Incentive systems.
- (vii) Job Evaluation and Merit Rating.
- (viii) Employee productivity.

3.3.2 Collection of Employee Costs

The task of collecting employee costs is performed by the Cost Accounting Department which record separately wages paid to direct and indirect employee. 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 employee 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 employees is essential.



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 employees 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. The objectives of time-keeping are as follows:

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

Methods of Time-keeping : There are various methods of time-keeping, which may be categorized into manual and mechanical methods. The choice of a particular method depends upon the requirements and policy of an entity; but whichever method is followed, it should make a correct record of the time by incurring minimum possible expenditure and it should minimise the risk of fraudulent payments of wages. The examples of time keeping methods are follows:

1. Manual Methods

(a) Attendance Register method- Under this method, an attendance register is kept to record

the arrival and departure time of an employee. This method is simple and expensive and is suitable for small organisations. However, this method may lead to dishonest practice of time manipulation by way of recording wrong time and back date entry in collusion with time keeper.

(b) Metal Disc/ Token method : This method of time recording is very old and is almost obsolete in practice. Under this method, each employee is allotted a metal disc or a token with a hole bearing his identification number. The token is kept or handed to the time keeper who record the token number in his register. Like attendance register method, this method also has some disadvantages like error in recording, proxy attendance etc.

2. Mechanical/ Automated Methods

(a) Punch Card Attendance-Under this method, each employee is provided a card for marking attendance. A punch card contains data related with the employee in digital form. In punch card attendance system, an employee needs to either insert or wave his

card to a card reader which then ensures whether the correct person is logging in and/or out. This system does not require to employ any time keeper and minimises the risk of recording error and time manipulation.

(b) Bio- Metric Attendance system-Under bio-metric attendance system attendance is marked by recognizing an employee on the basis of physical and behavioral traits. An employee's unique identity like finger print, face and retina image etc. are kept in a database which is matched at the time of marking of attendance before the attendance device for this purpose. Bio-metric attendance system includes fingerprint recognition system, face recognition system, Time and attendance tracking technology etc. This system reduces the risk of time manipulation and proxy attendance. However, it may not be suitable for small organisations due to cost associated with set-up and maintenance.

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 employee under any circumstances.
2. There should also be a provision of recording of time of piece employees 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 employees should be recorded so that total time of employees 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 employees 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 for marking attendance should be avoided.
7. The system should be reviewed and maintained periodically to prevent any error.

3.4.2 Time-Booking

Time keeping just records the time spent by an employee in the premises for production but it does not show how much time a person spent on a particular job. Time booking refers to a method wherein each activity of an employee is recorded. This data recorded is further used for measure the time spent on a particular job for costing, measurement of efficiency, fixation of responsibility etc.

Time booking for costing : The time spent on a particular job or activity is used to compute the cost of the job or activity.

Time booking to measure efficiency : The efficiency of the employees is measured by comparing the actual time taken by an employee with the standard time that should have been taken.

Time booking for fixation of responsibility : The time booked data is used to analyse the variance in time taken by an employee on a particular job or process with respect to standard time to see the reasons for the variance. The reasons for variance are further classified as controllable and uncontrollable. The controllable reasons are those which can be avoided by due care and efficiency. On the other hand, uncontrollable reasons cannot be avoided under the normal circumstances. Employees or any other concerned person or departments are made accountable for variance under controllable reasons. For the collection of all such data, 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 employees would be booked on the same card.

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

But this method has drawbacks as well. Since an employee'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 employee'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 attendance record.

- **The other with reference to each employee :** In this case, it would greatly facilitate reconciliation of the employee's job time with his attendance time recorded.

Under this system, a separate card would be used for each employee 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.

The format of job or time may vary industry to industry and according to the accounting system into used.

3.4.3 Payroll Procedure

Steps included in this process are as under:

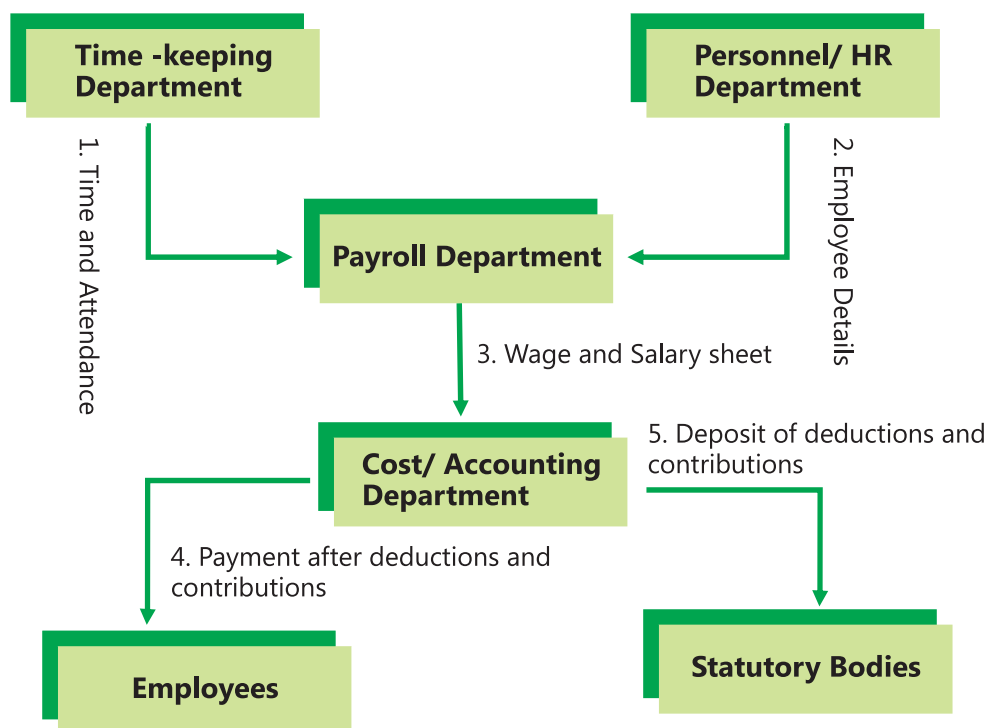


Diagram: Payroll Procedures

- 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 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 unauthorised or bogus employee is 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 wages/ salary of the employees alongwith employer's contributions such as provident fund and employee state insurancescheme are paid to the respective statutory bodies.

The followings are generally deducted from the payroll

Type of deductions	Description
Statutory Deductions	
1. Provident fund	Employee's contribution to the Provident fund is deducted from the salary/ wages of the concerned employee.
2. Employee State Insurance Scheme (ESI)	Employee's contribution to the ESI is deducted from the salary/ wages.
3. Tax Deduction at Source (TDS)	Employer is obliged to deduct tax at source if it will be paying to the employee net salary exceeding maximum exemption limit, in equal monthly installments to the income tax department.
4. Professional Tax	Professional tax is a state level tax imposed for carrying on business, profession or service.
Other Deductions	
1. Voluntary contribution to Provident fund	If any employee so desires may contribute over and above the contribution payable by the employer.
2. Contribution to any benevolent fund.	An employee may contribute to any benevolent fund voluntarily by putting a request to the payroll department.
3. Loan deductions	Installments of any loan taken by the employee.
4. Other advances and dues	Other advances like festival advance and unadjusted advances taken.

3.5 IDLE TIME

The time during which no production is carried-out because the worker remains idle but are paid. In other words, it is the difference between the time paid and the time booked. Idle time can be normal or abnormal. The time for which employees are paid includes holidays, paid leaves, allowable rest or off time etc.

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

Causes	Treatment
1. The time lost between factory gate and the place of work,	It is treated as a part of cost of production. Thus, in the case of direct workers an allowance for normal idle time is considered setting of standard hours or standard rate. In case of indirect workers, normal idle time is considered for the computation of overhead rate.
2. The interval between one job and another,	
3. The setting up time for the machine,	
4. Normal rest time, break for lunch etc.	

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

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

ILLUSTRATION 1

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

- | | |
|-------------------------------------|------------------------|
| (a) Basic pay | ₹10,000 p.m. |
| (b) Dearness allowance | ₹2,000 p.m. |
| (c) Bonus | 20% of salary and D.A. |
| (d) Other allowances | ₹2,500 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 compute the effective hourly cost of employee 'X'.

SOLUTION

Statement showing computation of effective hourly cost of employee 'X'

	Per month (₹)	Per annum (₹)
(A) Earning of Employee 'X':		
Basic pay	10,000	1,20,000
Dearness Allowance	2,000	24,000
Bonus	2,400	28,800
Employer's contribution to provident fund	1,200	14,400
Other allowances	2,500	30,000
	18,100	2,17,200
(B) Effective working hours (refer workings)		2,000 hours
(C) Effective hourly cost {(A) ÷ (B)}		₹108.60

Workings:

Calculation of effective working hours :

Annual working hours less Normal idle time = 2,400 hours – 400 hours = 2,000 hours.

ILLUSTRATION 2

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:
 $(₹100 + 120\% \text{ of } ₹100) \times 6 \text{ days} = ₹1,320$
- (iii) Wage rate per hour = ₹30
- (iv) Time wasted waiting for job (Abnormal idle time):
 $= 44 \text{ hrs.} - (15 \text{ hrs.} + 12 \text{ hrs.} + 13 \text{ hrs.}) = 4 \text{ hrs.}$

Allocation of wages in Cost Accounting

		(₹)
Allocated to Job X	: 15 hours × ₹30	450
Allocated to Job Y	: 12 hours × ₹30	360
Allocated to Job Z	: 13 hours × ₹30	390
Charged to Costing Profit & Loss A/c	: 4 hours × ₹30	<u>120</u>
Total		<u>1,320</u>

**3.6 OVERTIME**

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. Overtime payment consist of two elements- (i) Normal wages for overtime work and (ii) Premium payment for overtime work.

Overtime Payment = Wages paid for overtime at normal rate + Premium (extra) payment for overtime work

Overtime premium : 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.

Rate and conditions for overtime premium may either be fixed by an entity itself or it may be required by any statute in force. The overtime premium should not be less than the premium calculated as per the statute.

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 as 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 of Overtime and Treatment of Overtime premium in cost accounting

Causes	Treatment
(1) The customer may agree to bear the entire charge of overtime because urgency of work.	(1) If overtime is resorted to at the desire of the customer, then overtime premium may be charged to the job directly.

(2) Overtime may be called for to make up any shortfall in production due to some unexpected development.	(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.
(3) Overtime work may be necessary to make up a shortfall in production due to some fault of management.	(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.
(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	(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.

ILLUSTRATION 3

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

	A	B
(i) Basic Wages (₹)	10,000	16,000
(ii) Dearness Allowance	50%	50%
(iii) Contribution to provident Fund (on basic wages)	8%	8%
(iv) Contribution to Employee's State Insurance (on basic wages)	2%	2%
(v) Overtime (Hours)	10	--

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:

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

Overtime was done on job Y.

SOLUTION**Statement showing Earnings of Workers A and B**

	A (₹)	B (₹)
Basic wages	10,000	16,000
Dearness Allowance (50% of Basic Wages)	5,000	8,000
Overtime wages (Refer to Working Note 1)	1,500	--
Gross wages earned	16,500	24,000
Less: Contribution to Provident fund	(800)	(1,280)
Less: Contribution to ESI	(200)	(320)
Net wages earned	15,500	22,400

Statement of Employee Cost

	A (₹)	B (₹)
Gross Wages (excluding overtime)	15,000	24,000
Add: Employer's contribution to PF	800	1,280
Add: Employer's contribution to ESI	200	320
Gross wages earned	16,000	25,600
Normal working hours	200	200
Ordinary wages per hour	80	128

Statement Showing Allocation of Wages to Jobs

	Total Wages (₹)	Jobs		
		X(₹)	Y(₹)	Z(₹)
Worker A:				
- Ordinary Wages (4: 3 : 3)	16,000	6,400	4,800	4,800
- Overtime	1,500	--	1,500	--
Worker B:				
- Ordinary Wages(5:2:3)	25,600	12,800	5,120	7,680
	43,100	19,200	11,420	12,480

Working Notes

1. Normal Wages are considered as basic wages

$$\text{Over time} = \frac{2 \times (\text{Basic wages} + \text{DA}) \times 10 \text{ hours}}{200}$$

$$= 2 \times \left(\frac{₹15,000}{200} \right) \times 10 \text{ hours} = ₹150 \times 10 \text{ hours} = ₹1,500$$

ILLUSTRATION 4

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:

	Worker 'A' paid at ₹ 200 per day of 8 hours	Worker 'B' paid at ₹ 100 per day of 8 hours	Worker 'C' paid at ₹ 300 per day of 8 hours
Monday (hours)	10.5	8.0	10.5
Tuesday (hours)	8.0	8.0	8.0
Wednesday (hours)	10.5	8.0	10.5
Thursday (hours)	9.5	8.0	9.5
Friday (hours)	10.5	8.0	10.5
Saturday (hours)	--	8.0	8.0
Total (hours)	49.0	48.0	57.0

In terms of an award in an employee 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 :**

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	1½	3	12
Tuesday	8	--	--	--	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	--	--	--	--	--
Total	40	4	5	10	54

Calculation of hours to be paid for worker B :

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	---	---	---	8
Tuesday	8	---	---	---	8
Wednesday	8	---	---	---	8
Thursday	8	---	---	---	8
Friday	8	---	---	---	8
Saturday	4	4*	---	---	8
Total	44	4	---	---	48

(*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 :

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	1½	3	12
Tuesday	8	---	---	---	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	4	---	4*	8	12
Total	44	4	9	18	66

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

Wages payable :

	A	B	C
Basic Wages per hour (₹)	25.00	12.50	37.50
Dearness allowance per hour (₹)	5.50	5.50	5.50
Hourly rate (₹)	30.50	18.00	43.00
Total normal hours	54.00	48.00	66.00
Total Wages payable (₹)	1,647.00	864.00	2,838.00

ILLUSTRATION 5

In a factory, the basic wage rate is ₹100 per hour and overtime rates are as follows:

Before and after normal working hours	175% of basic wage rate
Sundays and holidays	225% of basic wage rate
During the previous year, the following hours were worked	
- Normal time	1,00,000 hours
- Overtime before and after working hours	20,000 hours
Overtime on Sundays and holidays	5,000 hours
Total	1,25,000 hours

The following hours have been worked on job 'Z'

Normal	1,000 hours
Overtime before and after working hrs.	100 hours.
Sundays and holidays	25 hours.
Total	1,125 hours

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

- Where overtime is worked regularly throughout the year as a policy due to the workers' shortage.
- Where overtime is worked irregularly to meet the requirements of production.
- Where overtime is worked at the request of the customer to expedite the job.

SOLUTION**Workings**

Basic wage rate : ₹100 per hour

Overtime wage rate before and after working hours : ₹100 × 175% = ₹175 per hour

Overtime wage rate for Sundays and holidays : ₹100 × 225% = ₹225 per hour

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

Particulars	Amount (₹)
Annual wages for the previous year for normal time (1,00,000 hrs. × ₹100)	1,00,00,000
Wages for overtime before and after working hours (20,000 hrs. × ₹175)	35,00,000
Wages for overtime on Sundays and holidays (5,000 hrs. × ₹225)	11,25,000
Total wages for 1,25,000 hrs.	1,46,25,000

$$\text{Average inflated wage rate} = \frac{\text{₹ } 1,46,25,000}{1,25,000 \text{ hours}} = \text{₹ } 117$$

(a) **Where overtime is worked regularly as a policy due to workers' shortage :**

The overtime premium is treated as a part of employee cost and job is charged at an inflated wage rate. Hence, employee cost chargeable to job Z

$$= \text{Total hours} \times \text{Inflated wage rate} = 1,125 \text{ hrs.} \times \text{₹ } 117 = \text{₹ } 1,31,625$$

(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:

$$\text{Employee cost chargeable to Job Z: } 1,125 \text{ hours @ ₹ } 100 \text{ per hour} = \text{₹ } 1,12,500$$

$$\text{Factory overhead: } \{100 \text{ hrs.} \times \text{₹ } (175 - 100)\} + \{25 \text{ hrs.} \times \text{₹ } (225 - 100)\} = \{\text{₹ } 7,500 + \text{₹ } 3,125\} = \text{₹ } 10,625$$

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

			(₹)
Job Z Employee cost	1,125 hrs. @ ₹ 100	=	1,12,500
Overtime premium	100 hrs. @ ₹ (175 – 100)	=	7,500
	25 hrs. @ ₹ (225 – 100)	=	<u>3,125</u>
		Total	<u>1,23,125</u>



3.7 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.

3.7.1 Identification of Utilisation of labours 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 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:

- It analyse the labour time into direct and indirect labour by cost centres, jobs, work orders.
- It provides details of direct labour cost comprises of wages, overtime to be charged as production cost of cost centre, jobs or work orders.
- It provides information for treatment of indirect labour cost as overhead expenses.

3.7.2 Identification of labour hours with work order or batches or capital job:

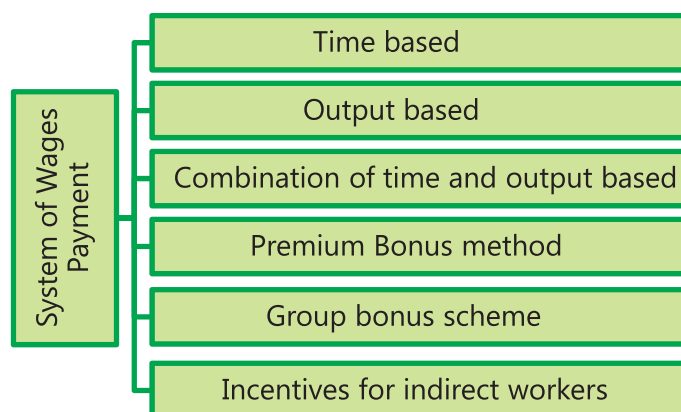
For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted:

- (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.



3.8 SYSTEMS OF WAGE PAYMENT AND INCENTIVES

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



3.8.1 Time based (Time Rate System)

(i) Straight Time Rate System

Under this system, the workers are paid on time basis i.e. hour, day, week, or month. The amount of wages due to a worker are arrived at by multiplying the time worked (including normal idle period) by rate for the time.

Time based wages payment is suitable for the employees (i) whose services cannot be directly or tangibly measured, *e.g.*, general helpers, supervisory and clerical staff etc. (ii) engaged in highly skilled jobs, (iii) where the pace of output is independent of the operator, *e.g.*, automatic chemical plants.

Wages under time rate system is calculated as under:

$$\text{Wages} = \text{Time Worked (Hours/ Days/ Months)} \times \text{Rate for the time}$$

(ii) Differential Time Rate System

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 is an example of differential time rates system:

Up to, say 75% efficiency	Normal (say ₹N per hr.)
From 76% to 80% efficiency	$1.10 \times N$
From 81% to 90% efficiency	$1.20 \times N$
From 91% to 100% efficiency	$1.30 \times N$
From 101% to 120% efficiency	$1.40 \times N$

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.

Merits and Demerits of Time rate system

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 employee, no distinction between efficient and inefficient employee 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 employee and fixed expenses will be spread over a smaller number of units).
- (iv) A firm cannot be sure of employee costs per unit under this method and, hence, may suffer a loss on quotations if already submitted.

3.8.2 Output Based (Piece Rate System)

(i) Straight Piece Rate System

Under this system, 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:

$$\text{Wages} = \text{Number of units produced} \times \text{Rate per unit}$$

(ii) Differential Piece Rate System

Under this system, the rate of wages is linked to efficiency of the workers for producing a unit. Efficiency is measured against a set standard. Different rate is given for different efficiency level. 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. For different levels of output below and above the standard, different piece rates are applicable.

The two important differential piece rate systems to be discussed here are (a) Taylor's Differential Piece Rate System and (b) Merrick's Differential Piece Rate System.

(a) Taylor's Differential Piece Rate System : This system of wages payment 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 for efficiency level of 100% or more.

**Some authors also use 80% and 120% of the piece rates in place of 83% and 125% respectively.*

ILLUSTRATION 6

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

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

Solution

Actual output = 37 units

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

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

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

Standard 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 7

Using Taylor's differential piece rate system, compute 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 hour- day)	₹90.00
Amar produced	23 units
Akbar produced	24 units
Ali produced	30 units

Solution**Computation of earnings under Taylor's differential piece rate system**

	Particulars	Amar	Akbar	Ali
A.	Standard output per day (units) {(8 hours × 60 minutes)/ 20 minutes}	24	24	24
B.	Actual output per day (units)	23	24	30
C.	Efficiency (%) $\left[\frac{\text{Actual output}}{\text{Standard output}} \times 100 \right]$	95.83% $\left[\frac{23 \text{ units}}{24 \text{ units}} \times 100 \right]$	100% $\left[\frac{24 \text{ units}}{24 \text{ units}} \times 100 \right]$	125% $\left[\frac{30 \text{ units}}{24 \text{ units}} \times 100 \right]$
D.	Percentage of piece rate	83%	125%	125%
E.	Rate per unit (₹) (83% of ₹30*)	24.90 (83% of ₹30*)	37.50 (125% of ₹30*)	37.50 (125% of ₹30*)
F.	Earnings (₹) (B × E)	572.7	900.00	1,125.00

$$\begin{aligned}
 * \text{ Normal rate per unit} &= \left[\frac{\text{₹ 90.00}}{\text{Standard production per hour}} \right] \\
 &= \frac{\text{₹ 90.00}}{3 \text{ units}} = \text{₹30}
 \end{aligned}$$

(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 :

Efficiency	Piece rate applicable
Upto 83%	Normal piece rate
Above 83% but upto 100%	10% above the normal rate
Above 100%	20% or 30% of normal rate

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

ILLUSTRATION 8

Refer the Illustration-7 and compute the earnings of workers under Merrick's Differential Piece Rate System

SOLUTION**Computation of earnings under Merrick's differential piece rate system**

	Particulars	Amar	Akbar	Ali
A.	Standard output per day (units) {(8 hours × 60 minutes)/ 20 minutes}	24	24	24
B.	Actual output per day (units)	23	24	30
C.	Efficiency (%) $\left[\frac{\text{Actual output}}{\text{Standard output}} \times 100 \right]$	95.83% $\left[\frac{23 \text{ unit}}{24 \text{ unit}} \times 100 \right]$	100% $\left[\frac{24 \text{ unit}}{24 \text{ unit}} \times 100 \right]$	125% $\left[\frac{30 \text{ unit}}{24 \text{ unit}} \times 100 \right]$
D.	Percentage of piece rate	110% of Piece rate	110% of Piece rate	120% of Piece rate Or 130% of Piece rate
E.	Rate per unit (₹)	33.00 (110% of ₹30*)	33.00 (110% of ₹30*)	36.00 or 39.00 (120% of ₹30*) or (130% of ₹30)
F.	Earnings (₹) (B × E)	759.00	792.00	1,080 or 1,170

$$* \text{ Normal rate per unit} = \left[\frac{\text{₹ 90.00}}{\text{Standard production per hour}} \right] = \frac{\text{₹ 90.00}}{3 \text{ units}} = \text{₹ 30}$$

ILLUSTRATION 9

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

₹54

Standard Time per Unit

1 Minute

Output per day is as follows :

Worker A – 390 Units; Worker B – 450 Units; Worker C – 600 Units

Working hours per day are 8.

SOLUTION

(i) Calculation of earnings under Straight Piece Rate System:

Worker A = 390 units ₹0.09 = ₹35.10

Worker B = 450 units ₹0.09 = ₹40.50

Worker C = 600 units ₹0.09 = ₹54.00

(ii) Calculation of earnings under Merrick's Multiple Piece Rate System

	Particulars	Worker- A	Worker- B	Worker- C
A.	Standard output per day (units)	480	480	480
B.	Actual output per day (units)	390	450	600
C.	Efficiency (%)	81.25%	93.75%	125%
	$\left[\frac{\text{Actual output}}{\text{Standard output}} \times 100 \right]$	$\left[\frac{390 \text{ unit}}{480 \text{ unit}} \times 100 \right]$	$\left[\frac{450 \text{ unit}}{480 \text{ unit}} \times 100 \right]$	$\left[\frac{600 \text{ unit}}{480 \text{ unit}} \times 100 \right]$
D.	Percentage of piece rate	Piece rate	110% of Piece rate	120% of Piece rate or 130% of Piece rate
E.	Rate per unit (₹)	0.9 (100% of ₹0.9*)	0.99 (110% of ₹0.9*)	1.08 or 1.17 (120% of ₹0.9*) or (130% of ₹0.9*)
F.	Earnings (₹) (B × E)	351.00	445.50	648 or 702

*Normal wage rate per unit = Normal Rate per Hour ÷ Standard output per hour
= ₹ 54 ÷ 60 units = ₹ 0.9

3.8.3 Combination of Time and Output based System

(i) 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 to 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:

Output	Payment
(i) When output is below the standard output	Guaranteed time rate is paid
(ii) When output is at par with standard output	Time rate plus bonus of 20% of time rate.
(iii) When output is above the standard output	High piece rate or Piece rate plus 20% of piece rate.

ILLUSTRATION 10

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:

$$8 \text{ hours} \times ₹20 = ₹160$$

$$\text{Bonus @ 20\% of time wages} = ₹ \underline{32}$$

$$\text{Total earnings} = ₹ \underline{192}$$

(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:

$$(i) ₹200/10 \text{ hrs.} = ₹20 \text{ per hour}$$

$$(ii) ₹192/8 \text{ hrs.} = ₹24 \text{ per hour}$$

$$(iii) ₹200/6 \text{ hrs.} = ₹33.33 \text{ per hour}$$

(ii) 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) 66 2/3% 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 11

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	:	₹500
Actual output in units		
Worker A		25 units
Worker B		40 units
Worker C		45 units

Solution

Calculation of bonus and total earnings under Emerson Efficiency System

	Particulars	Worker- A	Worker- B	Worker- C
A.	Standard output (units)	40	40	40
B.	Actual output (units)	25	40	45
C.	Efficiency (%)	62.5%	100%	112.5%
	$\left[\frac{\text{Actual output}}{\text{Standard output}} \times 100 \right]$	$\left[\frac{25 \text{ unit}}{40 \text{ unit}} \times 100 \right]$	$\left[\frac{40 \text{ unit}}{40 \text{ unit}} \times 100 \right]$	$\left[\frac{45 \text{ unit}}{40 \text{ unit}} \times 100 \right]$
D.	Time wages per day (₹)	500	500	500
E.	Rate of bonus	No bonus	20% of time rate	32.5% of time rate (20% + 12.5%)

F.	Bonus earnings (₹)	0	100 (20% of ₹ 500*)	162.50 (32.5% of ₹500*)
G.	Total Earnings (₹) (D + F)	500.00	600.00	662.50

(iii) Points Scheme- Bedaux System : Under this scheme, firstly the quantum of work that a worker can perform is expressed in Bedaux points or B's. These points represent the standard time in terms of minutes required to perform a 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 12

Calculate the earnings of worker from the following information under Bedaux 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- ₹100 per hour

Solution

Workings :

(i) Bedaux point per unit of product A:

$$\frac{30 \text{ sec onds} + 50\% \text{ of } 30 \text{ sec onds}}{60 \text{ sec onds}} = \frac{45}{60} = 0.75 \text{ B's}$$

(ii) Bedaux point per unit of product B:

$$= \frac{20 \text{ sec onds} + 50\% \text{ of } 20 \text{ sec onds}}{60 \text{ sec onds}} = \frac{30}{60} = 0.50 \text{ B's}$$

(iii) Total production in terms of B's:

$$500 \text{ units} \times 0.75 + 300 \text{ units} \times 0.50 = 525 \text{ B's}$$

$$\text{Standard B's (8 hours} \times 60) = 480 \text{ B's}$$

$$\text{No. of B's saved (525 B's} - 480 \text{ B's)} = 45 \text{ B's}$$

Calculation of earnings under Bedaux system

$$\begin{aligned}
 &= \text{Hrs. worked} \times \text{Rate per hour} + 75/100 \times \frac{45}{60} \times ₹100 \\
 &= 8 \text{ hours} \times ₹100 + 75/100 \times \frac{45}{60} \times ₹100 \\
 &= ₹800 + ₹56.30 = ₹856.30
 \end{aligned}$$

3.8.4 Premium Bonus Method

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 upto standard. In case the task is completed in less than the standard time, the saved time is shared between the employee and the employer.

(i) Halsey Premium Plan : Under Halsey premium plan 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. Earnings under Halsey Premium plan is calculated as under:

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

Advantages and Disadvantages of Halsey Premium Plan

Advantages	Disadvantages
1. Time rate is guaranteed while there is opportunity for increasing earnings by increasing production. 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.	1. Incentive is not so strong as with piece rate system. In fact the harder the worker works, the lesser he gets per piece. 2. The sharing principle may not be liked by employees.

ILLUSTRATION 13

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

Time Rate (per hour)	₹60
Time allowed	8 hours
Time taken	6 hours
Time saved	2 hours

SOLUTION**Calculation of total earnings :**

= Time taken × Time rate + 50% (Time Allowed – Time Taken) × Time rate

= 6 hrs. × ₹60 + 1/2 × (2 hrs. × ₹60) or ₹360 + ₹60 = ₹420

Of his total earnings, ₹360 is on account of the time worked and ₹60 is on account of his share of the premium bonus.

(ii) Rowan Premium Plan : 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.

$$\text{Time taken} \times \text{Rate per hour} + \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time taken} \times \text{Rate per hour}$$

Advantages and Disadvantages of Rowan Premium Plan

Advantages	Disadvantages
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.	1. The system is a bit complicated.
2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan.	2. The incentive is weak at a high production level where the time saved is more than 50% of the time allowed.
3. The sharing principle appeals to the employer as being equitable.	3. The sharing principle is not generally welcomed by employees.

ILLUSTRATION 14

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

Time rate (per Hour)	₹60
Time allowed	8 hours.
Time taken	6 hours.
Time saved	2 hours.

SOLUTION**Calculation of total earnings :**

$$= \text{Time taken} \times \text{Rate per hour} + \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time taken} \times \text{Rate per hour}$$

$$= 6 \text{ hours} \times ₹60 + \frac{2 \text{ hours}}{8 \text{ hours}} \times 6 \text{ hours} \times ₹60 = ₹360 + ₹90 = ₹450$$

ILLUSTRATION 15

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:

- Compute the normal rate of wages;
- Compute the cost of materials cost;
- 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.

Step 2 : Factory Cost of Workman 'A'

	(₹)
A. Material Cost	X
B. Wages	30 Y
C. Bonus = $\frac{30}{50} \times (50 - 30) \times Y$	12 Y
D. Overheads (30 ₹5)	150
E. Factory Cost	3,490
Or,, $X + 42 Y = ₹3,490 \text{ (Given)} - ₹150 = ₹3,340$ equation (i)	

Step 3 : Factory Cost of Workman 'B'

	(₹)
A. Material Cost	X
B. Wages	40 Y
C. Bonus = 50% of (SH - AH) × R = 50% of (50 - 40) × R	5 Y
D. Overheads (40 × ₹5)	200
E. Factory Cost	3,600
Or, $X + 45 Y = ₹3,600$ (Given) – ₹200 = ₹3,400.....equation (ii)	

Step 4 : Subtracting equation (i) from equation (ii)

$$3Y = ₹60$$

$$Y = ₹60/3 = ₹20 \text{ per hour.}$$

- (a) The normal rate of wages: ₹20 per hour
- (b) The cost of material: $X + 45 \times ₹20 = ₹3,400$ or, $X = ₹3,400 - ₹900 = ₹2,500$
- (c) **Comparative Statement of the Factory Cost of the product made by the two workmen.**

	'A' (₹)	'B' (₹)
Material cost	2,500	2,500
Direct Wages	600 (30 × ₹20)	800 (40 × ₹20)
Bonus	240 (12 × ₹20)	100 (5 × ₹20)
Factory Overhead	<u>150</u>	<u>200</u>
Factory Cost	3,490	3,600

ILLUSTRATION 16

- (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:
- The bonus earned
 - The total earnings of employee and
 - Hourly earnings.

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

SOLUTION

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

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

Bonus under Halsey Plan will be equal to the bonus under Rowan Plan when the following condition holds good:

$$\frac{50}{100} \times (SH - AH) \times R = \frac{AH}{SH} \times (SH - AH) \times R$$

$$\frac{50}{100} = \frac{AH}{SH}$$

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 Employee and hourly earnings under Halsey and Rowan Systems.

SH	AH	Time saved	Basic wages (AH × ₹8) (B × ₹8)	Bonus under Halsey System $\left[\frac{50}{100} \times C \times 8 \right]$	Bonus under Rowan system $\left[\frac{B}{A} \times C \times 8 \right]$	Total Earnings under Halsey System D+E	Total Earnings under Rowan System D+F	Hourly Earnings under Halsey System G/B	Hourly Earnings under Rowan System H/B
A hours	B hours	C = (A - B) hours	D (₹)	E (₹)	F (₹)	G (₹)	H (₹)	I (₹)	J (₹)
8	8	-	64	-	-	64	64	8.00	8.00
8	7	1	56	4	7	60	63	8.57	9.00
8	6	2	48	8	12	56	60	9.33	10.00
8	5	3	40	12	15	52	55	10.40	11.00
8	4	4	32	16	16	48	48	12.00	12.00
8	3	5	24	20	15	44	39	14.67	13.00
8	2	6	16	24	12	40	28	20.00	14.00
8	1	7	8	28	7	36	15	36.00	15.00

ILLUSTRATION 17

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. Mr. P, a machine man, 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.

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

SOLUTION

Total earnings (under 50% Halsey Scheme) = Hours worked × Rate per hour + $\frac{1}{2}$ × time saved × 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) = $\frac{\text{Hours worked} \times \text{Rate per hr} + \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Rate per hr}}{\text{Time taken} \times \text{Rate per hr}}$

₹37.5 T = $T \times ₹30 + \frac{(4 - T)}{4} \times T \times ₹30$

₹37.5 = ₹30 + (4 - T) × ₹7.5

or, ₹7.5 T = ₹22.5

or, T = 3 hours.

ILLUSTRATION 18

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:

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

In the above illustration time saved is 1 hour and, therefore, total gain is ₹5. Out of ₹5 according to Rowan 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 respectively are as below:

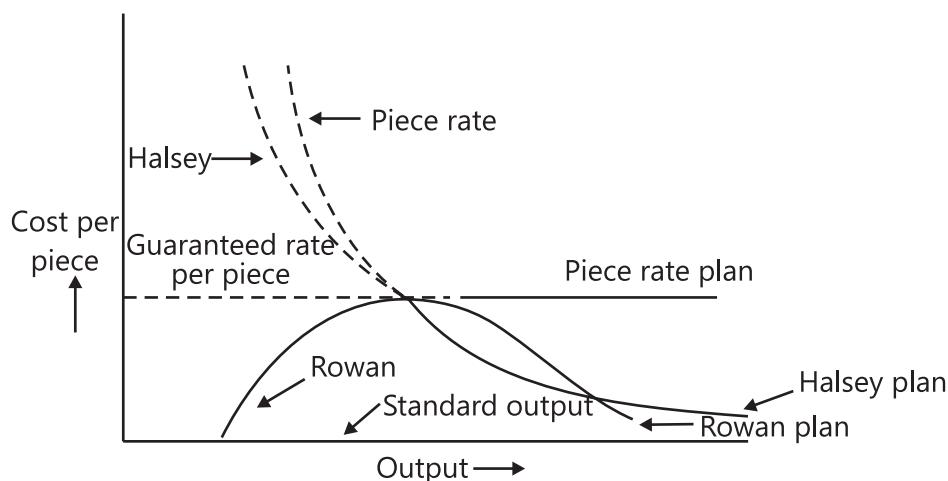
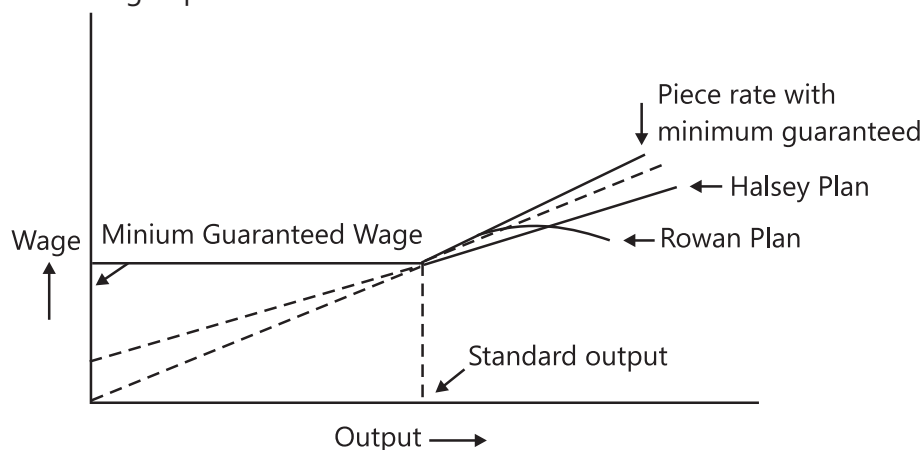
$$\begin{aligned}
 \text{Bonus} &= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} \\
 &= \frac{2 \text{ hours}}{4 \text{ hours}} \times 2 \text{ hours} \times ₹5 = ₹5 \\
 &= \frac{1 \text{ hour}}{10 \text{ hours}} \times 3 \text{ hours} \times ₹5 = ₹3.75
 \end{aligned}$$

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.



(iii) Barth System : 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.

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

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

3.8.5 Group Bonus Scheme

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

There following are few schemes of group bonus:

- (i) **Priestman's Production Bonus :** According to this method when the actual production in units or points exceeds the standard units or points, a bonus is paid to the workers as additional wages equivalent to the percentage of actual output over the standard output.
- (ii) **Cost Efficiency Bonus:** Under this scheme, bonus is paid when the actual cost is reduced to below the normal established targets. Targets for each cost elements (material, employee and overheads) are set. If the measurement of actual performance shows a saving in the cost either in total or for cost element (as the case may be), 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:

- (a) **Nunn-Bush Plan :** According to this plan a norm for direct employee 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 employee 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.
- (b) **Scanlon Plan :** Here also a fund is created for the normal cost of wages and salaries. This fund is debited with the actual employee cost. 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.
- (c) **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.

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.

3.8.6 Incentives for Indirect Employees

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

ILLUSTRATION 19

A, B and C were engaged on a group task for which a payment of ₹72,500 was to be made. A's time basis wages are ₹800 per day, B's ₹600 per day and C's ₹500 per day. A worked for 25 days; B worked for 30 days; and C for 40 days. Calculate the share of bonus to be distributed among the workers and total earnings thereof.

SOLUTION

Working:

Total wages on time basis:

Worker	(₹)
A(25 days × ₹ 800)	20,000
B (30 days × ₹600)	18,000
C (40 days × ₹500)	20,000
	58,000
Bonus (balancing figure)	14,500
Payment received for the task	72,500

The group bonus of ₹14,500 is 25% ($\frac{₹14,500}{₹58,000} \times 100$) of total time wages, the bonus is to be distributed among the workers at the rate of 25% of their respective time wages.

Calculation of share of bonus and total earnings of each worker

Worker	Basic Wages (₹)	Share of bonus @25% (₹)	Total earnings (₹)
A	20,000	5,000 (25% of ₹20,000)	25,000
B	18,000	4,500 (25% of ₹18,000)	22,500
C	20,000	5,000 (25% of ₹20,000)	25,000
Total	58,000	14,500	72,500

ILLUSTRATION 20

Both direct and indirect employees 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:

- For any production in excess of the standard rate fixed at 16,800 tons per month (of 28 days) a general incentive of ₹1,500 per ton 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 employee, @ 15% by inspection staff, @ 12% by maintenance staff and @ 8% by supervisory staff.
- Moreover, if the excess production is more than 20% above the standard, direct employees also get a special bonus @ ₹500 per ton for all production in excess of 120% of standard.
- Inspection staff are penalized @ ₹2,000 per ton for rejection by customer in excess of 2% of production.
- Maintenance staff are also penalized @ ₹2,000 per hour for breakdown.

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

- Actual working days : 25
- Production : 21,000 tons
- Rejection by customer : 500 tons
- Machine breakdown : 40 hours

SOLUTION

$$\begin{aligned}
 1. \text{ Standard output per day} &= \frac{\text{Standard output per month}}{\text{Budgeted number of days in a month}} \\
 &= \frac{16,800 \text{ tons}}{28 \text{ days}} = 600 \text{ tons}
 \end{aligned}$$

2. Standard output for 25 days = 600 tons × 25 days = 15,000 tons

(a) General Incentive

(i) Standard output	:	15,000 tons
(ii) Actual output	:	21,000 tons
(iii) Excess output over standard	:	21,000 – 15,000 = 6,000 tons
(iv) Percentage of excess	:	40%
production to standard output	:	$\frac{6,000 \text{ tons}}{15,000 \text{ tons}} \times 100$
(v) Aggregate general incentive	:	= Excess output × ₹1,500
	:	= 6,000 tons × ₹1,500 = ₹90,00,000
(vi) Allocation of general incentive		
Direct Employee	:	65% of ₹90,00,000 = ₹58,50,000
Inspection staff	:	15% of ₹90,00,000 = ₹13,50,000
Maintenance staff	:	12% of ₹90,00,000 = ₹10,80,000
Supervisory staff	:	8% of ₹90,00,000 = ₹ <u>7,20,000</u>
Total		₹ <u>90,00,000</u>

(b) Special bonus to direct workers

- (i) 20% is the excess output over 120% of standard output
or 3,000 tons (15,000 tons × 20%)
- (ii) Special incentive = 3,000 tons × ₹500 = ₹15,00,000

(c) Penalty imposed on inspection staff

- (i) Normal rejection = 2% of production = 2% of 21,000 tons
= 420 tons
- (ii) Actual rejection = 500 tons
- (iii) Excess rejection over normal rejection = 500 – 420 = 80 tons
- (iv) Penalty = 80 tons × ₹2,000 per ton = ₹1,60,000

(d) Penalty imposed on maintenance staff

- (i) Breakdown hours = 40 hours
- (ii) Penalty = 40 hours × ₹2,000 per hour = ₹80,000

Statement of production bonus earned by each group

Particulars	Direct Employee (₹)	Inspection staff (₹)	Maintenance staff (₹)	Supervisory staff (₹)	Total (₹)
Aggregate general incentive	58,50,000	13,50,000	10,80,000	7,20,000	90,00,000
Special bonus	15,00,000	-	-	-	15,00,000
Penalty	-	(1,60,000)	(80,000)	-	(2,40,000)
Production bonus	73,50,000	11,90,000	10,00,000	7,20,000	1,02,60,000

**3.9 ABSORPTION OF WAGES****3.9.1 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 Employee 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 Act. 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% wages earned in the relevant year or ₹100 (whichever is greater). The bonus may be upto 20% of wages depending upon the quantum of profits calculated as per the Act.

3.9.2 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 Employee can be charged directly to unit of cost as part of direct Employee cost? Of course, in the case of indirect Employee, 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 21

A worker is paid ₹10,000 per month and a dearness allowance of ₹2,000 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{(₹ 10,000 + 2,000) × 12}	1,44,000
Add: Employer Contribution to:	
-Provident Fund @ 10%	14,400
-E.S.I. Premium @ 4.75% (6.5 – 1.75)	6,840
Bonus at 2 months' wages (Basic + DA)	24,000
Total	1,89,240

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

Wage rate per hour (for costing purpose): ₹1,89,240/2,280 hours = ₹83

3.9.3 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 22

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

Basic pay	₹10,000 p.m.
D.A.	₹3,000 p.m.
Fringe benefits	₹1,000 p.m.

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	<u>20</u>
Effective working days	280 days
Total effective working hours (280 days × 8 hours)	2,240

(ii) Total wages paid in a year	(₹)
Basic pay	1,20,000
D.A.	36,000
Fringe benefits	<u>12,000</u>
	<u>1,68,000</u>
(iii) Hourly rate : ₹1,68,000/2,240 hours	<u>₹75.00</u>

3.9.4 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.

3.9.5 Absorption rates of Employee cost

Employee 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 employee hour, if overheads are predominantly employee oriented.

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

$$\text{Rate per hour} = \frac{\text{Total estimated monetary benefits and cost of nonmonetary benefits}}{\text{Budgeted direct employee hour - Normal idle time}}$$

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.



3.10 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.

$$\text{Efficiency in \%} = \frac{\text{Time allowed as per standard}}{\text{Time Taken}} \times 100$$

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.

3.10.1 Need for efficiency rating

- 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 Emerson efficiency plans bonus is paid at rising scale at various level of efficiency, ranging from 66.67% to 150%.
- The efficiency rating also helps the management in preparing employee requirement budget or for preparing manpower requirements.

Example : P Ltd. manufactures two products by using one grade of employees. The following estimates are available:

	Product- A	Product- B
Budgeted production (units)	3,480	4,000
Standard hours allowed per product	5	4

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 employee-hours requirement can be worked out as follows:

	Product- A	Product- B	Total
Budgeted production (units)	3,480	4,000	
Standard hours allowed for budgeted production	17,400 (3,480 units × 5 hours)	16,000 (4,000 units × 4 hours)	33,400

Since efficiency ratio is given as 80% therefore standard employee hours required for 100% efficiency level is $\left(33,400 \text{ hours} \times \frac{100}{80} \right) = 41,750 \text{ hours}$.

Employee Productivity : Productivity is generally determined by the input/output ratio. In case of employees, it is calculated as below :

$$\frac{\text{Standard time for doing actual work}}{\text{Actual time taken}}$$

Employee productivity is used for measuring the efficiency of individual workers. It is an index of efficiency in the utilisation of human resources, 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 Employee productivity : The important factors which must be taken into consideration for increasing employee productivity are as follows:

1. Employing only those workers who possess the right type of skill.
2. Placing a right type of person to a 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 employees.
5. Carrying out work study for fixation of wages and for the simplification and standardisation of work.



3.11 EMPLOYEE (LABOUR) TURNOVER

3.11.1 Employee (Labour) Turnover

Employee turnover or labour turnover in an organisation is the rate of change in the composition of employee force during a specified period measured against a suitable index.

The standard of usual employee turnover in the industry or locality or the employee 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 Employee turnover which are given below:

- (i) **Replacement Method** : This method takes into consideration actual replacement of employees irrespective of number of persons leaving the organisation. Employee Turnover under this method is calculated as under:

$$\frac{\text{Number of employees Replaced during the period}}{\text{Average number of employees during the period on roll}} \times 100$$

New employees appointed on account of expansion plan of the organisation are not included in number of replacements.

- (ii) **Separation Method** : In this method employee turnover is measured by dividing the total number of employees separated during the period by the average total number of employees on payroll during the same period. Employee Turnover under this method is calculated as under:

$$\frac{\text{Number of employees Separated during the period}}{\text{Average number of employees during the period on roll}} \times 100$$

- (iii) **Flux Method** : This method takes both the number of replacements as well as the number of separations during the period into account for calculation of employee turnover. Employee Turnover under this method is calculated as under:

$$\frac{\text{Number of employees Separated} + \text{Number of employees Replaced during the period}}{\text{Average number of employees during the period on roll}} \times 100$$

Employee turnover due to new recruitment : Generally, employees recruited on account of expansion of an organisation, are not considered for calculation of employee turnover. But it is considered that the newly recruited employees are also responsible for changes in the composition or work force. Due to this feature, some management accountants feel to take new recruitment for calculating employee turnover.

The total number of workers joining, including replacements, is called accessions.

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

$$\frac{\text{No. of Separation} + \text{No. of Replacements} + \text{No. of new Joinings}}{\text{Average no. of employees during the period on roll}} \times 100$$

Or

$$\frac{\text{No. of Separations} + \text{No. of Accessions}}{\text{Average no. of employees during the period on roll}} \times 100$$

Average number of employees during the period is calculated as follows:

$$= \frac{\text{No. of employees at beginning} + \text{No. of employees at end of the period}}{2}$$

Equivalent Employee (Labour) Turnover rate :

If in the above computations, the data given is for a period other than a year, the employee turnover rate so computed may be converted into equivalent annual employee turnover rate by using the following formula:

$$\frac{\text{Employee Turnover rate for the period}}{\text{Number of days in the period}} \times 365$$

ILLUSTRATION 23

The Accountant of Y Ltd. has computed employee turnover rates for the quarter ended 31st March, 20X1 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 workers for the quarter

(i) recruited and joined and (ii) left and discharged and (iii) Equivalent employee turnover rates for the year.

SOLUTION

Working Note :

Average number of workers on roll (for the quarter):

Employee Turnover rate using Replacement method

$$= \frac{\text{No. of replacements}}{\text{Average number of workers on roll}} \times 100$$

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

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

(i) Number of workers recruited and joined :

Employee turnover rate (Flux method)

$$= \frac{\text{No. of Separations}^*(S) + \text{No. of Accessions}(A)}{\text{Average number of workers on roll}}$$

$$\text{Or, } \frac{10}{100} = \frac{18^* + A}{600} \quad \text{Or, } A = \left[\frac{6000}{100} - 18 \right] = 42$$

No. of workers recruited and joined 42.

(ii) Number of workers left and discharged:

Employee turnover rate (Separation method)

$$= \frac{\text{No. of Separations}(S)}{\text{Average number of workers on roll}} \times 100 = \frac{3}{10} = \frac{S}{600} \quad \text{Or, } S^* = 18$$

Hence, number of workers left and discharged comes to 18

(iii) Calculation of Equivalent employee turnover rates:

$$= \frac{\text{Employee Turnover rate for the quarter (s)}}{\text{Number of quarter (s)}} \times 4 \text{ quarters}$$

$$\text{Using Flux method} = \frac{10\%}{1} \times 4 = 40\%$$

$$\text{Using Replacement method} = \frac{5\%}{1} \times 4 = 20\%$$

$$\text{Using Separation method} = \frac{3\%}{1} \times 4 = 12\%$$

3.11.2 Causes of Employee (Labour) Turnover

The reasons for employee turnover in an organisation can be classified under the following three heads:

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

(a) Personal causes : All the personal reasons which induce or compel an employee to leave his job; 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 organisation 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.

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

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

(c) Avoidable Causes : Avoidable causes are those which require the attention of management on a continuous basis so as to keep employee 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 employee turn-over appreciably so far as avoidable causes are concerned.

3.11.3 Effects of Employee (Labour) Turnover

High employee 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.
- (v) Cost of recruitment and training increases.

Cost of Employees (Labour) Turnover : Two types of costs which are associated with employee turnover are:

(a) Preventive Costs : The cost incurred to prevent employee turnover or keep it as lowest as possible. Cost incurred for prevention of employee turnover includes the following:

- (i) Cost of medical benefit provided to the employees;
- (ii) Cost incurred on employees' welfare like pension etc.
- (iii) Cost on other benefits with an objective to retain employees.

(b) Replacement Costs : These are the costs which arise due to employee turnover. If employees 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 recruitment, 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 employee turnover is high. Similarly, only adequate preventive costs can keep Employee turnover at a low level. Each company must, therefore, work out the optimum level of Employee turnover keeping in view its personnel policies and the behaviour of replacement cost and preventive costs at various levels of Employee turnover rates.

ILLUSTRATION 24

The management of B.R Ltd. is worried about their increasing employee turnover in the factory and before analyzing the causes and taking remedial steps, it wants to have an idea of the profit foregone as a result of employee 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 employee force was 4.45 lakhs. As a result of the delays by the Personnel Department in filling vacancies due to employee turnover, 1,00,000 potentially productive hours were lost. The actual direct employee hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive.

The costs incurred consequent on employee 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 employee turnover could have been sold at prevailing prices, find the profit foregone last year on account of employee turnover.

SOLUTION**Workings :****Computation of productive hours and contribution foregone**

Actual hours worked (given)	4,45,000
Less: Unproductive training hours	<u>15,000</u>
Actual productive hours	<u>4,30,000</u>

The potentially productive hours lost are 1,00,000

$$\text{Sales lost for 1,00,000 hours} = \frac{\text{₹ 83,03,300}}{4,30,000 \text{ hours}} \times 1,00,000 \text{ hours} = \text{₹19,31,000}$$

$$\text{Contribution lost for 1,00,000 hours} = \frac{\text{₹ 19,31,000}}{100} \times 20 = \text{₹3,86,200}$$

Computation of profit forgone on account of employee turnover

	(₹)
Contribution foregone (as calculated above)	3,86,200
Settlement cost due to leaving	43,820
Recruitment cost	26,740
Selection cost	12,750
Training costs	30,490
Profit foregone	5,00,000

**3.12 DIRECT EXPENSES****3.12.1 Direct Expenses**

Expenses other than direct material cost and direct employee cost, which are incurred to manufacture a product or for provision of service and can be directly traced in an economically feasible manner to a cost object. The following costs are examples for direct expenses:

- Royalty paid/ payable for production or provision of service;
- Hire charges paid for hiring specific equipment;
- Cost for product/ service specific design or drawing;
- Cost of product/ service specific software;
- Other expenses which are directly related with the production of goods or provision of service.

The above list of expenses is not exhaustive, any other expenses which are directly attributable to the production or service are also included as direct expenses.

3.12.2 Measurement of Direct Expenses

The direct expenses are measured at invoice or agreed price net of rebate or discount but includes duties and taxes (for which input credit not available), commission and other directly attributable costs.

In case of sub-contracting, where goods are get manufactured by job workers independent of the principal entity, are measured at agreed price. Where the principal supplies some materials to the job workers, the value of such materials and other incidental expenses are added with the job charges paid to the job workers.

3.12.3 Treatment of Direct Expenses

Direct Expenses forms part the prime cost for the product or service to which it can be directly traceable and attributable. In case of lump-sum payment or one-time payment, the cost is amortised over the estimated production volume or benefit derived.

If the expenses incurred are of insignificant amount i.e. not material, it can be treated as part of overheads.



SUMMARY

Employee Cost : Benefits paid or payable to the employees of an entity, whether permanent or temporary for the services rendered by them. Employee cost includes payments made in cash or kind.

Direct Employee (Labour) Cost : Benefits paid or payable to the employees which can be attributed to a cost object in an economically feasible manner.

Indirect Employee (Labour) Cost : Benefits paid or payable to the employees, which cannot be directly attributable to a particular cost object in an economically feasible manner.

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 recording and keeping of the employees' attendance time.

Time Booking : It is basically recording the details of work done and the time spent by an employee on each job or process.

Overtime : Payment to employees, when an employee 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 an employee for extra work.

Employee (Labour) Turnover: It is the rate of change in employee force during a specified period due to resignation, retirement and retrenchment. If the employee turnover is high, it's a sign of instability and may affect the profitability of the firm.

Employee (Labour) turnover can be measured through the following methods :

- (i) Replacement Method :

$$\frac{\text{Number of employees replaced}}{\text{Average number of employees on roll}} \times 100$$

- (ii) Separation Method:

$$\frac{\text{Number of employees separated during the year}}{\text{Average number of employees on rolls during the period}} \times 100$$

- (iii) Flux Method:

$$\frac{\text{Number of employees separated} + \text{number of employees replaced}}{\text{Average number of employees on rolls during the period}} \times 100$$

- (iv) Employee turnover due to new recruitment :

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

- (v) Employee turnover including accessions :

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

OR

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

Time Rate System : The system of wage payment where wages to an employee is paid on the basis of time irrespective of production volume.

Differential Time Rate : Under this system of wage payment 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 : The system of wage payment where wages is paid on the basis of number of units produced irrespective of time spent for production. Calculation takes number of units produced by the employee 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 :

Output/ Efficiency	Rate
< 100%	83% of normal rate
100%	125% of normal rate or 150% of lower rate

(ii) Merrick Differential Piece Work System:

Efficiency	Piece rate applicable
Upto 83%	Normal rate,
Above 83% and upto 100%	10% above normal rate.
Above 100%	20% or 30% above normal rate.

Gantt Task and bonus system

Output	Payment
Output below standard	guaranteed time rate.
Output at standard	Time rate plus bonus of 20% (usually) of time rate.

Output above standard High piece rate on employee's whole output.

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

Emerson's Efficiency system :

Efficiency	Payment
<66.67%	Hourly Rate
66.67%-100%	Bonus varies from 1% to 20%
100%	Bonus of 20% of basic + 1% of every 1% increase in efficiency.

Halsey System : Time taken \times Time rate + 50% of time saved \times Time rate.

Rowan System : Time taken \times Rate per hour + $\frac{\text{Time Saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$

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

TEST YOUR KNOWLEDGE

MCQs based Questions

- Idle time is the time under which
 - Full wages are paid to workers
 - No productivity is given by the workers
 - Both (a) and (b)
 - None of the above

2. Cost of idle time due to non-availability of raw material is
 - (a) Charged to overhead costs
 - (b) Charged to respective jobs
 - (c) Charged to costing profit and loss account
 - (d) None of the above
3. Time and motion study is conducted by
 - (a) Time keeping department
 - (b) Personal department
 - (c) Payroll department
 - (d) Engineering department
4. Identify, which one of the following, does not account for increasing labour productivity
 - (a) Job satisfaction
 - (b) Motivating workers
 - (c) High labour turnover
 - (d) Proper supervision and control
5. Labour turnover is measured by
 - (a) Number of persons replaced/ average number of workers
 - (b) Numbers of persons separated / number of workers at the beginning of the year
 - (c) $(\text{Number of persons replaced} + \text{number of persons separated}) / (\text{number of persons at the beginning} + \text{the number of persons at the end of the year})$
 - (d) None of the above
6. Labour productivity is measured by comparing
 - (a) Actual time and standard time
 - (b) Total out put with total man-hours
 - (c) Added value for the product with total wage cost
 - (d) All of the above
7. Under Taylor's differential piece rate scheme, if a worker failed to complete the task within the standard time, then he was paid
 - (a) 67% of the piece work rate
 - (b) 125% of the piece work rate
 - (c) 83% of the piece work rate
 - (d) 175% of the piece work rate

8. If the time saved is less than 50% of the standard time, then the wages under Rowan and Halsey premium plan on comparison gives
- (a) More wages to workers under Rowan plan than Halsey plan
 - (b) More wages to workers under Halsey plan than Rowan plan
 - (c) Equal wages under two plans
 - (d) None of the above
9. Standard time of a job is 60 hours and guaranteed time rate is ₹0.30 per hour. What is the amount of wages under Rowan plan if job is completed in 48 hours?
- (a) ₹ 16.20
 - (b) ₹ 17.28
 - (c) ₹ 18.00
 - (d) ₹ 14.40
10. Under Merrick multiple piece rate scheme, if the efficiency of a worker is more than 83% but up to 100%, then the applicable piece rate is
- (a) Ordinary piece rate
 - (b) 105% of ordinary piece rate
 - (c) 110% of Ordinary piece rate
 - (d) 120% of Ordinary piece rate

Theoretical Questions

1. Discuss the Gantt task and bonus system as a system of wage payment and incentives.
2. Discuss the accounting treatment of Idle time and overtime wages.
3. Discuss the effect of overtime payment on productivity.
4. State the circumstances in which time rate system of wage payment can be preferred in a factory.
5. Discuss the objectives of time keeping & time booking.
6. Discuss the two types of cost associated with labour turnover.
7. Describe briefly, how wages may be calculated under the following systems:
 - (i) Gantt task and bonus system
 - (ii) Emerson's efficiency system
 - (iii) Rowan system
 - (iv) Halsey system
 - (v) Barth system

Practical Questions

- 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 Employee 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)	₹40
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working days in the month	25
No. of working hours per day for each worker	8
Actual production during the month	1,250 units

Required :

- Calculate effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.
 - Calculate the savings to Mr. A in terms of direct labour cost per piece under the schemes.
- Wage negotiations are going on with the recognised employees' union, and the management wants you as the as an executive of the company to formulate an incentive scheme with a view to increase productivity.

The case of three typical workers A, B and C 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.

Assuming that day wages would be guaranteed at ₹ 75 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 employee 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.

- During audit of account of the G Ltd., 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 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:

Efficiency Level	Bonus
Upto 66⅔ %	Nil
66⅔ % to 79 %	10%
80% – 99%	20%
100% – 125%	45%

Your assistant has produced the following schedule pertaining to certain workers of a weekly pay roll:

Worker	Wages incentive plan	Total hours	Down-time hours	Units produced	Standard units	Base rate	Gross wages as per book
Rajesh	Straight piece work	40	5	400	-	180	8,500
Mohan*	Straight piece work	46	-	455	-	180	9,500
John	Straight piece work	44	-	425	-	180	8,500
Harish	Percentage bonus plan	40	4	250	200	220	12,000
Mahesh	Emerson's	40	-	240	300	210	9,300
Anil	Emerson's	40	-	600	500	200	12,600

* Total hours of Mohan include 6 overtime hours.

Prepare a schedule showing whether the above computation of workers' wages is correct or not. Give details.

ANSWERS/ SOLUTIONS**Answers to the MCQs based Questions**

1. (c) 2. (b) 3. (d) 4. (c) 5. (d) 6. (d)
 7. (c) 8. (a) 9. (b) 10. (c)

Answers to Theoretical Questions

- Please refer paragraph 3.8.3
- Please refer paragraph 3.5 & 3.6
- Please refer paragraph 3.6
- Please refer paragraph 3.8.1
- Please refer paragraph 3.4
- Please refer paragraph 3.11
- Please refer paragraph 3.8

Answers to the Practical Questions**1. Working Notes :**

- Total time wages of 10 workers per month:*

$$= \text{No. of working days in the month} \times \text{No. of working hours per day of each worker} \times \text{Hourly rate of wages} \times \text{No. of workers}$$

$$= 25 \text{ days} \times 8 \text{ hrs.} \times ₹40 \times 10 \text{ workers} = ₹80,000$$
- Time saved per month:*

Time allowed per piece to 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 × 2 hours)	2,500 hours
Actual time taken to produce 1,250 pieces	2,000 hours
Time saved (2,500 hours – 2,000 hours)	500 hours
- Bonus under Halsey scheme to be paid to 10 workers:*

$$\text{Bonus} = (50\% \text{ of time saved}) \times \text{hourly rate of wages}$$

$$= 50/100 \times 500 \text{ hours} \times ₹40 = ₹10,000$$

Total wages to be paid to 10 workers are (₹80,000 + ₹10,000) ₹90,000, if Mr. A considers the introduction of Halsey Incentive Scheme to increase the employee productivity.
- Bonus under Rowan Scheme to be paid to 10 workers:*

$$\text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{hourly rate}$$

$$= \frac{2,000 \text{ hours}}{2,500 \text{ hours}} \times 500 \text{ hours} \times ₹40 = ₹16,000$$

Total wages to be paid to 10 workers are (₹80,000 + ₹16,000) ₹96,000, if Mr. A considers the introduction of Rowan Incentive Scheme to increase the Employee productivity.

(i). (a) Effective hourly rate of earnings under Halsey scheme :

(Refer to Working Notes 1, 2 and 3)

$$= \frac{\text{Total time wages of 10 workers} + \text{Total bonus under Halsey scheme}}{\text{Total hours worked}}$$

$$= \frac{₹ 80,000 + ₹ 10,000}{2,000 \text{ hours}} = ₹45$$

(b) Effective hourly rate of earnings under Rowan scheme:

(Refer to Working Notes 1, 2 and 4)

$$= \frac{\text{Total time wages of 10 workers} + \text{Total bonus under Rowan scheme}}{\text{Total hours worked}}$$

$$= \frac{₹ 80,000 + ₹ 16,000}{2,000 \text{ hours}} = ₹48$$

(ii). (a) Saving in terms of direct Employee cost per piece under Halsey scheme:

(Refer to Working Note 3)

Employee cost per piece (under time wage scheme) = 2 hours × ₹40 = ₹80.

Employee cost per piece (under Halsey scheme)

$$= \frac{\text{Total wages paid under the scheme}}{\text{Total number of units produced}} = \frac{₹ 90,000}{1,250} = ₹72$$

Saving per piece: (₹80 – ₹72) = ₹8

(b) Saving in terms of direct Employee cost per piece under Rowan Scheme:

(Refer to Working Note 4)

Employee cost per piece under Rowan scheme = ₹96,000/1,250 units = ₹76.80

Saving per piece = ₹80 – ₹76.80 = ₹3.20

2. Calculation of earnings under different wage schemes:

(i) Day wages

Worker	Day wages (₹)	Actual Output (Units)	Labour cost per 100 pieces (₹)
A	600	180	333.33
B	600	120	500.00
C	600	100	600.00
Total	1,800	400	

Average labour cost to produce 100 pieces:

$$= \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{\text{₹ 1,800}}{400 \text{ units}} = \text{₹ 450}$$

(ii) Piece rate

Worker	Actual Output (Units)	Piece rate (₹)	Wages earned (₹)	Labour cost per 100 pieces (₹)
A	180	7.50	1,350	750.00
B	120	7.50	900	750.00
C	100	7.50	750	750.00
Total	400		3,000	

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

$$= \frac{\text{₹ 3,000}}{400 \text{ units}} = \text{₹ 750}$$

(iv) Halsey Scheme

Worker	Actual Output (Units)	Std. time (Hrs.)	Actual time (Hrs.)	Time saved (Hrs.)	Bonus hours (50% of time saved)	Rate per hour (₹)	Total wages (₹)	Labour cost per 100 pieces (₹)
	A	B	C	D = B - C	E	F	G = F × (C + D)	H = G/A × 100
A	180	18	8	10	5	75	975	541.67
B	120	12	8	4	2	75	750	625.00
C	100	10	8	2	1	75	675	675.00
Total	400						2,400	

Average cost of labour for the company to produce 100 pieces = $\frac{₹ 2,400}{400 \text{ units}} \times 100$
= ₹600

(v) Rowan Scheme :

Worker	Actual Output (Units)	Std. time (Hrs.)	Actual time (Hrs.)	Time saved (Hrs.)	Bonus hours*	Rate per hour (₹)	Total wages including bonus (₹)	Labour cost per 100 pieces (₹)
	A	B	C	D = B - C	E	F	G = F × (C + D)	H = G / A* 100
A	180	18	8	10	4.44	75	933	518.33
B	120	12	8	4	2.67	75	800	666.67
C	100	10	8	2	1.60	75	720	720.00
Total	400						2,453	

* Bonus hours = $\frac{\text{Time Saved}}{\text{Std. Time}} \times \text{Actual time}$

Average cost of labour for the company to produce 100 pieces = $\frac{₹ 2,453}{400 \text{ units}} \times 100$
= ₹613.25

3.

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

Worker	Wages incentive plan	Working note	Minimum wages (₹)	Gross wages as per plan (₹)	Gross wages as book (₹)	Wages to be paid. (₹)
			A	B	C	D = min. of B & C
Rajesh	Straight piece work	1	7,200	8,000	8,500	8,000
Mohan*	Straight piece work	2	8,820	9,100	9,500	9,100
John	Straight piece work	3	8,280	8,500	8,500	8,500
Harish	Percentage bonus plan	4	8,800	12,200	12,000	12,200
Mahesh	Emerson's	5	8,400	10,080	9,300	10,080
Anil	Emerson's	6	8,000	11,600	12,600	11,600

Working notes :

1. Minimum wages = Total normal hours × rate per hour
= 40 hours × ₹180 = ₹7,200
Gross wages (computed) as per incentive plan = No. of units × rate per unit
= 400 units × ₹20 = ₹8,000
2. Minimum wages = Total normal hours × Rate per hour + Overtime hours × Overtime rate per hour
= 40 hours × ₹180 + 6 hours × ₹270
= ₹7,200 + ₹1,620 = ₹8,820
Gross wages (computed) as per incentive plan = 455 units × ₹20 = ₹9,100
3. Minimum wages = 40 hours × ₹180 + 4 hours × ₹270
= ₹7,200 + ₹1,080 = ₹8,280
Gross wages (computed) as per incentive plan = 425 units × ₹20 = ₹8,500
4. Minimum wages = 40 hours × ₹ 220 = ₹8,800
Efficiency of worker = $\frac{\text{Actual production per hour}}{\text{Standard production per hour}} \times 100$
= $\frac{(250 \text{ units}/36 \text{ hours})}{(200 \text{ units}/40 \text{ hours})} \times 100 = 138.89\%$
Hourly rate = Rate per hour × Efficiency of worker
= ₹220 × 138.89% = ₹305
Gross wages (computed) as percentage of bonus plan = 40 hours × ₹305 = ₹12,200
5. Minimum wages = 40 hours × ₹210 = ₹8,400
Efficiency of worker = $\frac{(240 \text{ units}/40 \text{ hours})}{(300 \text{ units}/40 \text{ hours})} \times 100 = 80\%$
Bonus (as per Emerson's plan) = Total minimum wages × Bonus percentage
= ₹8,400 × 20% = ₹1,680
Gross wages (computed) as per Emerson's Efficiency plan = Minimum wages + Bonus
= ₹8,400 + ₹1,680 = ₹10,080

6. Minimum wages $= 40 \text{ hours} \times ₹200 = ₹8,000$
- Efficiency of worker $= \frac{600}{500} \times 100 = 120\%$
- Bonus (as per Emerson's plan) $= ₹8,000 \times 45\% = ₹3,600$
- Gross wages (computed) as per Emerson's Efficiency plan $= ₹8,000 + ₹3,600 = ₹11,600$