APPENDIX – I

1. MPS on DPS of EBL

X (DPS)	Y (MPS)	X^2	Y^2	XY	$(X-\bar{X})^2$
20	870	400	756900	17400	361
25	1379	625	1901641	34475	196
40	2430	1600	5904900	97200	1
50	3132	2500	9809424	156600	121
60	2455	3600	6027025	147300	441
$\sum X = $ **195**	$\sum Y =$ **10266**	$\sum X^2 = $ **8725**	$\sum Y^2 = $ **24399890**	$\sum XY = $ **452975**	$\sum (X-\bar{X})^2 = $ **1120**

$\bar{X} = \frac{\sum X}{n} = \frac{195}{5} = $ **39** $\qquad \bar{Y} = \frac{\sum Y}{n} = \frac{10266}{5} = 2053.20$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$

r = $\frac{5 \times 452975 - (195 \times 10266)}{\sqrt{5 \times 8725 - (195)^2}\ \sqrt{5 \times 24399890 - (10266)^2}}$

r = **0.82**

Coefficient of Determination (r^2) = **0.67**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.1 465

= **0.0988**

And P.E.(r) $\times$ 6=0.0988 $\times$ 6

=0.59

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} = \frac{5 \times 452975 - (195 \times 10266)}{5 \times 8795 - (195)^2}$ = **46.97**

a = $\bar{Y}$ - b $\bar{X}$ = 2053.20 – [(46.97) $\times$ 39] = 221.56

Hence the required simple regression equation as follows:

Y= 221.56 + (46.97 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\dfrac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$= \sqrt{\dfrac{24399890 - (221.56 \times 10266) - [(46.97) \times 452975]}{5-2}}$

= **532.70**

Standard Error of Beta Coefficient (S_b) = $\dfrac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

$= \dfrac{532.70}{33.47}$ = **15.92**

T-value $|t| = \dfrac{b}{S_b} = \dfrac{46.97}{15.92}$ = **2.95**

2. MPS on EPS of EBL

X (EPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
54.22	870	2939.81	756900	47171.40	539.62
62.78	1379	3941.33	1901641	86573.62	215.21
78.42	2430	6149.70	5904900	190560.60	0.94
91.82	3132	8430.91	9809424	287580.24	206.50
99.99	2455	9998.01	6027025	245475.45	508.05
$\sum X =$ **387.23**	$\sum Y =$ **10266**	$\sum X^2 =$ **31459.75**	$\sum Y^2 =$ **24399890**	$\sum XY =$ **857361.30**	$\sum\left(X-\overline{X}\right)^2 =$ **1470.32**

$\overline{X} = \dfrac{\sum X}{n} = \dfrac{387.23}{5} =$ **77.45** $\qquad \overline{Y} = \dfrac{\sum Y}{n} = \dfrac{10266}{5} =$ 2053.20

Coefficient of Correlation (r) = $\dfrac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\dfrac{5 \times 857361.30 - \left(387.23 \times 10266\right)}{\sqrt{5 \times 31459.75 - \left(387.23\right)^2}\ \sqrt{5 \times 24399890 - \left(10266\right)^2}}$

r = **0.89**

Coefficient of Determination (r^2) = **0.79**

Probable error of correlation coefficient, P.E. (r) = 0.6745 $\times \dfrac{1-r^2}{\sqrt{n}}$

= 0.6745 $\times$ 0.1681

= **0.1134**

And P.E.(r) $\times$ 6=0.1134 $\times$ 6

=0.68

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$$\sum Y = n.a + b\sum X \qquad \text{And} \qquad \sum XY = a\sum X + b\sum X^2$$

Solving two normal equations, we get

b = $\dfrac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\dfrac{5\times 857361.30 - (387.23\times 10266)}{5\times 31459.75 - (387.23)^2}$ = **42.37**

a = $\overline{Y}$ - b $\overline{X}$ = 2053.20 – [(42.37) $\times$ 77.45] = -1229.35

Hence the required simple regression equation as follows:

Y= -1229.35 + (42.37 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\dfrac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\dfrac{24399890 - (-1229.35\times 10266) - [(42.37)\times 857361.30]}{5-2}}$

= **476.77**

Standard Error of Beta Coefficient (S_b) = $\dfrac{S.E.E.}{\sqrt{\sum\left(X-\overline{X}\right)^2}}$

= $\dfrac{476.77}{38.34}$ = **12.43**

T-value $|t| = \dfrac{b}{S_b}$ = $\dfrac{42.37}{12.43}$ = **3.41**

3. MPS on DPR of EBL

X (DPR)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
36.88	870	1360.13	756900	32085.60	133.49
39.82	1379	1585.63	1901641	54911.78	74.20
51.01	2430	2602.02	5904900	123954.30	6,64
54.45	3132	2964.80	9809424	170537.40	36.19
60.01	2455	3601.20	6027025	147324.55	134.003
$\sum X$ = **242.17**	$\sum Y$ = **10266**	$\sum X^2$ = **12113.79**	$\sum Y^2$ = **24399890**	$\sum XY$ = **528813.63**	$\sum\left(X-\overline{X}\right)^2$ = **384.53**

$\overline{X} = \dfrac{\sum X}{n} = \dfrac{242.17}{5} =$ **48.43** $\qquad \overline{Y} = \dfrac{\sum Y}{n} = \dfrac{10266}{5} =$ 2053.20

Coefficient of Correlation (r) = $\dfrac{n\sum XY - \sum X\sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\dfrac{5\times 528813.63 - (242.17\times 10266)}{\sqrt{5\times 12113.79 - (242.17)^2}\ \sqrt{5\times 24399890 - (10266)^2}}$

r = **0.88**

Coefficient of Determination (r^2) = **0.77**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.1790

= **0.1208**

And P.E.(r) $\times$ 6=0.1208 $\times$ 6

=0.72

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 528813.63 - (242.17 \times 10266)}{5 \times 12113.79 - (242.17)^2}$ = 82.15

a = $\overline{Y}$ - b $\overline{X}$ = 2053.20 – [(82.15) $\times$ 48.43] = -1925.48

Hence the required simple regression equation as follows:

Y= -1925.48 + (82.15 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{24399890 - (-1925.48 \times 10266) - [(82.15) \times 528813.63]}{5-2}}$

= **492.10**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{492.10}{19.61}$ = **25.09**

T-value $|t| = \frac{b}{S_b}$ = $\frac{82.15}{25.09}$ = **3.27**

4. MPS on P/E Ratio of EBL

X (P/E)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
16.04	870	257.28	756900	13954.80	90.10
21.97	1379	482.68	1901641	30296.63	12.69
30.99	2430	960.38	5904900	75305.70	29.78
34.11	3132	1163.49	9809424	106832.52	73.58
24.55	2455	602.70	6027025	60270.25	0.96
$\sum X =$ **127.66**	$\sum Y =$ **10266**	$\sum X^2 =$ **3466.53**	$\sum Y^2 =$ **24399890**	$\sum XY =$ **286659.90**	$\sum(X-\overline{X})^2 =$ **207.12**

$\overline{X} = \frac{\sum X}{n} = \frac{127.66}{5} =$ **25.53** $\overline{Y} = \frac{\sum Y}{n} = \frac{10266}{5} =$ 2053.20

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5 \times 286659.90 - (127.66 \times 10266)}{\sqrt{5 \times 3466.53 - (127.66)^2}\ \sqrt{5 \times 24399890 - (10266)^2}}$

r = **0.93**

Coefficient of Determination (r^2) = **0.86**

Probable error of correlation coefficient, P.E. (r) = 0.6745 $\times \frac{1 - r^2}{\sqrt{n}}$

= 0.6745 $\times$ 0.1165

= **0.0785**

And P.E.(r) $\times$ 6=0.0785 $\times$ 6

=0.47

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5 \times 286659.90 - (127.66 \times 10266)}{5 \times 3466.53 - (127.66)^2}$ = 118.52

a = $\overline{Y}$ - b $\overline{X}$ = 2053.20 – [(118.52) $\times$ 25.53] = -972.88

Hence the required simple regression equation as follows:

Y= -972.89 + (118.52 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{24399890 - (-972.88 \times 10266) - [(118.52) \times 286659.90]}{5-2}}$

= **370.68**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum \left(X - \overline{X}\right)^2}}$

= $\frac{370.68}{14.39}$ = **25.76**

T-value $|t| = \frac{b}{S_b}$ = $\frac{118.52}{25.76}$ = **4.60**

5. MPS on DY of EBL

X (DY)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
2.1	870	4.41	756900	1827	0.03
1.81	1379	3.28	1901641	2495.99	0.01
1.65	2430	2.7	5904900	4009.5	0.08
1.6	3132	2.56	9809424	5011.2	0.1
2.44	2455	5.95	6027025	5990.2	0.27
$\sum X$ = **9.60**	$\sum Y$ = **10266**	$\sum X^2$ = **18.90**	$\sum Y^2$ = **24399890**	$\sum XY$ = **19333.89**	$\sum(X-\overline{X})^2$ = **0.49**

$\overline{X} = \frac{\sum X}{n} = \frac{9.60}{5} =$ **1.92** $\overline{Y} = \frac{\sum Y}{n} = \frac{10266}{5} = 2053.20$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$

r = $\frac{5 \times 19333.89 - (9.60 \times 10266)}{\sqrt{5 \times 18.90 - (9.60)^2}\ \sqrt{5 \times 24399890 - (10266)^2}}$

r = **-0.30**

Coefficient of Determination (r^2) = **0.09**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.4070

= **0.2745**

And P.E.(r) $\times$ 6=0.2745 $\times$ 6

=1.65

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2}$ = $\frac{5 \times 19333.89 - (9.60 \times 10266)}{5 \times 18.90 - (9.60)^2}$ = -768.73

a = $\overline{Y}$ - b $\overline{X}$ = 2053.20 – [(-768.73) $\times$ 1.92] = 3529.16

Hence the required simple regression equation as follows:

Y= 3529.16 + (-768.73 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\dfrac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\dfrac{24399890 - (3529.16 \times 10266) - [(-768.73) \times 19333.89]}{5-2}}$

= **1005.33**

Standard Error of Beta Coefficient (S_b) = $\dfrac{S.E.E.}{\sqrt{\sum\left(X-\overline{X}\right)^2}}$

= $\dfrac{1005.33}{0.70}$ = **1436.18**

T-value $|t| = \dfrac{b}{S_b}$ = $\dfrac{-768.73}{1436.18}$ = **-0.54**

6. MPS on NWPS of EBL

X (NWPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
219.87	870	48342.82	756900	191286.9	2589.18
217.67	1379	47380.23	1901641	300166.9	2817.91
280.82	2430	78859.87	5904900	682392.6	101.32
321.77	3132	103535.9	9809424	1007784	2602.63
313.64	2455	98370.05	6027025	769986.2	1839.21
$\sum X$ = **1353.77**	$\sum Y$ = **10266**	$\sum X^2$ = **376488.90**	$\sum Y^2$ = **24399890**	$\sum XY$ = **2951616.27**	$\sum\left(X-\overline{X}\right)^2$ = **9950.25**

$\overline{X} = \dfrac{\sum X}{n} = \dfrac{1353.77}{5} =$ **270.75** $\quad \overline{Y} = \dfrac{\sum Y}{n} = \dfrac{10266}{5} = 2053.20$

Coefficient of Correlation (r) = $\dfrac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\dfrac{5 \times 2951616.27 - (1353.77 \times 10266)}{\sqrt{5 \times 376488.90 - (1353.77)^2}\ \sqrt{5 \times 24399890 - (10266)^2}}$

r = **-0.95**

Coefficient of Determination (r^2) = **0.90**

Probable error of correlation coefficient, P.E. (r) = 0.6745 $\times \dfrac{1-r^2}{\sqrt{n}}$

= 0.6745 $\times$ 0.0447

= **0.0302**

And P.E.(r) $\times$ 6=0.0302 $\times$ 6

=0.18

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

$$b = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5 \times 2951616.27 - (1353.77 \times 10266)}{5 \times 376488.90 - (1353.77)^2} = 17.29$$

a = $\overline{Y}$ - b $\overline{X}$ = 2053.20 – [(17.29)× 270.75] = -2628.50

Hence the required simple regression equation as follows:

Y= -2628.50 + (17.29 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$$= \sqrt{\frac{24399890 - (-2628.50 \times 10266) - [(17.29) \times 2951616.27]}{5-2}}$$

= **339.91**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum \left(X - \overline{X}\right)^2}}$

$= \frac{339.91}{99.75}$ = **3.41**

T-value $|t| = \frac{b}{S_b} = \frac{17.29}{3.41}$ = **5.07**

7. DPS on EPS of EBL

X (EPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
54.22	20	2939.81	400	1084.40	539.45
62.78	25	3941.32	625	1569.50	215.09
78.42	40	6149.7	1600	3136.80	0.95
91.82	50	8430.91	2500	4591	206.61
99.99	60	9998	3600	5999.40	508.23
$\sum X =$ **387.23**	$\sum Y =$ **195**	$\sum X^2 =$ **31459.74**	$\sum Y^2 =$ **8725**	$\sum XY =$ **16381.10**	$\sum (X-\overline{X})^2 =$ **1470.33**

$\overline{X} = \frac{\sum X}{n} = \frac{387.23}{5} =$ **77.45** $\overline{Y} = \frac{\sum Y}{n} = \frac{195}{5} =$ 39

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

$$r = \frac{5 \times 16381.10 - (387.23 \times 195)}{\sqrt{5 \times 31459.74 - (387.23)^2}\ \sqrt{5 \times 8725 - (195)^2}}$$

r = **-0.99**

Coefficient of Determination (r^2) = **0.98**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.0089

= **0.0060**

And P.E.(r) $\times$ 6=0.0060 $\times$ 6

=0.04

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 16381.10 - (387.23 \times 195)}{5 \times 31459.74 - (387.23)^2}$ = 0.89

a = $\overline{Y}$ - b $\overline{X}$ = 39 – [(0.89) $\times$ 77.45] = -28.38

Hence the required simple regression equation as follows:

Y= -2628.50 + (17.29 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{8725 - (-28.38 \times 195) - [(0.89) \times 16381.10]}{5-2}}$

= **1.55**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{1.55}{38.34}$ = **0.04**

T-value $|t| = \frac{b}{S_b}$ = $\frac{0.89}{0.04}$ = **21.52**

8. DPS on NWPS of EBL

X (NWPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
219.87	20	48342.82	400	4397.4	2589.18
217.67	25	47380.23	625	5441.75	2817.91
280.82	40	78859.87	1600	11232.8	101.32
321.77	50	103535.9	2500	16088.5	2602.63
313.64	60	98370.05	3600	18818.4	1839.21
$\sum X$ = **1353.77**	$\sum Y$ = **195**	$\sum X^2$ = **376488.90**	$\sum Y^2$ = **8725**	$\sum XY$ = **55978.85**	$\sum\left(X-\overline{X}\right)^2$ = **9950.25**

$\overline{X} = \frac{\sum X}{n} = \frac{1353.77}{5} =$ **270.75** $\overline{Y} = \frac{\sum Y}{n} = \frac{195}{5} =$ 39

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5 \times 55978.85 - (1353.77 \times 195)}{\sqrt{5 \times 376488.90 - (1353.77)^2}\ \sqrt{5 \times 8725 - (195)^2}}$

r = **-0.95**

Coefficient of Determination (r^2) = **0.90**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1 - r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.0447

= **0.0302**

And P.E.(r) $\times$ 6=0.0302 $\times$ 6

=0.18

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5 \times 55978.85 - (1353.77 \times 195)}{5 \times 376488.90 - (1353.77)^2}$ = 0.32

a = $\overline{Y}$ - b $\overline{X}$ = 39 – [(0.32) $\times$ 270.75] = -47.58

Hence the required simple regression equation as follows:

Y= -47.58 + (0.32 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n - 2}}$

= $\sqrt{\frac{8725 - (-47.58 \times 195) - [(0.32) \times 55978.85]}{5 - 2}}$

= **5.85**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{5.85}{99.75}$ = **0.06**

T-value $|t| = \frac{b}{S_b}$ = $\frac{0.32}{0.06}$ = **5.46**

APPENDIX – II

1. MPS on DPS of SBL

X (DPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
0	0	0	0	0	70.93
0	360	0	129600	0	70.93
15.79	778	249.32	605284	12284.62	54.29
15.79	1089	249.32	1185921	17195.31	54.29
10.53	1000	110.88	1000000	10530	4.44
$\sum X = $ **42.11**	$\sum Y =$ **3227**	$\sum X^2 =$ **609.53**	$\sum Y^2 =$ **2920805**	$\sum XY =$ **40009.93**	$\sum (X-\overline{X})^2 =$ **254.88**

$\overline{X} = \frac{\sum X}{n} = \frac{42.11}{5} = \mathbf{8.42}$ $\qquad$ $\overline{Y} = \frac{\sum Y}{n} = \frac{3227}{5} = 645.40$

Coefficient of Correlation (r) = $\dfrac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\dfrac{5 \times 40009.93 - (42.11 \times 3227)}{\sqrt{5 \times 609.53 - (42.11)^2}\ \sqrt{5 \times 2920805 - (3227)^2}}$

r = **0.88**

Coefficient of Determination (r^2) = **0.77**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \dfrac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.1029

= **0.0694**

And P.E.(r) $\times$ 6=0.0694 $\times$ 6

=0.42

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\dfrac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \dfrac{5 \times 40009.93 - (42.11 \times 3227)}{5 \times 609.53 - (42.11)^2}$ = **50.35**

a = $\overline{Y}$ - b $\overline{X}$ = 645.40 – [(50.35) $\times$ 8.42] = 221.38

Hence the required simple regression equation as follows:

Y= 221.38 + (50.35 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$$= \sqrt{\frac{2920805 - (221.38 \times 3227) - [(50.35) \times 40009.93]}{5-2}}$$

= **253.02**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

$$= \frac{253.02}{15.96} = \textbf{15.85}$$

T-value $|t| = \frac{b}{S_b} = \frac{50.35}{15.85}$ = **3.18**

2. MPS on EPS of SBL

X (EPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
20.08	0	403.21	0	0	4.49
13.05	360	170.30	129600	4698	24.11
15.88	778	252.17	605284	12354.64	4.33
17.29	1089	298.94	1185921	18828.81	0.003
22.89	1000	523.95	1000000	22890	24.30
$\sum X =$ **89.80**	$\sum Y =$ **3227**	$\sum X^2 =$ **1648.58**	$\sum Y^2 =$ **2920805**	$\sum XY =$ **58771.45**	$\sum\left(X-\overline{X}\right)^2 =$ **57.24**

$\overline{X} = \frac{\sum X}{n} = \frac{89.80}{5} =$ **17.96** $\qquad \overline{Y} = \frac{\sum Y}{n} = \frac{3227}{5} = 645.40$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

$$r = \frac{5 \times 2920805 - (89.80 \times 3227)}{\sqrt{5 \times 1648.58 - (89.80)^2}\ \sqrt{5 \times 2920805 - (3227)^2}}$$

r = **0.17**

Coefficient of Determination (r^2) = **0.03**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.4338

= **0.2926**

And P.E.(r) $\times$ 6=0.2926 $\times$ 6

=1.76

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5\times 58771.45 - (89.80\times 3227)}{5\times 1648.58 - (89.80)^2}$ = **20.97**

a = $\overline{Y}$ - b $\overline{X}$ = 645.40 – [(20.97)× 17.96] = 268.50

Hence the required simple regression equation as follows:

Y= 645.40 + (20.97X)

Standard Error of Estimate (S.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$= \sqrt{\frac{2920805 - (645.40\times 3227) - [(20.97)\times 58771.45]}{5-2}}$

= **520.50**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X-\overline{X}\right)^2}}$

$= \frac{520.50}{7.56}$ = **68.48**

T-value $|t| = \frac{b}{S_b} = \frac{20.97}{68.48}$ = **0.31**

3. DPS on EPS of SBL

X (EPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
20.08	0	403.21	**0**	**0**	4.49
13.05	0	170.30	**0**	**0**	24.11
15.88	15.79	252.17	**249.32**	**250.75**	4.33
17.29	15.79	298.94	**249.32**	**282.64**	0.003
22.89	10.53	523.95	**110.88**	**241.03**	24.30
$\sum X =$ **89.80**	$\sum Y =$ **42.11**	$\sum X^2 =$ **1648.58**	$\sum Y^2 =$ **609.53**	$\sum XY =$ **774.42**	$\sum\left(X-\overline{X}\right)^2 =$ **57.23**

$\overline{X} = \frac{\sum X}{n} = \frac{89.80}{5} =$ **17.96** $\overline{Y} = \frac{\sum Y}{n} = \frac{42.11}{5} =$ 8.42

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X\sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5\times 744.42 - (89.80\times 42.11)}{\sqrt{5\times 1648.58 - (89.80)^2}\ \sqrt{5\times 609.53 - (42.11)^2}}$

r = **0.11**

Coefficient of Determination (r^2) = **0.012**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.4418

= **0.2980**

And P.E.(r) $\times$ 6=0.2980 $\times$ 6

=1.79

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 744.42 - (89.80 \times 42.11)}{5 \times 1648.58 - (89.80)^2}$ = **0.32**

a = $\overline{Y}$ - b $\overline{X}$ = 8.42 – [(0.32) $\times$ 17.96] = 2.74

Hence the required simple regression equation as follows:

Y= 2.74 + (0.32X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{609.53 - (2.74 \times 42.11) - [(0.32) \times 744.42]}{5-2}}$

= **9.11**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum \left(X - \overline{X}\right)^2}}$

= $\frac{9.11}{7.56}$ = **1.20**

T-value $|t| = \frac{b}{S_b}$ = $\frac{0.32}{1.20}$ = **0.26**

APPENDIX – III

1. MPS on DPS of HBL

X (DPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
31.38	920	984.70	846400	28869.60	57.88
35	1100	1225	1210000	38500	15.90
40	1740	1600	3027600	69600	1.02
45	1980	2025	3920400	89100	36.14
43.56	1760	1897.47	3097600	76665.60	20.90
$\sum X =$ **194.94**	$\sum Y =$ **7500**	$\sum X^2 =$ **7732.18**	$\sum Y^2 =$ **12102000**	$\sum XY =$ **302735.20**	$\sum(X-\overline{X})^2 =$ **131.74**

$\overline{X} = \frac{\sum X}{n} = \frac{194.94}{5} =$ **39.99** $\qquad \overline{Y} = \frac{\sum Y}{n} = \frac{7500}{5} = 1500$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$

r = $\frac{5 \times 302735.20 - (194.94 \times 7500)}{\sqrt{5 \times 7732.18 - (194.94)^2}\ \sqrt{5 \times 12102000 - (7500)^2}}$

r = **0.47**

Coefficient of Determination (r^2) = **0.22**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1 - r^2}{\sqrt{n}}$

$= 0.6745 \times\ 0.3488$

= **0.2325**

And P.E.(r) $\times$ 6=0.2325 $\times$ 6

=1.41

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} = \frac{5 \times 302735 - (194.94 \times 7500)}{5 \times 7732.18 - (194.94)^2}$ = **78.31**

a = $\overline{Y}$ - b $\overline{X}$ = 1500 – [(78.31) $\times$ 39.99] = -1552.99

Hence the required simple regression equation as follows:

Y= -1552.31 + (78.31 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\dfrac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$$= \sqrt{\frac{12102000 - (-1552.99 \times 7500) - [(78.31) \times 302735]}{5-2}}$$

= **120.38**

Standard Error of Beta Coefficient (S_b) = $\dfrac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

$$= \frac{120.38}{11.48} = \mathbf{10.49}$$

T-value $|t| = \dfrac{b}{S_b} = \dfrac{78.31}{10.49}$ = **7.47**

2. MPS on EPS of HBL

X (EPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
47.91	920	2295.37	846400	44077.20	111.94
59.24	1100	3509.39	1210000	65164	0.56
60.66	1740	3679.64	3027600	105548.40	4.71
62.74	1980	3936.30	3920400	124225.20	18.06
61.90	1760	3831.61	3097600	108944	11.63
$\sum X =$ **292.45**	$\sum Y =$ **7500**	$\sum X^2 =$ **17252.29**	$\sum Y^2 =$ **12102000**	$\sum XY =$ **447958.80**	$\sum\left(X-\overline{X}\right)^2 =$ **146.90**

$\overline{X} = \dfrac{\sum X}{n} = \dfrac{292.45}{5} =$ **58.49** $\qquad \overline{Y} = \dfrac{\sum Y}{n} = \dfrac{7500}{5} = 1500$

Coefficient of Correlation (r) = $\dfrac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

$$r = \frac{5 \times 447958.80 - \left(292.45 \times 7500\right)}{\sqrt{5 \times 17252.29 - (292.45)^2}\ \sqrt{5 \times 12102000 - (7500)^2}}$$

r = **0.46**

Coefficient of Determination (r^2) = **0.21**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \dfrac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.3533

= **0.2383**

And P.E.(r) $\times$ 6=0.2383 $\times$ 6

=1.43

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 447958.80 - (292.45 \times 7500)}{5 \times 17252.29 - (292.45)^2}$ = **63.20**

a = $\overline{Y}$ - b $\overline{X}$ = 1500 – [(63.20) × 58.49] = -2196.50

Hence the required simple regression equation as follows:

Y= -2196.50 + (63.20 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{12102000 - (-2196.50 \times 7500) - [(63.20) \times 447958.80]}{5-2}}$

= **297.36**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum \left(X - \overline{X}\right)^2}}$

= $\frac{297.36}{12.12}$ = **24.53**

T-value $|t| = \frac{b}{S_b}$ = $\frac{63.20}{24.53}$ = **2.58**

3. DPS on EPS of HBL

X (EPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
47.91	31.38	2295.37	**984.70**	**1503.42**	111.94
59.24	35	3509.39	**1225**	**2073.40**	0.56
60.66	40	3679.64	**1600**	**2426.40**	4.71
62.74	45	3936.30	**2025**	**2823.30**	18.06
61.90	43.56	3831.61	**1897.47**	**2696.36**	11.63
$\sum X =$ **292.45**	$\sum Y =$ **194.94**	$\sum X^2 =$ **17252.29**	$\sum Y^2 =$ **7732.19**	$\sum XY =$ **11522.88**	$\sum \left(X - \overline{X}\right)^2 =$ **146.90**

$\overline{X} = \frac{\sum X}{n} = \frac{292.45}{5} =$ **58.49** $\overline{Y} = \frac{\sum Y}{n} = \frac{194.94}{5} =$ 38.99

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5 \times 11522.88 - (292.45 \times 194.94)}{\sqrt{5 \times 17252.29 - (292.45)^2}\ \sqrt{5 \times 7732.19 - (194.94)^2}}$

r = **0.87**

Coefficient of Determination (r^2) = **0.76**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= 0.6745×0.1073

= **0.0724**

And P.E.(r) $\times$ 6=0.0724 $\times$ 6

=0.43

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5 \times 11522.88 - (292.45 \times 194.94)}{5 \times 17252.29 - (292.45)^2}$ = 0.82

a = $\overline{Y}$ - b $\overline{X}$ = 38.99 – [(0.82) $\times$ 58.49] = -9.13

Hence the required simple regression equation as follows:

Y= -9.13 + (0.82 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{7732.19 - (-9.13 \times 194.04) - [(0.82) \times 11522.88]}{5-2}}$

= **3.29**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{3.29}{12.12}$ = **0.27**

T-value $|t| = \frac{b}{S_b}$ = $\frac{0.82}{0.27}$ = **3.03**

APPENDIX – IV

1. MPS on DPS of NIC

X (DPS)	Y (MPS)	X^2	Y^2	XY	$(X-\bar{X})^2$
30	366	900	133956	10980	106.42
10.53	496	110.88	246016	5222.88	83.79
21.05	950	443.10	902500	19997.5	1.87
21.05	1284	443.10	1648656	27028.2	1.87
15.79	1126	249.33	1267876	17779.54	15.16
$\sum X =$ **98.42**	$\sum Y =$ **4222**	$\sum X^2 =$ **2146.41**	$\sum Y^2 =$ **4199004**	$\sum XY =$ **81008.12**	$\sum(X-\bar{X})^2 =$ **209.11**

$\bar{X} = \frac{\sum X}{n} = \frac{98.42}{5} =$ **19.68** $\qquad \bar{Y} = \frac{\sum Y}{n} = \frac{4222}{5} =$ 844.40

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$

r = $\frac{5 \times 81008.12 - (98.42 \times 4222)}{\sqrt{5 \times 2146.41 - (98.42)^2}\ \sqrt{5 \times 4199004 - (4222)^2}}$

r = **-0.20**

Coefficient of Determination (r^2) = **0.04**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.96

= **0.6475**

And P.E.(r) $\times$ 6=0.6475 $\times$ 6

=3.89

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} = \frac{5 \times 81008.12 - (98.42 \times 4222)}{5 \times 2146.41 - (98.42)^2}$ = **-10.03**

a = $\bar{Y}$ - b $\bar{X}$ = 844.40 – [(-10.03) $\times$ 19.68] = 1041.86

Hence the required simple regression equation as follows:

Y= 1041.86 + (-10.03 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$$= \sqrt{\frac{4199004 - (1041.86 \times 4222) - [(-10.03) \times 81008.12]}{5-2}}$$

= **451.99**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

$$= \frac{451.99}{14.46} = \mathbf{31.26}$$

T-value $|t| = \frac{b}{S_b} = \frac{-10.03}{31.26}$ = **-0.32**

2. MPS on EPS of NIC

X (EPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
22.75	366	517.56	133956	8326.50	0.29
16.1	496	259.21	246016	7985.60	51.67
24.01	950	576.48	902500	22809.50	0.52
25.75	1284	663.06	1648656	33063	6.06
27.83	1126	774.51	1267876	31336.58	20.63
$\sum X =$ **116.44**	$\sum Y =$ **4222**	$\sum X^2 =$ **2790.82**	$\sum Y^2 =$ **4199004**	$\sum XY =$ **103521.18**	$\sum\left(X-\overline{X}\right)^2 =$ **79.17**

$\overline{X} = \frac{\sum X}{n} = \frac{116.44}{5} =$ **23.28** $\overline{Y} = \frac{\sum Y}{n} = \frac{4222}{5} = 844.40$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

$$r = \frac{5 \times 103521.18 - \left(116.44 \times 4222\right)}{\sqrt{5 \times 2790.82 - \left(116.44\right)^2}\ \sqrt{5 \times 4199004 - \left(4222\right)^2}}$$

r = **0.72**

Coefficient of Determination (r^2) = **0.52**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1 - r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.2147

= **0.1448**

And P.E.(r) $\times$ 6=0.1448 $\times$ 6

=0.87

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$$\sum Y = n.a + b\sum X \quad \text{And} \quad \sum XY = a\sum X + b\sum X^2$$

Solving two normal equations, we get

$$b = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} = \frac{5\times 103521.18 - (116.44\times 4222)}{5\times 2790.82 - (116.44)^2} = \mathbf{65.67}$$

$a = \overline{Y} - b\overline{X} = 844.40 - [(65.67)\times 23.28] = -684.46$

Hence the required simple regression equation as follows:

Y= -684.46 + (65.67 X)

$$\text{Standard Error of Estimate (S.E.E.)} = \sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$$

$$= \sqrt{\frac{4199004 - (-684.46\times 4222) - [(65.67)\times 103521.18]}{5-2}}$$

= **312.25**

$$\text{Standard Error of Beta Coefficient } (S_b) = \frac{S.E.E.}{\sqrt{\sum\left(X-\overline{X}\right)^2}}$$

$$= \frac{312.25}{8.89} = \mathbf{35.12}$$

$$\text{T-value } |t| = \frac{b}{S_b} = \frac{65.67}{35.12} = \mathbf{1.87}$$

3. DPS on EPS of NIC

X (EPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
22.75	30	517.56	900	682.50	0.29
16.1	10.53	259.21	110.88	169.53	51.67
24.01	21.05	576.48	443.10	505.41	0.52
25.75	21.05	663.06	443.10	542.04	6.06
27.83	15.79	774.51	249.32	439.44	20.63
$\sum X =$ **116.44**	$\sum Y =$ **98.42**	$\sum X^2 =$ **2790.82**	$\sum Y^2 =$ **2146.41**	$\sum XY =$ **2338.92**	$\sum(X-\overline{X})^2 =$ **79.17**

$$\overline{X} = \frac{\sum X}{n} = \frac{116.44}{5} = \mathbf{23.28} \qquad \overline{Y} = \frac{\sum Y}{n} = \frac{98.42}{5} = 19.68$$

$$\text{Coefficient of Correlation (r)} = \frac{n\sum XY - \sum X\sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$$

$$r = \frac{5\times 2338.92 - (116.44\times 98.42)}{\sqrt{5\times 2790.82 - (116.44)^2}\ \sqrt{5\times 2146.41 - (98.42)^2}}$$

r = **0.36**

Coefficient of Determination (r^2) = **0.13**

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.3891

= **0.2624**

And P.E.(r) $\times$ 6=0.2624 $\times$ 6

=1.57

Regression equation of Y on X, Y= a+ b X

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 2338.92 - (116.44 \times 98.42)}{5 \times 2790.82 - (116.44)^2}$ = **0.59**

a = $\overline{Y}$ - b $\overline{X}$ = 19.68 – [(5.88) $\times$ 23.28] = 5.88

Hence the required simple regression equation as follows:

Y= 5.88 + (0.59 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{2146.41 - (5.88 \times 98.42) - [(0.59) \times 2338.92]}{5-2}}$

= **7.77**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{7.77}{8.89}$ = **0.87**

T-value $|t| = \frac{b}{S_b}$ = $\frac{0.59}{0.87}$ = **0.68**

APPENDIX – V

1. MPS on DPS of NABIL

X (DPS)	Y (MPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
70	1505	4900	2265025	105350	676
85	2240	7225	5017600	190400	121
140	5050	19600	25502500	707000	1936
100	5275	10000	27825625	527500	16
85	4899	7225	24000201	416415	121
$\sum X =$ **480**	$\sum Y =$ **18969**	$\sum X^2 =$ **48950**	$\sum Y^2 =$ **84610951**	$\sum XY =$ **1946665**	$\sum (X-\overline{X})^2 =$ **2870**

$\overline{X} = \frac{\sum X}{n} = \frac{480}{5} =$ **96** $\overline{Y} = \frac{\sum Y}{n} = \frac{18969}{5} = 3793.80$

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$

r = $\frac{5 \times 1946665 - (480 \times 18969)}{\sqrt{5 \times 48950 - (480)^2}\ \sqrt{5 \times 84610951 - (18969)^2}}$

r = **0.66**

Coefficient of Determination (r^2) = 0.43

Probable error of correlation coefficient, P.E. (r) = 0.6745 $\times \frac{1 - r^2}{\sqrt{n}}$

= 0.6745 $\times$ 0.2549

= **0.1719**

And P.E.(r) $\times$ 6=0.1719 $\times$ 6

=1.03

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} = \frac{5 \times 1946665 - (480 \times 18969)}{5 \times 48950 - (480)^2}$ = **43.78**

a = $\overline{Y}$ - b $\overline{X}$ = 3793.80 – [(43.78) $\times$ 96] = -408.83

Hence the required simple regression equation as follows:

Y= 3793.80 + (43.78 X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

$= \sqrt{\frac{84610851 - (-408.83 \times 18969) - [(43.78) \times 1946665]}{5-2}}$

= **1543.39**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum \left(X - \overline{X}\right)^2}}$

$= \frac{1543.39}{53.57}$ = **28.81**

T-value $|t| = \frac{b}{S_b}$ = $\frac{43.78}{28.81}$ = **1.52**

2. MPS on EPS of NABIL

X (EPS)	Y (MPS)	X²	Y²	XY	(X- $\overline{X}$)²
105.49	1505	11128.14	2265025	158762.45	141.13
129.21	2240	16695.22	5017600	289430.40	140.19
137.08	5050	18790.92	25502500	692254	388.48
108.31	5275	11731.06	27825625	571335.25	82.08
106.76	4899	11397.70	24000201	523017.24	112.57
$\sum X =$ **586.85**	$\sum Y =$ **18969**	$\sum X^2 =$ **69743.04**	$\sum Y^2 =$ **84610951**	$\sum XY =$ **2234799.34**	$\sum \left(X - \overline{X}\right)^2 =$ **864.46**

$\overline{X} = \frac{\sum X}{n} = \frac{586.85}{5} =$ **117.37** $\overline{Y} = \frac{\sum Y}{n} = \frac{18969}{5} =$ 3793.80

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5 \times 2234799.34 - (586.85 \times 18969)}{\sqrt{5 \times 69743.04 - (586.85)^2}\ \sqrt{5 \times 84610951 - (18969)^2}}$

r = **0.08**

Coefficient of Determination (r^2) = 0.01

Probable error of correlation coefficient, P.E. (r) = 0.6745 $\times \frac{1 - r^2}{\sqrt{n}}$

= 0.6745 $\times$ 0.4427

= **0.2986**

And P.E.(r) $\times$ 6=0.2986 $\times$ 6

=1.79

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 2234799.34 - (586.85 \times 18969)}{5 \times 69743.04 - (586.85)^2}$ = **9.73**

a = $\overline{Y}$ - b $\overline{X}$ = 3793.80 – [(9.73) × 117.37] = 2650.30

Hence the required simple regression equation as follows:

Y= 2650.30 + (9.73X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{84610851 - (2650.30 \times 18969) - [(9.73) \times 2234799.34]}{5-2}}$

= **2046.51**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{2046.51}{29.40}$ = **69.61**

T-value $|t| = \frac{b}{S_b}$ = $\frac{9.73}{69.61}$ = **0.14**

3. DPS on EPS of NABIL

X (EPS)	Y (DPS)	X^2	Y^2	XY	$(X-\overline{X})^2$
105.49	70	11128.14	4900	**7384.30**	141.13
129.21	85	16695.22	7225	**10982.85**	140.19
137.08	140	18790.92	19600	**19191.20**	388.48
108.31	100	11731.06	10000	**10931**	82.08
106.76	85	11397.70	7225	**9074.60**	112.57
$\sum X =$ **586.85**	$\sum Y =$ **480**	$\sum X^2 =$ **69743.04**	$\sum Y^2 =$ **48950**	$\sum XY =$ **57563.95**	$\sum\left(X - \overline{X}\right)^2 =$ **864.46**

$\overline{X} = \frac{\sum X}{n} = \frac{586.85}{5} =$ **117.37** $\overline{Y} = \frac{\sum Y}{n} = \frac{18969}{5} =$ 3793.80

Coefficient of Correlation (r) = $\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - \left(\sum X\right)^2}\sqrt{n\sum Y^2 - \left(\sum Y\right)^2}}$

r = $\frac{5 \times 57563.95 - (586.85 \times 480)}{\sqrt{5 \times 69743.04 - (586.85)^2}\ \sqrt{5 \times 48950 - (586.85)^2}}$

r = **0.71**

Coefficient of Determination (r^2) = 0.50

Probable error of correlation coefficient, P.E. (r) = $0.6745 \times \frac{1-r^2}{\sqrt{n}}$

= $0.6745 \times$ 0.2236

= **0.1508**

And P.E.(r) $\times$ 6=0.1508 $\times$ 6

=0.90

Regression equation of Y on X, **Y= a+ b X**

Where,

a = regression constant

b = Regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by,

$\sum Y = n.a + b\sum X$ And $\sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get

b = $\frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2}$ = $\frac{5 \times 57563.95 - (586.85 \times 480)}{5 \times 69743.04 - (586.85)^2}$ = **1.30**

a = $\overline{Y}$ - b $\overline{X}$ = 96 – [(1.30) $\times$ 117.37] = -56.93

Hence the required simple regression equation as follows:

Y= -56.93 + (1.30X)

Standard Error of Estimate (S.E.E.) = $\sqrt{\frac{\sum Y^2 - a\sum Y - b\sum XY}{n-2}}$

= $\sqrt{\frac{48950 - (-56.93 \times 480) - [(1.30 \times 57563.95]}{5-2}}$

= **21.62**

Standard Error of Beta Coefficient (S_b) = $\frac{S.E.E.}{\sqrt{\sum\left(X - \overline{X}\right)^2}}$

= $\frac{21.62}{29.40}$ = **0.74**

T-value $|t| = \frac{b}{S_b}$ = $\frac{1.30}{0.74}$ = **1.77**

APPENDIX – VI

1. Correlation analysis

Correlation coefficient between financial variables of EBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.82	.89	0.88	0.93	-0.3	0.95
DPS	1.00	0.99	0.99	0.64	0.22	0.95
EPS	-	1	0.99	0.68	0.19	0.96
P/E	-	-	0.69	1	-0.6	0.78
DPR	-	-	1.00	-	0.17	0.96
DY	-	-	-	-	1.00	0.78
NWPS	-	-	-	-	-	1.00

Correlation coefficient between financial variables of SBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.88	0.17	0.80	0.95	0.78	0.95
DPS	1.00	0.11	0.98	0.89	0.97	0.86
EPS	-	1.00	-0.01	-0.11	0.04	0.13
P/E	-	-	0.85	1.00	0.82	0.90
DPR	-	-	1.00	-	0.98	0.79
DY	-	-	-	-	1.00	0.83
NWPS	-	-	-	-	-	1.00

Correlation coefficient between financial variables of HBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.47	0.46	0.28	0.60	-0.63	0.33
DPS	1.00	0.89	0.73	0.94	-0.93	0.61
EPS	-	1.00	0.29	0.72	-0.83	0.41
P/E	-	-	0.82	1.00	-0.96	0.78
DPR	-	-	1.00	-	-0.65	0.62
DY	-	-	-	-	1.00	-0.79
NWPS	-	-	-	-	-	1.00

Correlation coefficient between financial variables of NIC

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	-0.20	0.72	-0.83	0.95	-0.74	0.59
DPS	1.00	0.36	0.70	-0.41	0.78	0.50
EPS	-	1.00	-0.33	0.46	-0.15	0.97
P/E	-	-	-0.90	1.00	-0.87	0.31
DPR	-	-	1.00	-	0.98	-0.18
DY	-	-	-	-	1.00	0.003
NWPS	-	-	-	-	-	1.00

Correlation coefficient between financial variables of NABIL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.66	0.08	0.86	0.96	-0.94	0.17
DPS	1.00	0.72	0.90	0.44	-0.39	0.82
EPS	-	1.00	0.35	-0.18	0.12	0.95
P/E	-	-	0.73	1.00	-0.98	-0.09
DPR	-	-	1.00	-	-0.64	0.52
DY	-	-	-	-	1.00	0.09
NWPS	-	-	-	-	-	1.00

APPENDIX – VII

Values of $PE(r) \times 6$ of EBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.59	0.38	0.41	0.24	1.65	0.18
DPS	-	0.04	0.04	1.07	1.72	0.18
EPS	-	-	0.04	0.97	1.74	0.14
P/E	-	-	0.95	-	1.16	0.71

Values of $PE(r) \times 6$ of SBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	0.54	1.74	0.66	0.18	0.72	0.18
DPS	-	1.79	0.07	0.36	0.12	0.48
EPS	-	-	-0.03	1.79	1.81	1.78
P/E	-	-	0.50	-	0.59	0.34

Values of $PE(r) \times 6$ of HBL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	1.41	1.43	1.67	1.16	1.09	1.61
DPS	-	0.38	0.84	0.21	0.24	1.14
EPS	-	-	1.66	0.87	0.14	1.50
P/E	-	-	0.59	-	0.14	0.70

Values of $PE(r) \times 6$ of NIC

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	1.74	0.87	0.56	0.18	0.82	1.18
DPS	-	1.58	0.92	1.51	0.71	1.36
EPS	-	-	1.61	1.43	1.77	0.11
P/E	-	-	0.34	-	0.44	1.64

Values of $PE(r) \times 6$ of NABIL

	DPS	EPS	DPR	P/E	DY	NWPS
MPS	1.02	1.82	0.47	0.14	0.21	1.76
DPS	-	0.87	0.34	1.46	1.53	0.59
EPS	-	-	1.59	1.75	1.78	0.18
P/E	-	-	0.85	-	0.07	1.80

APPENDIX – VIII

2. Regression analysis

Regression analysis between MPS on EPS

Bank	Years	(a)	(b)	SEE	S_b	r^2	T-value
EBL	5	-1229.35	42.37	476.77	12.43	0.79	3.41
SBL	5	286.50	20.97	520.50	68.48	0.03	0.31
HBL	5	-2196.50	63.20	297.36	24.53	0.21	2.58
NIC	5	-684.46	65.67	312.25	35.19	0.52	1.89
NABIL	5	2650.30	9.72	2046.50	69.61	0.01	0.20

Regression analysis between MPS on DPS

Bank	Years	(a)	(b)	SEE	S_b	r^2	T-value
EBL	5	221.56	46.97	532.70	15.92	0.67	2.95
SBL	5	221.39	50.35	253.02	15.85	0.77	3.17
HBL	5	-1552.99	78.31	120.38	10.49	0.22	7.46
NIC	5	1041.86	-10.03	451.99	31.26	0.04	0.32
NABIL	5	-408.83	43.78	1543.39	28.81	0.43	1.52

Regression analysis between MPS on DPR

Bank	Years	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	-1925.48	82.15	492.10	25.09	0.77	3.27
SBL	5	283.68	7.74	319.84	3.40	0.64	2.28
HBL	5	-3049.98	68.32	362.91	36.70	0.08	1.86
NIC	5	1419.68	-8.59	265.01	3.50	0.69	2.45
NABIL	5	-4092.68	97.27	1023.35	32.29	0.74	3.01

Regression analysis between MPS on P/E Ratio

Bank	Years	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	-972.88	118.52	370.68	25.76	0.86	4.60
SBL	5	-18.59	18.11	159.116	3.30	0.90	5.48
HBL	5	-421.29	75.97	94.50	7.90	0.37	9.61
NIC	5	-198.75	29.50	154.55	6.08	0.90	4.85
NABIL	5	301.52	107.09	552.63	17.28	0.92	6.19

Regression analysis between MPS on DY

Bank	Year	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	3529.16	-768.73	1005.33	1436.18	0.09	0.54
SBL	5	282.76	401.15	328.26	183.39	0.61	2.19
HBL	5	3813.28	-846.74	93.87	87.72	0.40	9.65
NIC	5	1159.09	-101.06	315.78	55.21	0.55	1.83
NABIL	5	7781.63	-1342.70	702.86	282.27	0.88	4.76

Regression analysis between MPS on NWPS

Bank	Years	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	-2628.50	17.29	339.91	3.41	0.90	5.07
SBL	5	-4903.01	44.15	168.73	8.59	0.90	5.14
HBL	5	-4359.49	23.67	368.31	13.07	0.11	1.81
NIC	5	-1996.62	21.02	371.41	16.64	0.35	1.26
NABIL	5	944.05	7.85	2024.78	26.99	0.03	0.29

Regression analysis between DPS on EPS

Bank	Years	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	-28.37	0.87	1.55	0.04	0.98	21.52
SBL	5	2.73	0.32	9.11	1.20	0.01	0.26
HBL	5	-9.12	0.82	3.29	0.27	0.76	3.03
NIC	5	18.25	0.04	8.32	0.32	0.13	0.14
NABIL	5	-60.87	1.33	21.3	0.73	0.50	1.82

Regression analysis between DPS on NWPS

Bank	Years	(a)	(b)	SEE	S_b	R^2	T-value
EBL	5	-47.57	0.32	5.84	0.06	0.90	5.45
SBL	5	-79.17	0.69	4.73	0.24	0.74	2.89
HBL	5	-22.25	0.24	5.26	0.18	0.37	1.32
NIC	5	-23.84	0.32	7.24	0.32	0.25	0.99
NABIL	5	-116.19	0.58	17.74	0.23	0.67	2.47