3. EMPLOYEE COST AND DIRECT EXPENSES

ASSIGNMENT SOLUTIONS

PROBLEM NO: 1

1. Statement showing calculation of remuneration

Particulars	Rs.
(a) Basic payment (7,000x12)	84,000
(b) Dearness allowances (1,000x12)	12,000
(c) Salary + D.A.	96,000
(d) Bonus (96,000x10%)	9,600
(e) Other allowances (1,500x12)	18,000
	1,23,600
(f) Employee contribution	4,800
Total	1,28,400 (A)

Hours (2,000 – 200) = 1800 h (B)

Earning per hour A/B = 1,28,400 / 1,800 = 71.33

PROBLEM NO: 2

Calculation of Earnings of A & B for a month

Particulars	A (Rs.)	B (Rs.)
Basic wages	100	160
Dearness Allowance	(100x50%) 50	(160x 50%) 80
Contribution to provident fund	(150x10%) 15	(240x10%) 24
Contribution to Employee state insurance	(150x4.75%)7.125	(240x4.75%) 11.4
Total	**172.125**	**275.4**

Calculation of overtime wages:

A = (Rs.150/200hrs) x 10hrs x 200% = Rs.15/-

Apportionment of worker A & worker B to different jobs like X, Y, Z.

Particulars	Job-X (Rs.)	Job-Y (Rs.)	Job-Z (Rs.)
Worker A	68.85	51.6375	51.6375
Worker B	137.7	55.08	82.62
Overtime	-	15	-
Total	**206.55**	**121.7175**	**134.2575**

PROBLEM NO: 3

From the given data

Time taken   = (9hrs + 9hrs + 9hrs + 9hrs + 9hrs + 5hrs)   = 50 hrs.

Time allowed   = Total units produced/No. of units allotted per hour

                             = 600 units/10 units   = 60 hours

∴ Time saved   = Time allowed - Time taken

                             = 60 hrs. - 50 hrs.   = 10 hrs.

∴ Bonus   = 40 % of the time saved

= 40% x Time saved x rate per hour

= 40% x 10 hrs. x 0.5 per hour

= Rs.2

Total Earnings (wages)   = (H.W x R.P.H) + 40% (T.S x R.P.H)

= (50 hrs. x 0.5) + 40% (10 hrs. x 0.5)

= 25 + 2   = Rs.27

Effective rate of earnings per hour = Total earnings/Hours worked

= Rs.27/50hrs.   = Rs. 0.54 per hour

PROBLEM NO: 4

i) Effective hourly rate of earnings under Rowan Incentive Plan:

Earnings under Rowan Incentive plan =

(Actual time taken × wage rate) + $\dfrac{\text{Time Saved}}{\text{Time Allowed}}$ x Time taken x Wage rate

= (5 hours × Rs.120) + $\left(\dfrac{1\,\text{hour}}{6\,\text{hours}} \times 5\,\text{hours} \times \text{Rs.120}\right)$

= Rs.600 + Rs.100 = Rs.700

Effective hourly rate = Rs.700/5 hours = Rs.140 /hour

ii) Let time taken = X

∴ Effective hourly rate = $\dfrac{\text{Earnings under Halsey scheme}}{\text{Time Taken}}$

Or, Effective hourly rate under Rowan Incentive plan

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

Or, Rs.140 = $\dfrac{(\text{X} \times \text{Rs.120}) + 50\% \,\text{Rs.120} \times (6 - \text{X})}{\text{X}}$

Or, 140X = 120X + 360 - 60X

Or, 80X   = 360

Or,   X   = 360/80 = 4.5 hours

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

PROBLEM NO: 5

Increase in hourly rate of wages under Rowan Plan is Rs.30 i.e. (Rs.180 - Rs.150)

$\dfrac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Rs.150} = \text{Rs.30}$ (Please refer Working Note)

Or, $\dfrac{\text{Time Saved}}{50\,\text{hours}} \times \text{Rs.150} = \text{Rs.30}$

Or, Time saved $= \dfrac{1500}{150} = 10\,\text{hours}$

Therefore, Time Taken is 40 hours i.e. (50 hours - 10 hours)

Effective Hourly Rate under Halsey System:

Time saved = 10 hours

Bonus @ 50% = 10 hours × 50% × Rs.150 = Rs.750

Total Wages = (Rs.150 × 40 hours + Rs.750) = Rs.6,750

Effective Hourly Rate = Rs.6,750 ÷ 40 hours = Rs.168.75

Working Note:

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

$$\text{Or, Rs.180} = \frac{\text{TimeTaken} \times \text{Rate per hour}}{\text{TimeTaken}} + \frac{\frac{\text{TimeTaken}}{\text{Time Allowed}} \times \text{TimeSaved} \times \text{Rate per hour}}{\text{TimeTaken}}$$

$$\text{Or, Rs.180} - \frac{\text{TimeTaken} \times \text{Rate per hour}}{\text{TimeTaken}} = \frac{\text{TimeTaken}}{\text{Time Allowed}} \times \text{TimeSaved} \times \text{Rate per hour} \times \frac{1}{\text{TimeTaken}}$$

$$\text{Or, Rs.180} - 150 = \frac{\text{TimeSaved}}{\text{Time Allowed}} \times \text{Rs.150}$$

PROBLEM NO: 6

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

This is Equal to $\frac{\text{Time saved}}{\text{Time allowed}}$ x Rate per hour (Please refer Working Note)

Or, $\frac{\text{Time saved}}{\text{Time allowed}}$ x Rs.50 = Rs.10

Or, $\frac{\text{Time saved}}{90 \text{hours}}$ x Rs.50 = Rs.10

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

Effective Hourly Rate under Halsey System:

Time saved	= 18 hours	
Bonus @ 40%	= 18 hours × 40% × Rs. 50	= Rs. 360
Total Wages	= (Rs.50 × 72 hours + Rs.360)	= Rs. 3,960
Effective Hourly Rate	= Rs. 3,960 ÷ 72 hours	= Rs. 55

Working Note:

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

$$\text{Or, Rs.60} = \frac{\text{TimeTaken} \times \text{Rate per hour}}{\text{TimeTaken}} + \frac{\frac{\text{TimeTaken}}{\text{Time Allowed}} \times \text{TimeSaved} \times \text{Rate per hour}}{\text{TimeTaken}}$$

$$\text{Or, Rs.60} - \frac{\text{TimeTaken} \times \text{Rate per hour}}{\text{TimeTaken}} = \frac{\text{TimeTaken}}{\text{Time Allowed}} \times \text{TimeSaved} \times \text{Rate per hour} \times \frac{1}{\text{TimeTaken}}$$

$$\text{Or, Rs.60} - 50 = \frac{\text{TimeSaved}}{\text{Time Allowed}} \times \text{Rs.50}$$

PROBLEM NO: 7

Given Data

Rate per hour (R.P.H) = Rs.60

Time allowed (T.A)   = 8 Hours

Time Taken (H.W)   = 6 Hours

Time Saved (T.S)   = 2 Hours

Earnings of a worker under Halsey system= (H.W x R.P.H) + (½) (T.S x R.P.H)

$\qquad$ = (6 hrs x Rs.60) + (½) (2 hrs x Rs. 60)

$\qquad$ = 360 + 60 = Rs.420/-

Earnings of a worker under Rowan scheme   = (H.W x R.P.H) + (T.S/T.A) (H.W x R.P.H)

$\qquad$ = (6 hrs x Rs. 60) + $\left(\dfrac{2\ hours}{8\ hours}\right)(6 hours \times Rs.\ 60)$

Note:
H.W = Hours worked
R.P.H = Rate per Hour
T.S = Time Saved

$\qquad$ = 360 + 90 = Rs.450/-

PROBLEM NO: 8

Standard time (ST)	=	20 hours
Actual time (AT)	=	15 hours
Time saved (TS)	=	Standard time - Actual time
	=	20 - 15 = 5 hours
Rate per hour	=	Rs.5
Earnings as per Rowan plan	=	Wages + Bonus

$\qquad$ = Time taken x Rate per hour + $\left(\dfrac{T.S}{S.T} \times TT \times RPH\right)$

$\qquad$ = $15 \times 5 + \dfrac{5}{20}x\ 15 \times 5$

$\qquad$ = 75 + 18.75 =   Rs. 93.75

Earnings as per Halsey plan   = Wages + Bonus

$\qquad$ = Time taken x Rate per hour + $\left(\dfrac{1}{2} \times TS \times RPH\right)$

$\qquad$ = $15 x 5 + \dfrac{1}{2}x\ 5x\ 5$

$\qquad$ = 75 + 12.5   =   Rs.87.5

Statement showing Factory cost

Particulars	Rowan plan	Halsey plan
Direct Material	Rs.50	Rs.50
Direct Wages	Rs.93.75	Rs.87.5
Direct Expenses	Nil	Nil
Prime cost	**Rs.143.75**	**Rs.137.5**
Add: Factory overheads @100% on direct wages	Rs.93.75	Rs.87.5
Factory cost	237.5	225

PROBLEM NO: 9

Working notes:

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

   (Standard production time for 6,120 units) - (Actual time taken by the workers)

   = (6,120 units × 1.975 hours) - (24 days × 8 hours per day × 50 skilled workers)

   = (12,087 hours - 9,600 hours)

   = 2,487 hours

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

Time saved (Refer to working note 1)	= 2,487 hours
Wage rate per hour	= Rs. 30
Bonus under Halsey Scheme (With 50% bonus)	= ½ × 2,487 hours × Rs.30 = Rs.37,305

Bonus under Rowan Scheme

$$= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$$

$$= \frac{2,487 \text{ hours}}{12,087 \text{ hours}} \times 9,600 \text{ hours} \times \text{Rs.30}$$

$$= \text{Rs.59,258.38}$$

a) **Computation of effective rate of earnings under the Halsey and Rowanscheme:**

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

   = Time wages + Bonus

   = (24 days × 8 hours + 50 skilled workers × Rs.30) + Rs.37,305

   = Rs.2,88,000 + Rs.37,305 = Rs. 3,25,305

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

   = Time wages + Bonus

   = Rs.2,88,000 + Rs.59,258.38 = Rs.3,47,258.38

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

   Effective rate of earnings per hour (under Rowan Plan) $= \dfrac{\text{Rs.3,47258.38}}{9600 \text{ hours}} = \text{Rs.36.17}$

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

Direct labour cost (per unit) under time wages system (1.975 hours per unit × Rs.30)	59.25
Direct labour cost (per unit) under Halsey Plan $\left(\dfrac{\text{Rs.3,25,305}}{6,120 \text{ units}}\right)$	53.15
Direct labour cost (per unit) under Rowan Plan $\left(\dfrac{\text{Rs.3,47,258.38}}{6,120 \text{ units}}\right)$	56.74

   Saving of direct labour cost under:

Halsey Plan (RS. 59.25 - RS.53.15)	RS.6.10
Rowan Plan (RS. 59.25 - RS.56.74)	RS.2.51

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

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

PROBLEM NO: 10

Let 'y' be the wage rate per hour

Let 'x' be the cost of materials

Earnings

Under Halsey = (H.W x R.P.H) + (½) (T.S x R.P.H)

= (80hrs x y) + ½(20hrs × y) = 90y

Under Rowan = (H.W x R.P.H) + (T.S/T.A) (H.W x R.P.H)

= (60hrs x y) + (40/100) 60hrs x y = 84y

Statement showing factory cost of the worker Vishnu and Shiva

Particulars	Vishnu	Shiva
a) Cost of materials	x	x
b) Normal wages	84y	90y
c) Factory Overheads	600 (60 hours x Rs. 10)	800 (80 hours x Rs.10)
d) Factory Cost	x+84y+600	x+90y+800

From solved equation

x + 84y + 600 = 7280 - 1

x + 90y + 800 = 7600 - 2

(-) (-)   (-)   (-)

- 6y   - 200 = -320

- 6y   = -320 + 200

-6y   = -120

y   = Rs.20

Substitute y = 20 in Equation - 1

x + 84y + 600 = 7280

x + 84 (20) + 600 = 7280

x = 7280 - 2280

x = Rs.5000

Cost of Materials = Rs.5000

Wage rate per hour = Rs.20

PROBLEM NO: 11

Calculation of:

1. Time saved and wages:

Workmen	A	B
Standard time (hrs.)	40	40
Actual time taken (hrs.)	32	30
Time saved (hrs.)	8	10
Wages paid @ Rs. x per hr. (Rs.)	32x	30x

2. **Bonus Plan:**

Particulars	Halsey	Rowan
Time saved (hrs.)	8	10
Bonus (Rs.)	$4x \left(\dfrac{8 \text{ hrs. x Rs. x}}{2} \right)$	$7.5x \left(\dfrac{10 \text{ hrs.}}{40 \text{ hrs.}} \text{ x 30 hrs. x Rs. x} \right)$

3. **Total wages:**

Workman A: 32x + 4x   = Rs.36x

Workman B: 30x + 7.5x = Rs.37.5x

Statement of factory cost of the job

Workmen	A	B
Material cost (assumed)	y	y
Wages (shown above)	36x	37.5x
Works overhead	240	225
Factory cost (given)	2,600	2,600

The above relations can be written as follows:

36x + y + 240 = 2,600

37.5x+ y+ 225 = 2,600

Subtracting (i) from (ii) we get

1.5x - 15 = 0

Or, 1.5 x = 15

Or, x = Rs.10 per hour

On substituting the value of x in (i) we get y = Rs.2,000

Hence the wage rate per hour is Rs.10 and the cost of raw material is Rs.2,000 on the job.

PROBLEM NO: 12

Statement showing earnings and earning p/h

Particulars	X	Y	Z
ST	100h	100h	100h
Actual time	50h	60h	70h
Time saved (ST – AT)	50h	40h	30h
Date p/h	2	2	2
% of time saved $\left(\dfrac{T.S}{ST} X100\right)$	50% $\left(\dfrac{50}{100} X100\right)$	40% $\left(\dfrac{40}{100}\right)$	30% $\left(\dfrac{30}{100} X100\right)$
Wage Rate (T x R)	100 (50x2)	120 (60x2)	140 (70x2)
Bonus hours / rate	13 $\begin{pmatrix} 5\%x10h \\ 10\%x10h \\ 20hx15\% \\ 10hx20\% \end{pmatrix} x2$	9 $\begin{pmatrix} 10hx5\% \\ 10hx10\% \\ 20hx15\% \end{pmatrix} x2$	6 $\begin{pmatrix} 10hx5\% \\ 10hx10\% \\ 10hx15\% \end{pmatrix} x2$
Total	113	129	146
Earnings p/h	2.26 $\left(\dfrac{113}{50}\right)$	2.15 $\left(\dfrac{129}{60}\right)$	2.08 $\left(\dfrac{146}{70}\right)$

PROBLEM NO: 13

i) Statement showing annual cost of each employee

Particulars	Rs.
Salary (37,500x12)	4,50,000
Bonus (4,50,000x10%)	45,000
Employer contribution to PF and AI (4,50,000x5%)	22,500

Employees welfare exp. $\left(\dfrac{76,600}{250}\right)$　　　　　　　306

Annual cost of each worker　　　　　　　　5,17,806

ii) Employee cost p/h = $\dfrac{\text{Employee Cost}}{\text{Effective Hours}}$ = $\dfrac{5,17,806}{2,270}$ = 228.11

Effective hours = 3,105

(–) Leave　　　　　(25)

　　　　　　　　　290 Expected no of days to work

Total hours (290×8) = 2,320h

(–) Normal idle time = (50)

Effective Hours　　2,270h

iii) Cost of abnormal idle time =

　　　　= Abnormal Idle Time x Cost p/h

　　　　= 70h x 228.11

　　　　= 15,968

PROBLEM NO: 14

Labour turnover rate:

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

i) Separation Method:

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

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

ii) Replacement Method:

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

iii) New Recruitment:

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

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

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

iv) Flux Method:

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

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

PROBLEM NO: 15

Labour Turnover Rate (Replacement method) = $\dfrac{\text{No.of workers replaced}}{\text{Average no.of workers}} \times 100$

Or, $\dfrac{10}{100} = \dfrac{50}{\text{Average no.of workers}}$

Thus, Average No. of workers = 500

Labour Turnover Rate (Separation method) = $\dfrac{\text{No.of workers separated}}{\text{Average no.of workers}} \times 100$

$\dfrac{5}{100} = \dfrac{\text{Number of workers separated}}{500}$

Thus, No. of workers separated = 25

Labour Turnover Rate (Flux Method)

= $\dfrac{\text{No. of Separations + No. of Accession (Joinings)}}{\text{Average no. of workers}} \times 100$

Or, $\dfrac{20}{100} = \dfrac{25 + \text{No. of Accession(Joinings)}}{500} \times 100$

100 (25 + No. of Accessions) = 10,000

25 + No. of Accessions =100

Thus, No. of Accessions = 100 - 25 =75

Accordingly,

(i) Workers recruited and Joined = 75

(ii) Workers left and discharged = 25

(iii) Average number of workers on roll = 500

PROBLEM NO: 16

Total hours worked	=	4,45,000h
Un productive hours	=	(5,000)
Productive hours	=	4,40,000h

Productive hours lost due to labor turnover = 50,000h

Sales lost due to labour turnover = 6,02,273

$\begin{pmatrix} 4,40,000 \rightarrow 53,00,000 \\ 50,000 \rightarrow ? \end{pmatrix}$

Contribution lost = sales cost x p/v ratio

= 6,02,273 x 30%

= 1,80,682

Statement showing profit forgone due to labour turnover:-

Particulars	Rs.
Contributions Cost	1,80,682
Settlement Cost due to leaving	50,000
Recruitment Cost	35,000
Selection Cost	10,000
Training Cost	5,000
	2,80,682

PROBLEM NO: 17

Output by experienced workers in 50,000 hours $= \dfrac{50,000}{10} = 5,000$ units

Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 - 3,000 = 2,000 units

Total loss of output = Due to delay recruitment + Due to inexperience = 10,000 + 2,000 = 12,000 units

Contribution per unit = 20% of Rs.180 = Rs. 36

Total contribution lost = Rs.36 × 12,000 units = Rs. 4,32,000

Cost of repairing defective units = 3,000 units × 0.2 × Rs. 25 = Rs. 15,000

Profit forgone due to labour turnover

Particulars	Amount (Rs.)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340
Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2014-15	9,00,000

THE END