APPENDIX 4. Details of Calculations of -

II Prediction of overall degree of success i.e. PSCE grand total percent (y_T) from a standardized test in English (T_e) and standardized test in Mathematics (T_n)

	N	T_e	T_n	T_n^2	T_e^2	$T_e T_n$	y_T
1	352	4107	6296	122722	52541	76948	18246
T_e		52541	76948	1560336	724563	1023242	217622
T_n			122722	2564234	1023242	1560336	335947
T_n^2				56702782	21499022	33840454	6726065
T_e^2					10631837	14576902	2837860
$T_e T_n$						21499022	4196512
	352	4107	6296	122722	52541	76948	18246
	1	11.6676136364	17.8863636364	348.6420454545	149.2642045455	218.6022727273	51.8352272727
		4622.110795	3488.704545	128463.119314	111534.911930	125442.465906	4734.721590
		1	.7547860057	27.7931717805	24.1307309316	27.1396492792	1.0243634997
			7476.229177	272221.517107	-710.422492	89333.873120	6018.707495
			1	36.4116067956	-.0950241726	11.9490549320	.8050458795
				434312.5130	106978.9474	273912.0218	14018.4975
				1	.2463179029	.6306795536	.0322774433
					71509.14260	5321.039241	-2748.053060
					1	.0744106145	-.0384293946
						32947.77805	-1158.313452
						1	-.0351560415

(i) $b_{T_e T_n} = -.0351560415$

$b_{T_e^2} + b_{T_e T_n}(.0744106145) = -.0384293946$

$b_{T_e^2} = -.0358134119$

$b_{T_n^2} + b_{T_e^2}(.2463179029) + b_{T_e T_n}(.6306795536) = .0322774433$

$b_{T_n^2} = .0632711244$

$b_{T_n} + b_{T_n^2}(36.4116067956) - b_{T_e^2}(.0950241726) + b_{T_e T_n}(11.9490549320) = .8050458795$

$b_{T_n} = -1.0820790924$

$b_{T_e} + b_{T_n}(.7547860057) + b_{T_n^2}(27.7931717805) + b_{T_e^2}(24.1307309316) + b_{T_e T_n}(27.1396492792) = 1.0243634997$

$b_{T_e} = 1.9009228692$

$c + b_{T_e}(11.6676136364) + b_{T_n}(17.8863636364) + b_{T_n^2}(348.6420454545) + b_{T_e^2}(149.2642045455) + b_{T_e T_n}(218.6022727273) = 51.8352272727$

$c = 39.9823306050$

$y_T = 1.9009228692T_e - 1.0820790924T_n + .0632711244T_n^2 - .0358134119T_e^2 - .0351560415T_e T_n + 39.9823306050$

(ii) $b_{T_e^2} = -.0384293946$

$b_{T_n^2} + b_{T_e^2}(.2463179029) = .0322774433$

$b_{T_n^2} = .0417432912$

$b_{T_n} + b_{T_n^2}(36.4116067956) - b_{T_e^2}(.0950241726) = .8050458795$

$b_{T_n} = -.7185461475$

$b_{T_e} + b_{T_n}(.7547860057) + b_{T_n^2}(27.7931717805) + b_{T_e^2}(24.1307309316) = 1.0243634997$

$b_{T_e} = 1.3338629836$

$c + b_{T_e}(11.6676136364) + b_{T_n}(17.8863636364) + b_{T_n^2}(348.6420454545) + b_{T_e^2}(149.2642045455) = 51.8352272727$

$c = 40.3070755478$

$y_T = 1.3338629886T_e - .7185461475T_n + .0417432912T_n^2 - .0384293946T_e^2 + 40.3070755478$

(iii) $b_{T_n^2} = .0322774433$

$b_{T_n} + b_{T_n^2}(36.4116067956) = .8050458795$

$b_{T_n} = -.3702276943$

$b_{T_e} + b_{T_n}(.7547860057) + b_{T_n^2}(27.7931717805) = 1.0243634997$

$b_{T_e} = .4067136560$

$c + b_{T_e}(11.6676136364) + b_{T_n}(17.8863636364) + b_{T_n^2}(348.6420454545) = 51.8352272727$

$c = 42.4586027858$

$y_T = .4067136560T_e - .3702276943T_n + .0322774433T_n^2 + 42.4586027858$

(iv) $b_{T_n} = .8050458795$

$b_{T_e} + b_{T_n}(.7547860057) = 1.0243634997$

$b_{T_e} = .4167261359$

$c + b_{T_e}(11.6676136364) + b_{T_n}(17.8863636364) = 51.8352272727$

$c = 32.5736845888$

$y_T = .4167261359T_e + .8050458795T_n + 32.5736845888$

(v) $b_{T_e} = 1.0243634997$

$c + b_{T_e}(11.6676136364) = 51.8352272727$

$c = 39.8833497350$

$y_T = 1.0243634997T_e + 39.8833497350$

II Prediction of overall degree of success i.e. PScE grand total percent (y_T) from a standardized test in English(T_e) and standardized test in Mathematics (T_n)

(i) The fitted regression of (y_T) on T_e, T_n, T_n^2, T_e^2, T_eT_n is

$$y_T = 1.900922869T_e - 1.082079092T_n + .063271124T_n^2 - .035813412T_e^2 - .035156042T_eT_n + 39.982330603$$

Reg. S.S.$= (1.900922869)(217622) - (1.082079092)(335947) + (.063271124)(6726085) - (.035813412)(2837860) - (.035156042)(4196512) + (39.982330603)(18246) - \frac{(18246)^2}{352}$

$= 956079.77 - 945785.56$

$= 10294.21$

(ii) The fitted regression of (y_T) on T_e, T_n, T_n^2, T_e^2 is

$$y_T = 1.333862989T_e - .718546148T_n + .041743291T_n^2 - .038429395T_e^2 + 40.307073548$$

Reg. S.S.$= (1.333862989)(217622) - (.718546148)(335947) + (.041743291)(6726085) - (.038429395)(2837860) + (40.307073548)(18246) - \frac{(18246)^2}{352}$

$= 956039.05 - 945785.56$

$= 10253.49$

(iii) The fitted regression of (y_T) on T_e, T_n, T_n^2 is

$$y_T = .406713656T_e - .370227694T_n + .032277443T_n^2 + 42.458602786$$

Reg. S.S.$= (.406713656)(217622) - (.370227694)(335947) + (.032277443)(6726085) (42.458602786)(18246) - \frac{(18246)^2}{352}$

$= 955933.45 - 945785.56$

$= 10147.89$

(iv) The fitted regression of (y_T) on T_e, T_n is

$$y_T = .416726136T_e + .805045880T_n + 32.573684389$$

Reg. S.S.$= (.416726136)(217622) + (.805045880)(335947) + (32.573684389)(18246) - \frac{(18246)^2}{352}$

$= 955480.97 - 945785.56$

$= 9695.41$

(v) The fitted regression of (y_T) on T_e is

$$y_T = 1.024363500T_e + 39.883349735$$

Reg. S.S.$= (1.024363500)(217622) + (39.883349735)(18246) - \frac{(18246)^2}{352}$

$= 950635.63 - 945785.56$

$= 4850.07$