Chapter : VIII

ANALYSIS AND INTERPRETATION OF DATA

(A) The Scheme of The Chapter

The answersheets of the final version of the test were scored. The scores were grouped into frequency-distributions. Such grouping was done in four manners :

(i) For the whole test and for all the faculties.

(ii) For the four subtests (parts) separately.

(iii) For the three faculties separately.

(iv) For boys and girls separately.

The tables containing these frequency distributions are given in Section (B) of this chapter.

From these frequency distributions, mean score and standard deviation for each distribution are also

calculated. These measures show the central tendency and the variability respectively of these distribution. The mean scores and standard deviations are also given along with the distributions.

On the basis of these frequency distributions, percentile ranks were calculated -

(i) for the whole test irrespective of faculties,

(ii) for four parts separately,

(iii) for three faculties separately,

(iv) for two sexes separately.

Sexwise percentile ranks were calculated, but the investigator found that there was not much perceptible difference between boys and girls. These PRs are to serve as norms for the test. All this analysis is given in Section (B) that follows.

Inter-correlations among the four subtests were also calculated. They are already dealt with in Chapter VII in the section of factorial validity of the test.

Table 8.1 gives The whole test frequency distribution for all faculties combined.

Table 8.2 gives Partwise frequency distributions for all faculties combined, that is, for Part I, II, III and IV separately.

Table 8.3 gives Facultywise frequency distributions for all parts combined, that is, for Arts, Science and Commerce separately.

Table 8.4 gives Frequency distributions for all parts and all faculties separately. In all, it contains 16 distributions.

Table 8.5 gives Percentile rank norms for Arts, Science, Commerce separately and also for all faculties together.

Table 8.6 gives Partwise percentile rank norms, that is, for Part I, II, III and IV.

Table 8.7 gives Separate norms for boys and girls.

Table 9.8 gives a summary of all statistics with their SEs.

Section (C) attempts to interpret the analysis.

Section (D) interprets the intercorrelation among the four subtests.

(B) Tables showing The Grouped Data and Their Analysis

Table : 8.1

THE WHOLE-TEST ALL FACULTY FREQUENCY DISTRIBUTION

Class Interval of Scores	Frequency	Cummulative Frequency
306 - 310	7	1000
301 - 305	13	993
296 - 300	24	980
291 - 295	29	956
286 - 290	36	927
281 - 285	44	891
276 - 280	48	847
271 - 275	55	799
266 - 270	62	744
261 - 265	59	682
256 - 260	65	623
251 - 255	68	558
246 - 250	67	490
241 - 245	59	423
236 - 240	58	364
231 - 235	54	306
226 - 230	52	252
221 - 225	46	200
216 - 220	36	154
211 - 215	31	118

Table : 8.1
(Contd.)

Class Interval of Scores	Frequency	Cummulative Frequency
206 - 210	27	87
201 - 205	21	60
196 - 200	15	39
191 - 195	15	24
186 - 190	9	9
Below 186	-	-

N	=	1000
Mean Score	=	250.25
S.D.	=	27.75

Table : 8.2

TESTWISE FREQUENCY DISTRIBUTION

TEST : I

Class Interval of Scores	Frequency
141 - 145	69
136 - 140	91
131 - 135	167
126 - 130	229
121 - 125	187
116 - 120	110
111 - 115	94
106 - 110	53
	N = 1000
Mean =	126.3
S.D. =	9.1515

TEST : II

Class Interval of Scores	Frequency
55 - 55	91
46 - 50	118
41 - 45	163
36 - 40	241
31 - 35	182
26 - 30	116
21 - 25	89
	N = 1000
Mean =	37.965
S.D. =	8.51

Table : 8.2
(Contd.)

TEST : III

Class Interval of Scores	Frequency
76 - 80	63
71 - 75	109
66 - 70	219
61 - 65	176
56 - 60	149
51 - 55	119
46 - 50	87
41 - 45	78
	N = 1000
Mean	= 61.33
S.D.	= 7.05

TEST : IV

Class Interval of Scores	Frequency
28 - 30	118
25 - 27	187
22 - 24	248
19 - 21	244
16 - 18	131
13 - 15	72
	N = 1000
Mean	= 21.5
S.D.	= 4.47

Table : 8.3

THE WHOLE-TEST FACULTYWISE FREQUENCY DISTRIBUTION OF SCORES

Class Interval of Scores	Arts		Science		Commerce		Total
	Frequency	Cum. Fre.	Frequency	Cum. Fre.	Frequency	Cum. Fre.	
306 - 310	4	400	3	300	-	-	7
301 - 305	5	396	2	297	6	300	13
296 - 300	11	391	6	295	7	294	24
291 - 295	12	380	9	289	8	287	29
286 - 290	15	368	10	280	11	279	36
281 - 285	16	353	13	270	15	268	44
276 - 280	20	337	15	257	13	253	48
271 - 276	21	317	18	242	16	240	55
266 - 270	25	296	19	224	18	224	62
261 - 265	26	271	18	205	15	206	59
256 - 260	26	245	21	187	18	191	65
251 - 255	30	219	19	166	19	173	68
246 - 250	28	189	18	147	21	154	67
241 - 245	24	161	18	129	17	133	59
236 - 240	22	137	18	111	18	116	58

Table : 8.3
(Contd.)

Class Interval of Scores	Arts		Science		Commerce		Total
	Frequency	Cum. Fre.	Frequency	Cum. Fre.	Frequency	Cum. Fre.	
231 - 235	20	115	18	93	16	98	54
226 - 230	18	95	17	75	17	82	52
221 - 225	17	77	14	58	15	65	46
216 - 220	15	60	10	44	11	50	36
211 - 215	12	45	9	34	10	39	31
206 - 210	10	33	9	25	8	29	27
201 - 205	8	23	6	16	7	21	21
196 - 200	6	15	4	10	5	14	15
191 - 195	5	9	4	6	6	9	15
186 - 190	4	4	2	2	3	3	9
Below 186	-	-	-	-	-	-	-
Total :	400		300		300		

Median = 252 Median = 251 Median = 249.5

Table : 8.4

FACULTYWISE AND TESTWISE SCORES

PART : I

Score	All Faculties	Arts	Science	Commerce
106 - 110	53	22	15	16
111 - 115	94	48	27	19
116 - 120	110	51	30	29
121 - 125	187	78	58	51
126 - 130	229	68	75	86
131 - 135	167	61	52	54
136 - 140	91	40	25	26
141 - 145	69	32	18	19
Total : N =	1000	400	300	300
Mean =	126.30	125.85	126.30	125.15
S.D. =	9.1515	9.65	8.50	8.45

Table : 8.4
(Contd.)

PART : II

Score	All Faculties	Arts	Science	Commerce
21 - 25	89	21	45	23
26 - 30	116	31	55	30
31 - 35	182	78	68	36
36 - 40	241	101	65	75
41 - 45	163	82	35	46
46 - 50	118	48	20	50
51 - 55	91	39	12	40
Total : N =	1000	400	300	300
Mean =	37.965	39.15	36.15	39.65
S.D. =	8.51	7.55	8.05	8.85

Table : 8.4
(Contd.)

PART : III

Score	All Faculties	Arts	Science	Commerce
41 - 45	78	16	47	15
46 - 50	87	35	26	26
51 - 55	119	44	42	33
56 - 60	149	51	44	54
61 - 65	176	73	33	70
66 - 70	219	104	62	53
71 - 75	109	51	36	22
76 - 80	63	26	10	27
Total : N =	1000	400	300	300
Mean =	61.33	62.70	59.15	62.04
S.D. =	7.05	7.85	10.55	7.75

Table : 8.4
(Contd.)

PART : IV

Score	All Faculties	Arts	Science	Commerce
13 - 15	72	15	29	28
16 - 18	131	26	52	53
19 - 21	244	85	79	80
22 - 24	248	102	73	73
25 - 27	187	97	41	49
28 - 30	118	75	26	17
Total : N =	1000	400	300	300
Mean =	21.5	23.48	21.77	21.14
S.D. =	4.47	3.72	4.2	4.08

Table : 8.5

PERCENTILE RANK NORMS FOR THE WHOLE TEST

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
186	-	-	-	-
187	-	-	-	-
188	1	-	1	1
189	1	-	1	1
190	1	1	1	1
191	1	1	1	1
192	1	1	2	1
193	2	1	2	2
194	2	2	2	2
195	2	2	3	3
196	2	2	3	3
197	3	2	4	3
198	3	3	4	3
199	3	3	4	4
200	4	3	5	5
201	4	4	5	5
202	4	4	5	5
203	5	4	6	5
204	5	5	6	5

Table : 8.5
(Contd.)

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
205	6	5	7	6
206	6	6	7	6
207	7	6	8	7
208	7	7	8	7
209	8	7	9	8
210	8	8	9	8
211	9	9	10	9
212	9	9	11	10
213	10	10	12	10
214	10	10	12	11
215	11	11	13	11
216	12	12	13	12
217	12	12	14	13
218	13	13	15	14
219	14	14	16	14
220	15	14	16	15
221	15	15	17	16
222	16	16	18	17
223	17	17	19	18
224	18	18	20	19
225	19	19	21	20
226	20	20	22	21

Table : 8.5
(Contd.)

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
227	21	21	23	22
228	22	22	25	23
229	22	23	26	24
230	23	24	27	25
231	24	26	28	26
232	25	27	29	27
233	26	28	30	28
234	27	29	31	29
235	28	30	32	30
236	29	32	33	31
237	30	33	34	32
238	32	34	36	34
239	33	35	37	35
240	34	36	38	36
241	35	38	39	37
242	36	39	40	38
243	37	40	42	39
244	38	41	43	41
245	40	42	44	42
246	41	44	45	43
247	42	45	46	44
248	44	46	48	46

Table : 8.5
(Contd.)

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
249	45	47	49	47
250	47	48	51	48
251	48	50	52	50
252	50	51	53	51
253	51	52	55	52
254	53	53	56	54
255	54	54	57	55
256	55	56	58	56
257	57	57	59	58
258	58	59	61	59
259	59	60	62	60
260	61	62	63	62
261	62	63	64	63
262	63	64	65	64
263	65	66	66	65
264	66	67	67	66
265	67	68	68	68
266	68	69	69	69
267	70	70	71	70
268	71	72	72	71
269	72	73	73	73
270	74	74	74	74

Table : 8.5
(Contd.)

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
271	75	75	75	75
272	76	77	76	76
273	77	78	77	77
274	78	79	78	78
275	79	80	79	79
276	80	81	80	80
277	81	82	81	81
278	82	83	82	82
279	83	84	83	83
280	84	85	84	84
281	85	86	85	85
282	85	87	86	86
283	86	88	87	87
284	87	89	88	88
285	88	90	89	89
286	89	90	90	90
287	89	91	91	91
288	90	92	92	92
289	91	92	93	92
290	92	93	93	93
291	92	94	93	93

Table : 8.5
(Contd.)

Score	Percentile Ranks			
	Arts	Science	Commerce	All Faculty
292	93	94	94	94
293	94	95	94	94
294	94	95	94	95
295	95	96	95	96
296	95	97	96	96
297	96	97	97	97
298	97	97	97	97
299	97	98	97	97
300	98	98	98	98
301	98	98	98	98
302	98	99	99	98
303	98	99	99	99
304	99	99	99	99
305	99	99	100	99
306	99	99	-	99
307	99	99	-	99
308	99	99	-	99
309	99	99	-	99
310	100	100	-	100
Above 310	-	-	-	-

Table : 8.6

TESTWISE PERCENTILE RANKS

TEST : I

Score	P.R.	Score	P.R.	Score	P.R.
106	1	120	25	133	76
107	2	121	28	134	79
108	3	122	31	135	82
109	4	123	35	136	85
110	5	124	39	137	87
111	6	125	43	138	89
112	8	126	47	139	90
113	10	127	51	140	92
114	12	128	56	141	94
115	14	129	61	142	95
116	16	130	65	143	97
117	18	131	69	144	99
118	20	132	73	145	100
119	22				

TEST : II

Score	P.R.	Score	P.R.	Score	P.R.
21	1	24	4	27	12
22	2	25	4	28	15
23	3	26	10	29	17

Table : 8.6
(Contd.)

Score	P.R.	Score	P.R.	Score	P.R.
30	19	39	56	48	85
31	22	40	60	49	87
32	26	41	64	50	90
33	30	42	68	51	93
34	33	43	71	52	95
35	37	44	74	53	97
36	41	45	77	54	99
37	46	46	80	55	100
38	51	47	83		

TEST : III

Score	P.R.	Score	P.R.	Score	P.R.
41	1	49	14	57	33
42	2	50	16	58	36
43	4	51	18	59	39
44	5	52	20	60	42
45	7	53	22	61	45
46	9	54	25	62	49
47	10	55	27	63	52
48	12	56	30	64	56

Table : 8.6
(Contd.)

Score	P.R.	Score	P.R.	Score	P.R.
65	59	71	84	76	94
66	63	72	86	77	96
67	67	73	88	78	98
68	72	74	90	79	99
69	77	75	92	80	100
70	81				

TEST : IV

Score	P.R.	Score	P.R.	Score	P.R.
13	1	20	32	26	79
14	4	21	41	27	85
15	6	22	49	28	90
16	9	23	57	29	94
17	14	24	65	30	98
18	18	25	73	31	100
19	24				

Table : 8.7

SEXWISE PERCENTILE RANK NORMS

Score	P.R. Boys	P.R. Girls	Score	P.R. Boys	P.R. Girls
188	1	-	208	7	7
189	1	-	209	8	8
190	1	1	210	9	9
191	1	1	211	9	10
192	1	1	212	10	10
193	2	2	213	10	11
194	2	2	214	11	12
195	3	2	215	12	12
196	3	3	216	12	13
197	3	3	217	13	13
198	4	3	218	14	14
199	4	4	219	14	15
200	5	4	220	15	16
201	5	4	221	16	17
202	5	5	222	17	18
203	5	5	223	18	19
204	5	5	224	19	20
205	6	6	225	20	21
206	6	6	226	21	22
207	7	7	227	22	23

Table : 8.7
(Contd.)

Score	P.R. Boys	P.R. Girls	Score	P.R. Boys	P.R. Girls
228	23	24	249	47	52
229	24	25	250	48	53
230	25	26	251	50	54
231	26	27	252	51	55
232	27	29	253	52	56
233	28	30	254	53	57
234	29	31	255	54	57
235	30	32	256	56	58
236	31	33	257	58	59
237	32	35	258	59	60
238	34	36	259	60	61
239	35	37	260	62	63
240	36	38	261	63	64
241	37	39	262	64	65
242	38	40	263	65	66
243	39	42	264	66	67
244	41	44	265	68	68
245	42	45	266	69	69
246	43	46	267	70	70
247	44	48	268	71	70
248	46	50	269	73	71

Table : 8.7
(Contd.)

Score	P.R.		Score	P.R.	
	Boys	Girls		Boys	Girls
270	74	72	291	93	94
271	75	73	292	94	94
272	76	74	293	94	95
273	77	75	294	95	95
274	78	76	295	95	96
275	79	77	296	96	97
276	81	79	297	97	97
277	82	80	298	97	97
278	83	81	299	97	98
279	84	82	300	98	98
280	85	83	301	98	98
281	86	84	302	98	99
282	87	85	303	99	99
283	88	86	304	99	99
284	89	88	305	99	99
285	90	89	306	99	99
286	90	90	307	99	99
287	91	91	308	99	100
288	92	92	309	99	-
289	93	93	310	100	-
290	93	93			

Table : 8.8

A SUMMARY

OF

THE STATISTICS REGARDING THIS TEST-BATTERY

Sr. No.	Name of the Measure		Figure	S.E.	N
1.	Whole Test	Mean	250.25	.8760	1000
2.	Whole Test	S.D.	27.75	.5096	1000
3.	Whole Test	Median	251.	1.0960	1000
4.	Part I	Mean	126.3	.2910	1000
5.	Part I	S.D.	9.15	.2791	1000
6.	Part I	Median	126.75	.3635	1000
7.	Part II	Mean	37.97	.2609	1000
8.	Part II	S.D.	8.51	.1923	1000
9.	Part II	Median	37.80	.3225	1000
10.	Part III	Mean	61.33	.22	1000
11.	Part III	S.D.	7.05	.1584	1000
12.	Part III	Median	62.33	.276	1000
13.	Part IV	Mean	21.5	.14	1000
14.	Part IV	S.D.	4.47	.103	1000
15.	Part IV	Median	22.12	.175	1000

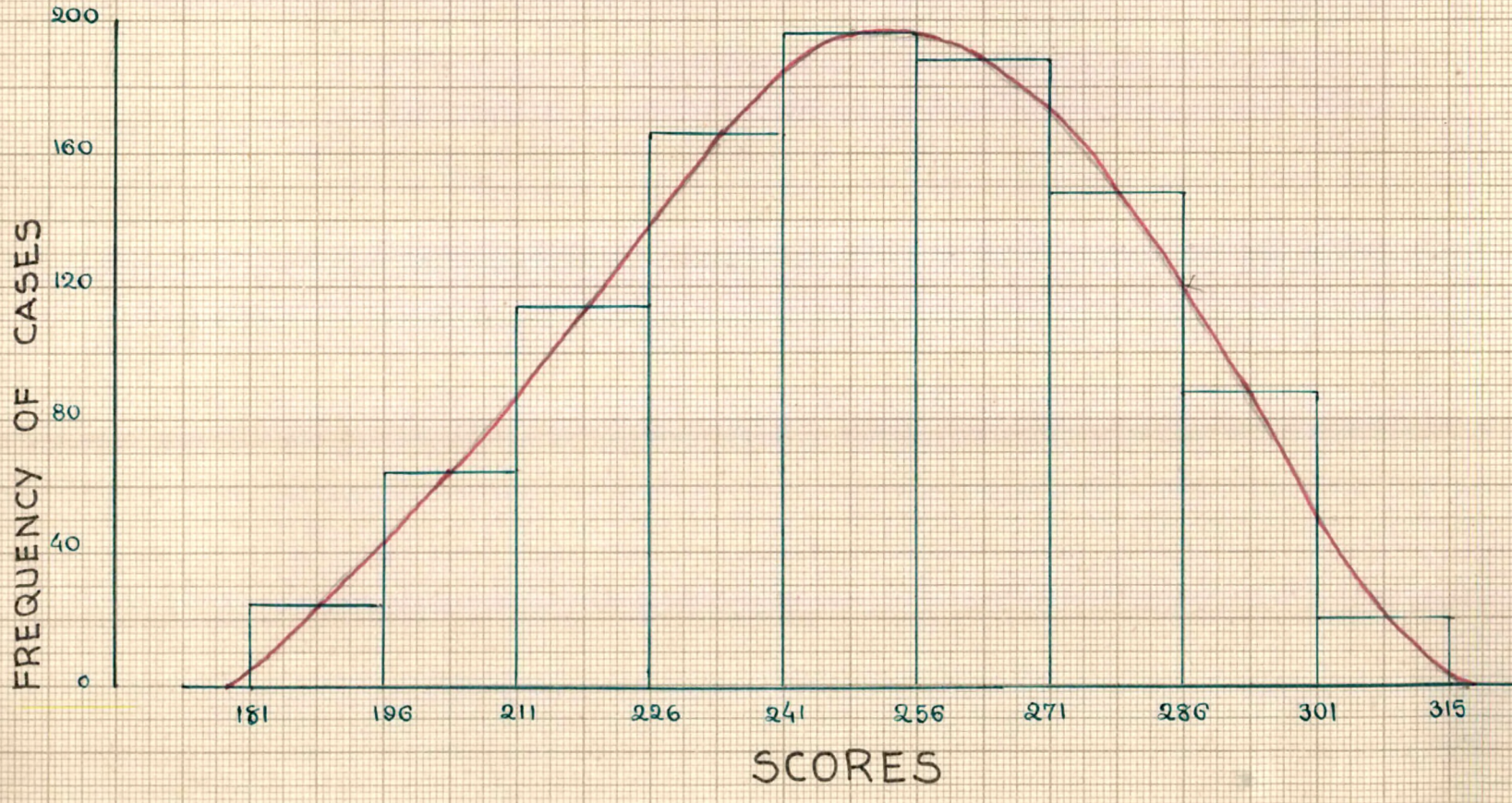
Table : 8.8
(Contd.)

Sr. No.	Name of the Measure			Figure	S.E.	N
16.	Part I)	Arts	Mean	125.85	.4825	400
17.	)	Arts	S.D.	9.65	.3426	400
18.	)	Science	Mean	126.30	.4907	300
19.	)	Science	S.D.	8.5	.3484	300
20.	)	Commerce	Mean	125.15	.4891	300
21.	)	Commerce	S.D.	8.45	.3378	300
22.	Part II)	Arts	Mean	39.15	.3775	400
23.	)	Arts	S.D.	7.55	.2683	400
24.	)	Science	Mean	36.15	.4648	300
25.	)	Science	S.D.	8.05	.3291	300
26.	)	Commerce	Mean	39.65	.5108	300
27.	)	Commerce	S.D.	8.85	.3624	300
28.	Part III)	Arts	Mean	62.70	.3925	400
29.	)	Arts	S.D.	7.85	.2787	400
30.	)	Science	Mean	59.15	.6092	300
31.	)	Science	S.D.	10.55	.4324	300
32.	)	Commerce	Mean	62.04	.4471	300
33.	)	Commerce	S.D.	7.75	.3178	300

Table : 8.8
(Contd.)

Sr. No.	Name of the Measure			Figure	S.E.	N
34.	Part IV	Arts	Mean	23.48	.1860	400
35.		Arts	S.D.	3.72	.1321	400
36.		Science	Mean	21.17	.2424	300
37.		Science	S.D.	4.2	.1721	300
38.		Commerce	Mean	21.14	.2354	300
39.		Commerce	S.D.	4.08	.1692	300
40.	Arts Faculty Median			252.	-	400
41.	Science Faculty Median			251.	-	300
42.	Commerce Faculty Median			249.5	-	300
43.	Whole Test	Reliability		.82	.0328	100
44.	Part I	Reliability		.80	.0360	100
45.	Part II	Reliability		.82	.0328	100
46.	Part III	Reliability		.85	.0278	100
47.	Part IV	Reliability		.83	.0311	100
48.	Correlation with Dr. Urvashi Desai's Test-Congruent Validity			.69	.0675	60
49.	Correlation with S.S.C. Gujarati Marks - Concurrent Validity			.75	.0438	100

HISTOGRAM AND CURVE OF TOTAL SCORES
(FINAL ADMINISTRATION)



(C) Interpretation

(i) Table 8.1 shows that the scores on the whole test range from 188 to 310. The total score is 400. So it can be said that the scores range from 47 % to 77 %. The distribution is almost normal, but not perfectly normal. 646 testees out of the total sample of 1000 have scores between 278 and 222, that is between $+1\sigma$ and -1σ.

The mean score is 250.25 and S.D. is 27.25. The S.E. of S.D. is .5096. The median score is 251 (50th percentile). The histogram and the curve of distribution are given on page 263.

The distribution was subjected to statistical tests to ascertain the degree of skewness, kurtosis and goodness of fit to normality. The results are given below :

(a) Skewness

The formula to measure the skewness of a curve, as given by Garrett (1962), is :

$$Sk = \frac{3(\text{mean} - \text{median})}{\sigma}$$

According to this formula, the skewness-index of this curve is -0.081. It shows that the distribution is negatively skewed to a small degree.

(b) Kurtosis

The curve is slightly platykurtic. For a normal distribution the kurtosis-index is .263. If ku is greater than .263, the distribution is platykurtic to that extent. The formula for measuring kurtosis, as given by Garrett (1962), is :

$$ku = \frac{Q}{P_{90} - P_{10}}$$, where Q = Quartile Deviation
P_{90} = 90th percentile
P_{10} = 10th percentile.

Calculated according to the above formula, the kurtosis index of the present distribution is .31. This indicates that the distribution is slightly platykurtic.

(c) Goodness of Fit

The chi-square test for the goodness of fit to normality was applied to the distribution. The χ^2 value for the normal distribution, at 95 % level of significance and 22 d.f., is 12.338. If the actual χ^2 value is greater than this, the distribution can be said to be deviating from normality to that extent. The actual χ^2 is 16.61. This means that the deviation of the present distribution from a normal one is greater than mere chance would permit. But the figure of excess χ^2 (4.272) is very small, and we

can say that the distribution is almost normal, though not perfectly so.

(ii) Table 8.2 gives the partwise frequency distributions. The data can be analysed as follows :

Part	Total Score	Range of Score	Mean	S.D.	Median	S.E. of Mean
I	180	107 to 142 = 36	126.3	9.15	127	.2910
II	73	22 to 53 = 32	37.97	8.51	38	.2609
III	111	43 to 79 = 37	61.33	7.05	62	.220
IV	36	14 to 30 = 17	21.5	4.47	22	.140

The above analysis shows that all the distributions are almost normal where mean and median virtually coincide. The distribution for Part III has a little lesser dispersion than normal; it is less stretched at the tails. But the discrepancy is very insignificant. For Part I, II and IV the major part of the spread of scores is covered by -2σ and $+2\sigma$, instead of -3σ and $+3\sigma$.

(iii) Table 8.3 gives facultywise frequency distributions. To the surprise of the investigator, the distribution and the scores do not differ significantly among the three faculties. The data given below testifies this interpretation: (Total Score = 400)

Faculty	Range of Score	Median
Arts	188 to 310 = 123	252
Science	190 to 309 = 120	251
Commerce	188 to 304 = 117	249.5

So the investigator's hypothesis that he would find a significant difference among the scores of the three faculties is disproved. Though this is a matter of a little surprise for him, he can conjecture the following probable reasons for this:

(a) The bright students now-a-days opt for commerce and science. As regards sex, girls generally go to Arts faculty. So the composition of the Arts faculty is generally as follows :

- a large proportion of male students with medial intelligence.
- almost all female students with medial intelligence.
- a large proportion of female students with high intelligence.

It might be expected that the Arts faculty students should have scored appreciably higher on this test, it being a language ability test, compared to the students in the other two faculties. But the Science and

Commerce faculties now-a-days attract most of the brighter students, mostly boys and some girls. It may be that the comparatively higher intelligence of the Science and Commerce students has entered into their verbal performance also, and consequently, they have fared almost at par with the Arts faculty students.

(b) The effect of the differential course among Arts, Science and Commerce on the preacquired language ability of the students begins to be conspicuous only after some time, that is after the students have studied in the respective faculties for some time. But at the time when they enter these faculties, their special language aptitude might not be differentiated appreciably. They might not have chosen their course of study on the basis of their language ability in Gujarati. So there might be (at present) little interfaculty difference in the level of Gujarati language ability.

Anyway, there is little difference among the three median scores.

(iv) Table 8.4 gives distribution of scores for all faculties and parts separately. The analysis could be presented as follows :

Part	Total Score	Arts		Science		Commerce	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
I	180	125.85	9.65	126.3	8.5	125.25	8.45
II	73	39.15	7.55	36.15	8.05	39.65	8.85
III	111	62.70	7.85	59.15	10.55	62.04	7.75
IV	36	23.48	3.72	21.77	4.2	21.14	4.08

The above analysis shows that the difference among faculties in Partwise scores is also not much significant. Yet there is some difference between Arts and Commerce on one hand and Science on the other hand in Part II (Sentence structure) and Part III (Spelling). In both these tests the mean score of Science is about .33 S.D. lower than the other two faculties. But the difference is not significant at 5 % level. In Part III Science-faculty distribution has greater dispersion (S.D.) compared to the other two faculties. It might mean that in the area of spelling and punctuation, there is a greater number of brighter as well as duller students in Science, as compared to Arts and Commerce. In comprehension, Arts students are a little better than those of Science and Commerce.

(v) Table 8.5 deals with norms. Without norms, test scores can not be interpreted. As its name implies, a norm is the "normal" or average performance. A raw score is meaningless until evaluated in terms of a suitable set of norms. In the process of standardizing a test, it must be administered to a large, representative sample of the type of subjects for whom it is designed. This group, which is known as the standardization sample, serves to establish the norms. Such norms not only indicate the average performance but also show the relative frequency of varying degrees of deviation above and below the average. It is thus possible to evaluate different degrees of superiority and inferiority.

Thus, psychological test norms essentially represent the test performance of the standardization sample. The norms are empirically established by determining what a representative group of persons actually do on the test. In order to determine precisely the individual's exact position with reference to the standardization sample, the raw score is expressed as a transferred score - age scores, percentiles and standard scores. In aptitude testing, percentile norms and standard score norms are generally used. Such transformed scores serve two purposes. First, they indicate the individual's relative standing in the normative

sample and thus permit an evaluation of his performance in reference to other persons. Secondly, they provide comparable measures which make possible a direct comparison of the individual's performance on tests of different traits.

Percentile scores are expressed in terms of percentage of persons in the standardization sample who fall below a given raw score. The 50th percentile (P_{50}) is the median of the distribution. Percentiles higher than 50 indicate above-average performance, while those below 50 signify inferior performance. $P_{(100)}$ designates a score higher than any found in the standardization sample.

Percentile scores may be reported with reference to the total standardization sample, or they may be given separately for subgroups within the total sample. It is helpful to have subgroup norms when recognizable subgroups yield appreciably different scores on a particular test. In the present investigation, percentile norms for boys and girls, and also those for Arts, Science and Commerce faculties are given separately.

Percentile scores are easy to compute and can be readily understood, even by relatively untrained users. Moreover, percentiles are universally applicable. At the

same time, the investigator is aware of its drawback - namely, the marked inequality of units, especially at the extremes of distribution. In a normal distribution, the raw score differences near the median are exaggerated in the percentile transformation, while the raw score differences near the ends of the distribution are greatly shrunk.

Table 8.5 deals with percentile norms, for all faculties together, and for each faculty separately. The nature and importance of norms are already discussed above. After that, the data given in Table 8.5 is self-explanatory. Any one who administers this test can find out the relative position of a testee with the help of these norms. For illustration, if the testee is a student desiring to go for Science and if he scores, say, 259 marks out of 400 on this test-battery, it can be said that 60 % of students will be <u>below</u> him. But if he enters the Commerce faculty 62 % of students will be <u>below</u> him. But if another testee secures 239 marks, only 35 % of students will be <u>below</u> him. Those below the median score for each faculty are definitely sub-normal.

<u>(vi)</u> Table 8.6 gives the same kind of percentile norms separately for each test. They can be interpreted as above. This table would reveal a testee's comparative

strength or weakness in the areas - vocabulary, structures, spelling and comprehension. This can have diagnostic value.

(vii) Table 8.7 gives separate norms for boys and girls.

(viii) Table 8.8, summarizing the content of the chapter, gives all statistical measures related to this test, along with their standard errors.

(ix) Reliability coefficient and validity coefficients are given in Chapter VII at relevant places and their implications are fully discussed. The intercorrelations among the four parts are interpreted in the subsequent section.

(D) Interpretation of The Intercorrelations among The Four Subtests.

The present test is a battery of four subtests. All the subtests are standardized on the same sample and they all measure the component traits, or the specific traits, comprizing the same group factor, viz. language ability. Hence it can be logically deduced that, (i) there will not be a perfect correlation among them; (ii) but, at the same time, the intercorrelations will be more than moderate. The actual figures of intercorrelation

substantiate and conform to this theoretical assumption. The following table shows the intercorrelations between six pairs of tests :

Pair			Correlation
Between Test I	and II	(Vocabulary and Structure)	.58
Between Test I	and III	(Vocabulary and Spelling)	.47
Between Test I	and IV	(Vocabulary and Comprehension)	.58
Between Test II	and III	(Structure and Spelling)	.49
Between Test II	and IV	(Structure and Comprehension)	.48
Between Test III	and IV	(Spelling and Comprehension)	.43

The above table shows that all correlations are above .43. It would mean that there is a fairly high correlation among the tests. This establishes the factorial validity of the distinct group factor named language ability. At the same time the correlation is nowhere higher than .58. This indicates that each component trait is a specific factor and has a discrete, unitary character. The statistical analysis conforms to the initial presumption that went into the construction of the battery that language ability is a composite consisting of subabilities such as vocabulary control, control over structures, mastery over spelling and comprehensional ability. Each is related to others and yet is distinct from them.

Now let us interpret each individual correlation one by one. That will throw light upon the relationship of each component ability with all the rest.

(a) The correlation between Test I and II is .58. It indicates the correlation between vocabulary and sentence structure. Even empirically, experienced teachers' rating conform to this figure. The correlation between vocabulary and structure is positive. It is high, but not very high. A student might speak and write correct sentence structures and yet might have a limited vocabulary. Structural words are different from content words.Expanse of vocabulary depends upon the mastery over content words - both for active use and passive recognition. A student might have a good control over the use of structure words; he might not have the same degree of mastery over content vocabulary. To conclude, a student having good mastery over vocabulary is likely to have a mastery over sentence structures, but not necessarily so. In the same way, a student having a good command over the correct and effective use of sentence pattern will generally have a mastery over content words, but not necessarily so.

Even after conceding this, it is important to note that the interdependence of structure and vocabulary is borne out by the high figure of correlation, viz. .58.

It means that a student who is good at Gujarati structure is also good at vocabulary, so far as this test is concerned.

(b) The correlation between Test I and III is .47. This shows the correlation between vocabulary and spelling. It is natural that it should be moderately high. In Gujarati, a slight change in spelling changes the meaning of words. Words with a slight difference in spelling (i and i:, u and u:, o and o:, — specially because Gujarati is a phonic language) have different meaning. So a student who knows a large number of content words will also know the subtle difference in the spelling of words.

Gujarati being a phonic language, much of spelling error results from wrong pronunciation. A student good at vocabulary can be expected to have correct pronunciation, which in turn will be transferred to the area of spelling. Thus there is a positive correlation between the mastery over content words and knowledge of correct spelling. Modern language theory says that spelling is an orthographical skill and is largely a habit of the eyes and the fingers. If a word comes before the eyes of a student frequently, he will catch its spelling through the habit of the eye. Now students

who read much, and consequently have a good command over vocabulary, will have a greater chance of visualizing the correct spelling of words frequently. Hence there is a theoretical justification for this empirical finding. Those who are weak in spelling will be generally weak in vocabulary also. Those who are good in one will be generally good in the other. But the correlation is not very high. It might happen a student using a varied and wide range of words spells them wrongly. It has been sometimes found that good writers make mistake in spelling.

(c) Correlation between Test I and IV is .58. This shows the relationship between vocabulary and comprehension. The correlation is high, and it is quite natural. Comprehension involves two main factors: speed of comprehension, and precision or accuracy of comprehension. Both these abilities are facilitated if a person has a good command over vocabulary. In any passage for comprehension, structures are there; stylistic subtlties are also there; but mainly the passage abounds in unknown content words. So, any person who understands and uses correctly a great number of content words should have considerable ease, accuracy and speed in comprehension. Vocabulary is integrally related to comprehension. That relationship is substantiated by

this high figure of correlation. A person who has a good vocabulary can understand details, can understand relationship among items of information and can also understand subtle shades of meaning underlying words. He can understand the special use of a word in a particular content. Thus his command over vocabulary facilitates his comprehension. This figure of correlation also conforms to the expert rating.

Yet it would be interesting to note that the correlation is not very high. That indicates that comprehension does not depend on vocabulary only. It partly depends upon structure and spelling also. Again, comprehension is a distinct ability.

(d) Correlation between Test II (Structure) and Test III (Spelling) is .49. The correlation appears to be rather high, though not very high. This result does not conform with the ratings of language experts. They say that sentence structure is basically related to spoken language. The structure of a language is essentially determined by speech and it has not much relation with how the spoken words are orthographically expressed in written symbols, that is, spelling. Sentence structure essentially comprizes of word order, syntax, inflexions of verbs, nouns and pronouns and other grammatical points. How these are related to spelling is rather

difficult to say. Yet the present investigation has come out with this rather high figure of correlation.

This could perhaps be explained by comparatively large number of spelling items and comparatively small number of structure items. So while mutual correlation works, the loading of spelling over structure expresses itself through high correlation.

(e) Correlation between sentence structure and comprehension (Tests II and IV) is .48. This result conforms to the ratings of experts to a great extent. Comprehension of prose material pertaining to Arts, Science or Commerce depends as much on the correct understanding of sentence patterns as on the knowledge of general and faculty-biassed content words (registers). Comprehension is the result of mastery over words as well as structures. Reciprocally, a student having good comprehension will have greater facility in using structures. Learning of structures is a matter of habit-formation, and it may be that practice in reading transfers its gains to the area of mastery over sentence-patterns and grammatical points. While reading prose material, a student is many times confronted with difficult sentence patterns; naturally, a student who has a greater ease in using and understanding structures

will have greater speed and accuracy in reading. The correlation between the both is high.

(f) Correlation between Test III (Spelling) and Test IV (Comprehension) is .43. Reading comprehension involves correct meaning of words and correct meaning of words is to some extent related to spelling, because Gujarati is a phonic language. Words with different spellings have different meanings. So a student good at spelling will benefit by it in reading comprehension also. On the other hand, a student who is good in comprehension will have greater practice in reading; and in the course of his reading, he will come across words very frequently. This will result in the habit formation of the eyes and the fingers, and this in turn will result in better spelling.

Yet the correlation is only moderate. It is not high, as compared to the figures of other correlations. This indicates that there is not much interdependence between spelling and comprehension. Comprehension involves the knowledge of the structure and vocabulary of a language, while spelling is just an orthographical aspect.