QUESTION 18

Z Ltd is working by employing 50 skilled workers. It is considering the introduction of an incentive scheme - either Halsey Scheme (with 50% Bonus) or Rowan Scheme - of wage payment for increasing the labour productivity to adjust with the increasing demand for its products by 40%. The company 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 the company has accordingly given assurance to the workers.

Because of this assurance, an increase in productivity has been observed as revealed by the figures for the month of April, 2021:

Hourly rate of wages (guaranteed)	Rs . 50
Average time for producing one unit by one worker at the previous performance (this may be taken as time allowed)	1.975 hours
Number of working days in a month	24
Number of working hours per day of each worker	8
Actual production during the month	6,120 units

Required:

(i) Calculate the effective increase in earnings of workers in percentage terms under Halsey and Rowan scheme.

(ii) Calculate the savings to Z Ltd in terms of direct labour cost per unit under both the schemes.

(iii) Advise Z Ltd about the selection of the scheme that would fulfill its assurance of incentivising workers and also to adjust with the increase in demand.

SOLUTION

(a) Working Notes:

1. Total time wages of 50 workers per month:

    = No. of working days in the month × No. of working hours per day of each worker
    × Hourly rate of wages × No. of workers
    = 24 days × 8 hrs. × Rs.50 × 50 workers = Rs.4,80,000

2. Time saved per month:

Time allowed per unit to a worker	1.975 hours
No. of units produced during the month by 50 workers	6,120 units
Total time allowed to produce 6,120 units (6,120 × 1.975 hrs)	12,087 hours
Actual time taken to produce 6,120 units (24 days × 8 hrs. × 50 workers)	9,600 hours
Time saved (12,087 hours – 9,600 hours)	2,487 hours

3. Bonus under Halsey scheme to be paid to 50 workers:

Bonus = (50% of time saved) × hourly rate of wages

= 50/100 × 2,487 hours × Rs.50 = Rs.62,175

Total wages to be paid to 50 workers are (Rs.4,80,000 + Rs.62,175) Rs.5,42,175, if Z Ltd. considers the introduction of Halsey Incentive Scheme to increase the worker productivity.

4. Bonus under Rowan Scheme to be paid to 50 workers:

$$\text{Bonus} = \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Hourly Rate}$$

$$= \frac{9,600 \text{ Hours}}{12,087 \text{ Hours}} \times 2,487 \text{ Hours} \times \text{Rs.}50 = \text{Rs. } 98,764$$

Total wages to be paid to 50 workers are (Rs.4,80,000 + Rs.98,764) Rs.5,78,764, if Z Ltd. considers the introduction of Rowan Incentive Scheme to increase the worker productivity.

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

$$= \frac{\text{Total time wages of 50 workers x Total bonus under Halsey scheme}}{\text{Total hours worked}}$$

$$= \frac{\text{Rs.4,80,000 X Rs.62,175}}{9,600 \text{ hours}} = \text{Rs.56.48}$$

Effective increase in earnings of worker (in %) = $\dfrac{\text{Rs.56.48 - Rs.50}}{\text{Rs.50}} \times 100 = 2.96\%$

(b) Effective hourly rate of earnings under Rowan scheme:
(Refer to Working Notes 1, 2 and 4)

$$= \frac{\text{Total time wages of 50 workers x Total bonus under Rowan scheme}}{\text{Total hours worked}}$$

$$= \frac{\text{Rs.4,80,000 + Rs.96,875}}{9,600 \text{ hours}} = \text{Rs.60.29}$$

Effective increase in earnings of worker (in %) = $\dfrac{\text{Rs.60.29 - Rs.50}}{\text{Rs. 50}} \times 100 = 20.58\%$

(ii) (a)   Saving in terms of direct labour cost per unit under Halsey scheme:
(Refer to Working Note 3)
Labour cost per unit (under time wage scheme)
= 1.975 hours × Rs.50 = Rs.98.75
Labour cost per unit (under Halsey scheme)

$$= \frac{\text{Total wages paid under the scheme}}{\text{Total number of units produced}} = \frac{\text{Rs.5, 42,175}}{6,120} = s \text{ Rs.88.60}$$

Saving per unit = Rs.98.75 – Rs.88.60 =Rs.10.15

(b) Saving in terms of direct worker cost per unit under Rowan Scheme:
(Refer to Working Note 4)
Labour cost per unit under Rowan scheme = Rs.5,78,764/6,120 units= Rs.94.57
Saving per unit =Rs.98.75 – Rs.94.57 = Rs.4.18

(iii)   Calculation of Productivity:

Normal Production Hours worked/Unit per Hour (9,600/1.975)	4,861
Actual Production Units	6,120
Increase in labour productivity	1,259
% Productivity i.e. increase in production/Normal production	**25.9%**

Advice: Rowan plan fulfills the company's assurance of 20% increase over the present earnings of workers. This would increase productivity by 25.9% only. It will not adjust with the increase in demand by 40%.

QUESTION 19

A company has three production departments (M_1, M_2 and A_1) and three service department, one of which Engineering service department, servicing the M_1 and M_2 only. The relevant information is as follows:

	Product X	Product Y
M_1	10 Machine hours	6 Machine hours
M_2	4 Machine hours	14 Machine hours
A_1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are

	Indirect Wages (Rs.)	Consumable Supplies(Rs.)
M_1	46,520	12,600
M_2	41,340	18,200
A_1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

(Rs.)

– Depreciation on Machinery	39,600
– Insurance of Machinery	7,200
– Insurance of Building	3,240 (Total building insurance cost for M_1 is one third of annual premium)
– Power	6,480
– Light	5,400
– Rent	12,675 (The general service dept. is located in a building owned by the company. It is valued at Rs.6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above)

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.

The following data are also available:

Department	Book value Machinery (Rs.)	Area (Sq. ft.)	Effective H.P. hours %	Production Direct Labour hour	Capacity Machine hour
M_1	1,20,000	5,000	50	2,00,000	40,000
M_2	90,000	6,000	35	1,50,000	50,000
A_1	30,000	8,000	05	3,00,000	-
Stores	12,000	2,000	-	-	-
Engg. Service	36,000	2,500	10	-	-
General Service	12,000	1,500	-	-	-

Required:

(i) Prepare an overhead analysis sheet, showing the basis of apportionment of overhead to departments.

(ii) Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.

(iii) Calculate suitable overhead absorption rate for the production departments.

(iv) Calculate the overheads to be absorbed by two products, X and Y.

SOLUTION

(i) Summary of Apportionment of Overheads

Items	Basis of Apportionment	Total Amount	Production Deptt. M1	M2	A1	Service Deptt. Store Service	Engineering Service	General Service
Indirect wages	Allocation given	1,25,140	46,520	41,340	16,220	8,200	5,340	7,520
Consumable stores	Allocation given	45,200	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of machine (20:15:5:2:6:2)	39,600	15,840	11,880	3,960	1,584	4,752	1,584

Insurance of Machine	Capital value of machine (20:15:5:2:6:2)	7,200	2,880	2,160	720	288	864	288
Insurance on Building	1/3rd to M1 Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1:-:2:-)	6,480	3,240	2,268	324	-	648	-
Light	Area (10:12:16:4:5:3)	5,400	1,080	1,296	1,728	432	540	324
Rent*	Area (10:12:16:4:5:-)	12,675	2,697	3,236	4,315	1,079	1,348	--
Total		2,44,935	85,937	81,028	32,331	14,599	17,962	13,078

*Rent to be apportioned among the departments which actually use the rented building. The notional rent is imputed cost and is not included in the calculation.

(ii) Allocation of service departments overheads

Service Dept.	Basis of Apportionment	Production Deptt.			Service Dept.		
		M1	M2	A1	Store Service	Engineering Service	General Service
Store	Ratio of consumable value (126 :182 : 42)	5,256	7,591	1,752	(14,599)	-	-
Engineering service	In Machine hours Ratio of M_1 and M_2 (4 : 5)	7,983	9,979	-	-	(17,962)	-
General service	Labour hour Basis (20 : 15 : 30)	4,024	3,018	6,036	-	-	(13,078)
Production Department allocated in (i)		85,937	81,028	32,331			
Total		1,03,200	1,01,616	40,119			

(iii) Overhead Absorption rate

	M_1	M_2	A_1
Total overhead allocated	1,03,200	1,01,616	40,119
Machine hours	40,000	50,000	-
Labour hours	-	-	3,00,000
Rate per Machine hour	2.58	2.032	-
Rate per Direct labour	-	-	0.134

(iv) Statement showing overhead absorption for Product X and Y

Machine Dept.	Absorption Rate	Product X		Product Y	
		Hours	(Rs.)	Hours	(Rs.)
M_1	2.58	10	25.80	6	15.48
M_2	2.032	4	8.13	14	28.45
A_1	0.134	14	1.88	18	2.41
			35.81		46.34

QUESTION 20

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e. three operators on each machine. Operators are paid Rs.20 per hour. The factory works for fourty eight hours in a week which includes 4 hours set up time. The work is jointly done by operators.

The operators are paid fully for forty eight hours. In additions they are paid a bonus of 10 percent of productive time. Costs are reported for this company on the basis of thirteen four weekly period.

The company for the purpose of computing machine hour rates includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of the factory overheads applicable to the cost centre are available:

- ➢ Depreciation 10% per annum on original cost of the machine. Original cost of each machine is Rs.52,000.
- ➢ Maintenance and repairs per week per machine is Rs.60.
- ➢ Consumable stores per week per machine are Rs.75.
- ➢ Power: 20 units per hour per machine at the rate of 80 paise per unit. No power is used during the set-up hours.
- ➢ Apportionment to the cost centre: Rent per annum Rs.5,400, Heat and Light per annum Rs.9,720 foreman's salary per annum Rs.12, 960 and other miscellaneous expenditure per annum Rs.18,000.

REQUIRED

CALCULATE the cost of running one machine for a four week period.

SOLUTION

Effective Machine hour for four -week period

    = Total working hours – unproductive set-up time

    = {(48 hours * 4 weeks) – (4 hours * 4 weeks)}

    = (192- 16hours)

    =176 hours.

(i) Computation of cost of running one machine for a four week period

		(Rs.)	(Rs.)
(A)	**Standing charges (per annum)**		
	Rent	5,400	
	Heat and light	9,720	
	Forman's salary	12,960	
	Other miscellaneous expenditure	18,000	
	Standing charges (per annum)	46,080	
	Total expenses for one machine for four week period (Rs.46,080/ (3machines * 13four-week period))		1,181.54
	Wages (48hours * 4weeks * Rs.20 * 3 operators)		11,520.00
	Bonus {(176hours * Rs.20 * 3operators) * 10%}		1,056.00
	Total standing charges		13,757.54
(B)	**Machine Expenses**		
	Depreciation (52,000 *10% * 1/13four -week period)		400.00
	Repairs and maintenance (Rs.60 * 4weeks)		240.00
	Consumable stores (Rs.75 *4weeks)		300.00
	Power (176hours *20units * Rs.0.80)		2,816.00
	Total machine expenses		3,756.00
(C)	**Total expenses (A) + (B)**		**17,513.54**

(iii) Machine hour rate = Rs.17,513.54/176hours
= Rs.99.51

QUESTION 21 (Similar to Past Paper Nov 19)

The total overhead expenses of a factory is Rs.4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at Rs.1.25 per hour. The actual hours worked were 2,93,104. STATE how would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in-progress?

On investigation, it was found that 50% of the unabsorbed overhead was an account of increase in the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency.

SOLUTION

Calculation of under / over absorption of overheads

	Amount (Rs.)
Actual factory overhead expenses incurred	4,46,380
Overheads absorbed (2,93,104 hours *1.25)	3,66,380
Under-absorption of Overhead	80,000

Reasons for unabsorbed overheads

(i) 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labour.

(ii) 50% of the unabsorbed overhead was due to factory inefficiency.

Treatment of unabsorbed overheads in cost accounting

1. Unabsorbed overhead amounting to Rs.40,000, which were due to increase in the cost of indirect material and labour should be charged to units of produced by using a supplementary rate.

$$\text{Supplementary rate} = \frac{\text{Rs.40,000}}{(7,800 + 200) \text{ units}} = \text{Rs.5 per unit}$$

The sum of ₹40,000 (unabsorbed overhead) should be distributed by using a supplementary rate among cost of sales, finished goods and work-in progress A/cs. The amount to be debited is calculated as below:

	Amount(Rs.)
Stock of Finished Goods {(7,800 -7,000) * Rs.5}	4,000
Work-in -progress (200 units *Rs.5)	1,000
Cost of Sales (7,000 units *Rs.5)	35,000
Total	40,000

1. The use of cost of sales figure, would reduce the profit for the period by ₹ 35,000 and will increase the value of stock of finished goods and work- in-progress by ₹ 4,000 and ₹ 1,000 respectively.
2. The balance amount of unabsorbed overheads of ₹ 40,000 due to factory inefficiency should be debited to Costing Profit & Loss Account, as this is an abnormal loss.

QUESTION 22

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are absorbed on a fixed percentage basis on factory cost.

The company has furnished the following data relating to two jobs undertaken by it in a period:

	Job 101 (Rs.)	Job 102 (Rs.)
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Selling price	1,66,650	1,28,250
Profit percentage on total cost	10%	20%

Required:

(i) COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.

(ii) CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.

(iii) Using the above recovery rates DETERMINE the selling price of job 103.

The additional data being:

Direct Material	Rs.24,000
Direct Wages	Rs.20,000
Profit percentage on selling price	12-1/2%

SOLUTION

(i)Computation of percentage recovery rates of factory overheads and administrative overheads.

Let the factory overhead recovery rate as percentage of direct wages be F and administrative overheads recovery rate as percentage of factory cost be A.

Factory cost of jobs:

Direct material +Direct wages +Factory overhead

For job 101 =Rs.54,000 +Rs.42,000 +Rs.42,000F

For job 102 =Rs.37,500 +Rs.30,000 +Rs.30,000F

Total cost of jobs:

Factory cost +Administrative overhead

For job 101 = (Rs.96,000 +Rs.42,000F) +(96,000 +42,000F) A =Rs.1,51,500* eqn……(i)

For job 102 = (Rs.67,500 + Rs.30,000F) +(67,500 +30,000F) A =Rs.1,06,875** eqn….(ii)

The value of F & A can be found using following equation

Multiply equation (i) by 5 and equation (ii) by 7

$4,80,000 + 2,10,000F + 4,80,000A + 2,10,000AF = 7,57,500$ ....eqn (iii)

$4,72,500 + 2,10,000F + 4,72,500A + 2,10,000AF = 7,48,125$ ....eqn (iv)

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$7,500 + 7,500A \qquad\qquad\qquad\qquad = 9,325$

$7,500 A = 9,325 - 7,500$

A = 0.25

Now put the value of A in equation (i) to find the value of F

$96,000 + 42,000F + 24,000 + 10,500F = 1,51,500$

$52,500F = 1,51,500 - 1,20,000$

F = 0.6

On solving the above relations: F = 0.60 and A = 0.25

Hence, percentage recovery rates of:

Factory overheads = 60% of wages and

Administrative overheads = 25% of factory cost.

Working note:

$$\text{Total cost} = \frac{\text{Selling Price}}{(100\% + \text{percentage of profit})}$$

$$\text{*For job 101} = \frac{\text{Rs.1,66,650}}{(100\% + 20\%)} = \text{Rs.1,51,500}$$

$$\text{**For job 102} = \frac{\text{Rs.1,28,250}}{(100\% + 20\%)} = \text{Rs.1,06,875}$$

(ii) Statement of jobs, showing amount of factory overheads, administrative overheads and profit:

	Job 101 (Rs.)	Job 102 (Rs.)
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Prime cost	96,000	67,500
Factory overheads:		
60% of direct wages	25,200	18,000
Factory cost	1,21,200	85,500
Administrative overheads:		
25% of Factory cost	30,300	21,375
Total cost	1,51,500	1,06,875
Profit(10% & 20% respectively)	15,150	21,375
Selling price	1.66,650	1,28,250

(iii) Selling price of job 103

	(Rs.)
Direct materials	24,000
Direct wages	20,000
Prime cost	44,000
Factory overheads (60% of Direct wages)	12,000
Factory cost	56,000
Administrative overheads (25% of factory cost)	14,000
Total cost	70,000
Profit margin (balancing figure)	10,000
Selling price (total cost/87.5%)	80,000

QUESTION 23

A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The releavant data for a month are given below:

Department	Direct Materials (Rs.)	Direct Wages (Rs.)	Factory Overheads (Rs.)	Direct labour hours (Rs.)	Machine Hours
Budget:					
Machinery	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	-
Actual:					
Machinery	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	-

The details of one of the representative jobs produced during the month are as under:

Job No. CW 7083

Department	Direct Materials	Direct Wages	Direct Labour hours	Machine Hours
Machinery	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit:

Required:

(i) COMPUTE the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.

(ii) Suggest any suitable alternative method(s) of absorption of factory overheads and CALCULATE the overhead recovery rates based on the method(s) so recommended by you.

(iii) DETERMINE the selling price of job CW 7083 based on the overhead application rates calculated in (ii) above.

(iv) CALCULATE the department-wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

SOLUTION

**(i) Computation of overhead absorption rate
(as per the current policy of the company)**

Department	Budgeted Factory Overheads	Budgeted Direct Wages
	(Rs.)	(Rs.)
Machinery	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	6,25,000	5,00,000

Overhead absorption rate = Budgeted factory overheads *100

$$\frac{}{\text{Budgeted Direct Wages}}$$

$$= \frac{6,25,000 * 100}{5,00,000}$$

= 125% of Direct wages

Selling price of the Job. CW – 7083

	(Rs.)
Direct materials (Rs.1,200 + Rs.600 + Rs.300)	2,100.00
Direct Wages (Rs.240 + Rs.360 + Rs.60)	660.00
Overheads (125% * 660)	825.50
Total factory cost	3,585.00
Add: Mark-up (30% * 3,585)	1,075.50
Selling Price	4,660.50

(ii) Methods available for absorbing factory overheads and their overhead recovery rates in different department.

1. Machining Department

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:

$$\text{Machine hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted machine hours}}$$

$$= \frac{\text{Rs.3,60,000}}{80,000 \text{ hours}}$$

$$= \text{Rs. 4.50 per hour}$$

2. Assembly Department

In this department direct labour hours is the main factor of production. Hence direct labour rate method should be used to recover overheads in this department. The overheads recovery rate in this case is:

$$\text{Direct labour hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct labour hours}}$$

$$= \frac{\text{Rs.1,40,000}}{1,00,000 \text{ hours}}$$

$$= \text{Rs. 1.40 per hour}$$

3. Packing Department

Labour is the most important factor of production in this department. Hence direct labour hour rate method should be used to recover overheads in this department. The overhead recovery rate in this case comes to:

Budgeted factory overheads

$$\text{Direct labour hour rate} = \frac{\text{Budgeted factory overheads}}{\text{Direct labour hours}}$$

$$= \frac{\text{Rs.1,25,000}}{50,000 \text{ hours}}$$

$$= \text{Rs.2.50 per hour}$$

(iii) Selling price of Job CW-7083 (based on the overhead application rates calculated in (ii) above)

	Rs.
Direct materials	2,100.00
Direct wages	660.00
Overheads (Refer to Working Note)	1,078.00
Factory cost	3,838.00
Add: Mark up (30% of 3,838)	1,151.40
Selling price	4,989.40

Working note:
Overhead summary statement

Dept.	Basis	Hours	Rate (Rs.)	Overheads (Rs.)
Machining	Machine hour	180	4.50	810
Assembly	Direct labour hour	120	1.40	168
Packing	Direct labour hour	40	2.50	100
			Total	1,078

(iv) Department-wise statement of total under or over recovery of overheads
(a) Under current policy

Departments

	Machining (Rs.)	Assembly (Rs.)	Packing (Rs.)	Total (Rs.)
Direct Wages (Actual)	96,000	2,70,000	90,000	
Overheads Recovered @ 125% of Direct Wages: (A)	1,20,000	3,37,500	1,12,500	5,70,000
Actual overheads: (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/over recovery of recovery of overheads: (A-B)	(2,70,000)	2,53,500	(22,500)	39,000

(b) As per methods suggested

Basis of overheads recovery

	Machine hours	Direct labour hours	Direct labour hours	Total (Rs.)
Hours worked	96,000	90,000	60,000	
Rate/hour (Rs.)	4.50	1.40	2.50	
Overhead Recovered (Rs.): (A)	4,32,000	1,26,000	1,50,000	7,08,000
Actual overheads (Rs.): (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/ Over recovery: (A-B)	42,000	42,000	15,000	99,000

QUESTION 24

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year consisting of 365 days. Holidays, break-down, etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:
- (a) Rated Capacity.
- (b) Practical Capacity.
- (c) Normal Capacity.
- (d) Actual Capacity.

SOLUTION

(a) Rated capacity   36.5   tonnes

(Refers to the capacity of a machine or a plant as indicated by its manufacturer)

(b) Practical capacity   30.0   tonnes

[Defined as actually utilised capacity of a plant i.e. $\dfrac{36.5 \text{ tonnes} \times (365 - 65)\text{days}}{365 \text{ days}}$]

(c) Normal capacity   25.0   tonnes

(It is the capacity of a plant utilized based on sales expectancy)

(d) Actual capacity   25.2   tonnes

(Refers to the capacity actually achieved)

Student Notes