



Elements of
**MATHEMATICAL
STATISTICS**

S.C. Gupta • V.K. Kapoor

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Elements
of
Mathematical Statistics

Dedicated to our Parents

Elements of
MATHEMATICAL STATISTICS

*[For B.A./B.Sc. (Ancillary – Paper I & II)
Course of Madras/Madurai Universities]*

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Third Extensively Revised Edition



SULTAN CHAND & SONS

Educational Publishers

New Delhi

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23, Daryaganj, New Delhi-110 002

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011-23247051, 40234454 (*Office*)

E-mail : sultanchand74@yahoo.com; info@sultanchandandsons.com

Fax : 011-23266357; Website : www.sultanchandandsons.com

ISBN : 978-81-8054-700-3 (TC 501)

Price : ₹ 495.00

Third Edition : Reprint 2015, 2018, 2019, 2022, 2025, 2026

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Author's Acknowledgement: The writing of a Textbook always involves creation of a huge debt towards innumerable author's and publications. We owe our gratitude to all of them. We acknowledge our indebtedness in extensive footnotes throughout the book. If, for any reason, any acknowledgement has been left out we beg to be excused. We assure to carry out correction in the subsequent edition, as and when it is known.

Preface

To the Third Edition

We take great pleasure in presenting to the readers the *third extensively revised and greatly improved edition* of the book. We take this opportunity of expressing our sincere gratitude to the teachers of the subject in various colleges of the country for their *unsolicited letters of appreciation and encouraging response* to the book. Especially we would like to thank all those professors and students who sent us *criticisms and suggestions* for the improvement of the book in the light of which the subject-matter of the whole book has been revised. Some of the major changes in the third edition are :

- Nearly all the chapters are completely revised and greatly improved though the method of presentation remains essentially the same, as it has already received the approval of students and teachers alike.
- The chapters on Probability, Random Variables and Distribution Functions, Mathematical Expectation and Theoretical Distributions have been rewritten in many places.

An attempt has been made to give detailed discussion of “Random Variables (Discrete as well as Continuous) and Axiomatic Approach of Probability” to make the book more instructive.

- Many solved examples in the book have been rewritten.
- To meet fully the needs of BA/ BSc (Ancillary – Paper I & Paper II) courses of Madras and Madurai Universities, FIVE new chapters: ‘THEORY OF ESTIMATION’, ‘TESTING OF HYPOTHESIS’, ‘ANALYSIS OF VARIANCE’, ‘DESIGN OF EXPERIMENTS’, and ‘DESIGN OF SAMPLE SURVEYS’ have been added.
- To improve the grasp and understanding of the subject-

matter by students, large number of solved examples and questions in exercises from recent university question papers up to 1978 of Delhi, Madras, Madurai, Calicut, Guru Nanak Universities have been added.

- An attempt has been made to incorporate answers to quite a good number of questions in the exercise sets. Copious hints are provided for many ticklish problems.

We earnestly hope that all these changes, additions and improvements will enhance the value of the book and will prove of immense utility to the students whose viewpoint has been kept foremost during revision.

We are convinced that there is always scope for improvement. May we, in the end, request our colleagues teaching the subject to continue to offer their valuable criticisms and suggestions for further improvement of the book.

S.C. GUPTA
V.K. KAPOOR

Contents

<i>Art.</i>	<i>Page</i>
1. Introduction – Meaning and Scope	1–7
1·1 Origin and Development of Statistics	1
1·2 Definition of Statistics	2
1·3 Importance and Scope of Statistics	3
1·4 Limitations of Statistics	5
1·5 Distrust of Statistics	6
2. Frequency Distributions and Measures of Central Tendency	8–33
2·1 Frequency Distributions	8
2·1·1 Continuous Frequency Distribution	10
2·2 Graphic Representation of a Frequency Distribution	11
2·2·1 Histogram	11
2·2·2 Frequency Polygon	11
2·3 Averages or Measures of Central Tendency or Measures of Location	12
2·4 Requisites for an Ideal Measure of Central Tendency	12
2·5 Arithmetic Mean	12
2·5·1 Properties of Arithmetic Mean	14
2·5·2 Merits and Demerits of Arithmetic Mean	16
2·5·3 Weighted Mean	16
2·6 Median	17
2·6·1 Merits and Demerits of Median	19
2·7 Mode	19
2·7·1 Merits and Demerits of Mode	22
2·8 Geometric Mean	22
2·8·1 Merits and Demerits of Geometric Mean	23
2·9 Harmonic Mean	23
2·9·1 Merits and Demerits of Harmonic Mean	24
2·10 Selection of an Average	24
2·11 Partition Values	24
2·11·1 Graphical Location of the Partition Values	25
3. Measures of Dispersion, Skewness and Kurtosis	34–61
3·1 Dispersion	34
3·2 Characteristics for an Ideal Measure of Dispersion	34
3·3 Measures of Dispersion	34
3·4 Range	34
3·5 Quartile Deviation	34

3·6	Mean Deviation	35
3·7	Standard Deviation and Root Mean Square Deviation	36
	3·7·1 Relation between Standard Deviation and Root Mean Square Deviation	36
	3·7·2 Different Formulae for Calculating Variance	37
	3·7·3 Theorem (Variance of the Combined Series)	43
3·8	Coefficient of Dispersion	45
	3·8·1 Coefficient of Variation	45
3·9	Moments	52
	3·9·1 Relation between Moments about Mean in Terms of Moments about any Point and <i>vice versa</i>	52
	3·9·2 Effect of Change of Origin and Scale on Moments	53
	3·9·3 Sheppard's Correction for Moments	54
	3·9·4 Charlier's Check	54
3·10	Pearson's β and γ Co-efficients	54
3·11	Skewness	56
3·12	Kurtosis	58
4.	Theory of Probability	62–108
4·1	Introduction	62
4·2	Short History	62
4·3	Definitions of Various Terms	63
	4·3·1 Mathematical or Classical or 'a priori' Probability	64
	4·3·2 Statistical or Empirical Probability	65
4·4	Mathematical Tools: Preliminary Notion of Sets	71
	4·4·1 Sets and Elements of Sets	71
	4·4·2 Operations on Sets	72
	4·4·3 Algebra of Sets	72
4·5	Axiomatic Approach to Probability	73
	4·5·1 Random Experiment (Sample Space)	73
	4·5·2 Event	74
	4·5·3 Some Illustrations	75
	4·5·4 Algebra of Events	77
4·6	Probability – Mathematical Notion	78
	4·6·1 Probability Function	78
	4·6·2 Laws of Addition of Probabilities	80
	4·6·3 Extension of General Law of Addition of Probabilities	81
4·7	Law of Multiplication or Theorem of Compound Probability	84
	4·7·1 Extension of Multiplication Law of Probability	84
	4·7·2 Independent Events	85
	4·7·3 Pairwise Independent Events	85
	4·7·4 Mutually Independent Events	86
	4·7·5 Given n Independent Events A_i	87
4·8	Baye's Theorem	104
5.	Random Variables and Distribution Functions	109–147
5·1	Random Variable	109

5·2	Distribution Function	110
5·2·1	Properties of Distribution Function	110
5·3	Discrete Random Variable	111
5·3·1	Probability Mass Function	111
5·3·2	Discrete Distribution Function	112
5·4	Continuous Random Variable	115
5·4·1	Probability Density Function	115
5·4·2	Various Measures of Central Tendency, Dispersion, Skewness and Kurtosis for Continuous Probability Distribution	116
5·4·3	Continuous Distribution Function	130
5·5	Joint Probability Distribution	134
5·5·1	Joint Probability Mass Function and Marginal and Conditional Probability Functions	134
5·5·2	Joint Probability Distribution Function	135
5·5·3	Joint Density Function, Marginal Density Function	136
5·5·4	Independent Random Variables	136
5·5·5	The Conditional Distribution Function and Conditional Probability Density Function	137
5·6	Transformation of One-dimensional Random Variable	144
6	Mathematical Expectation and Generating Functions	148–180
6·1	Mathematical Expectation	148
6·2	Addition Theorem of Expectation	150
6·3	Multiplication Theorem of Expectation	151
6·4	Covariance	152
6·5	Expectation of Linear Combination of Random Variables	153
6·6	Variance of a Linear Combination of Random Variables	153
6·7	Expectation of a Continuous Random Variable	154
6·8	Conditional Expectation and Conditional Variance	155
6·9	Moment Generating Function	166
6·9·1	Theorems on Moment Generating Functions	167
6·10	Cumulants	168
6·10·1	Additive Property of Cumulants	169
6·10·2	Effect of Change of Origin and Scale on Cumulants	170
6·11	Characteristic Function	171
6·11·1	Properties of Characteristic Functions	171
6·11·2	Uniqueness Theorem of Characteristic Functions	172
6·12	Chebyshev's Inequality	174
6·13	Weak Law of Large Numbers	175
6·13·1	Bernoulli's Law of Large Numbers	176
7	Theoretical Discrete Distributions	181–213
7·0	Introduction	181
7·1	Bernoulli Distribution	181
7·1·1	Moments of Bernoulli Distribution	181

7·2	Binomial Distribution	181
7·2·1	Moments	184
7·2·2	Recurrence Relation for the Moments of Binomial Distribution	185
7·2·3	Factorial Moments of Binomial Distribution	187
7·2·4	Mean Deviation about Mean	187
7·2·5	Mode of the Binomial Distribution	188
7·2·6	Moment Generating Function of Binomial Distribution	189
7·2·7	Characteristic Function of Binomial Distribution	189
7·2·8	Cumulants of the Binomial Distribution	189
7·2·9	Recurrence Relation for Cumulants of Binomial Distribution	190
7·2·10	Recurrence Relation for the Probabilities of Binomial Distribution	191
7·3	Poisson Distribution	197
7·3·1	Poisson Distribution	197
7·3·2	Moments of the Poisson Distribution	199
7·3·3	Mode of the Poisson Distribution	201
7·3·4	Recurrence Relation for the Moments of the Poisson Distribution	201
7·3·5	Moment Generating Function of Poisson Distribution	202
7·3·6	Characteristic Function of the Poisson Distribution	202
7·3·7	Cumulants of the Poisson Distribution	202
7·3·8	Additive or Reproductive Property of Independent Poisson Variates	202
7·3·9	Recurrence Formula for the Probability of Poisson Distribution	209
8.	Theoretical Continuous Distributions	214–248
8·1	Rectangular Distribution	214
8·1·1	Moments of Rectangular Distribution	215
8·1·2	Moment Generating Function	215
8·1·3	Characteristic Function	215
8·1·4	Mean Derivation about Mean	215
8·2	Normal Distribution	217
8·2·1	Normal Distribution as a Limiting form of Binomial Distribution	218
8·2·2	Chief Characteristics of the Normal Distribution and Normal Probability Curve	220
8·2·3	Mode of Normal Distribution	221
8·2·4	Median of Normal Distribution	222
8·2·5	M.G.F. of Normal Distribution	222
8·2·6	Cumulant Generating Function (<i>c.g.f.</i>) of Normal Distribution	222
8·2·7	Moments of Normal Distribution	223
8·2·8	A Linear Combination of Independent Normal Variates is also a Normal Variate	224

8·2·9	Points of Inflection of Normal Curve	226
8·2·10	Mean Deviation from the Mean for Normal Distribution	226
8·2·11	Area Property (Normal Probability Integral)	226
8·2·12	Error Function	228
8·2·13	Importance of Normal Distribution	228
8·2·14	Fitting of Normal Distribution	229
8·3	Gamma Distribution	244
8·3·1	M.G.F. of Gamma Distribution	245
8·3·2	Cumulant Generating Function of Gamma Distribution	245
8·3·3	Additive Property of Gamma Distribution	246
8·4	Beta Distribution of First Kind	246
8·4·1	Constants of Beta Distribution of First Kind	246
8·5	Beta Distribution of Second Kind	247
8·5·1	Constants of Beta Distribution of Second Kind	247
8·6	The Exponential Distribution	248
8·6·1	Moment Generating Function of Exponential Distribution	248
9.	Curve Fitting and Principle of Least Squares	249 – 259
9·1	Curve Fitting	249
9·1·1	Fitting of a Straight Line	249
9·1·2	Fitting of Second Degree Parabola	250
9·1·3	Fitting of Polynomial of k th Degree	250
9·1·4	Change of Origin	252
9·2	Most Plausible Solution of a System of Linear Equations	255
9·3	Conversion of Data to Linear Form	256
10.	Correlation and Regression	260–289
10·1	Bivariate Distribution, Correlation	260
10·2	Scatter Diagram	260
10·3	Karl Pearson's Coefficient of Correlation	260
10·3·1	Limits for Correlation Coefficient	261
10·4	Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution	271
10·5	Probable Error of Correlation Coefficient	275
10·6	Rank Correlation	275
10·6·1	Repeated Ranks	277
10·7	Regression	280
10·7·1	Lines of Regression	280
10·7·2	Regression Curves	281
10·7·3	Regression Coefficients	283
10·7·4	Properties of Regression Coefficients	283
10·7·5	Angle between two Lines of Regression	284
10·7·6	Standard Error of Estimate or Residual Variance	284
11.	Theory of Attributes	290–306
11·1	Introduction	290
11·2	Notations	290

11·3	Dichotomy	290
11·4	Classes and Class Frequencies	290
	11·4·1 Order of Classes and Class Frequencies	291
	11·4·2 Relation between Class Frequencies	291
11·5	Class Symbols as Operators	292
11·6	Consistency of Data	296
	11·6·1 Conditions for Consistency of Data	296
11·7	Independence of Attributes	299
	11·7·1 Criterion of Independence	299
	11·7·2 Symbols $(AB)_0$ and δ	301
11·8	Association of Attributes	301
	11·8·1 Yule's Coefficient of Association	302
	11·8·2 Coefficient of Colligation	303
12.	Sampling and Large Sample Tests	307 – 333
12·1	Sampling Introduction	307
12·2	Types of Sampling	307
12·3	Parameters and Statistic	308
	12·3·1 Sampling Distribution	308
	12·3·2 Standard Error	308
12·4	Tests of Significance	310
12·5	Null Hypothesis	310
12·6	Errors in Sampling	311
12·7	Critical Region and Level of Significance	311
12·8	Tests of Significance for Large Samples	312
12·9	Sampling of Attributes	312
	12·9·1 Test for Single Proportion	313
	12·9·2 Test of Significance for Difference of Proportions	313
12·10	Sampling of Variables	321
12·11	Unbiased Estimates for Population Mean (μ) and Variance σ^2	321
12·12	Standard Error of Sample Mean	323
12·13	Test of Significance for Single Mean	324
12·14	Test of Significance for Difference of Means	327
12·15	Test of Significance for the Difference of Standard Deviations	328
13.	Exact Sampling Distribution	
	(Chi-Square Distribution)	334–351
13·1	Chi-square Variate	334
13·2	Derivation of the Chi-square Distribution	334
13·3	M.G.F. of χ^2 Distribution	335
	13·3·1 Cumulant Generating Function of χ^2 Distribution	336
	13·3·2 Mode and Skewness of χ^2 Distribution	337
	13·3·3 Additive Property of χ^2 Variates	337
13·4	Chi-square Probability Curve	338
13·5	Applications of Chi-square Distribution	338
	13·5·1 Chi-square Test as a Test for Population Variance	339
	13·5·2 Chi-square Test of Goodness of Fit	339

13·5·3 Independence of Attributes	344
13·6 Yate's Correction	349
14. Exact Sampling Distributions (<i>Continued</i>) – <i>t</i>, <i>F</i> and <i>Z</i> Distributions	352–373
14.1 Introduction	352
14.2 Student's ' <i>t</i> ' (Definition)	352
14.2.1 Derivation of Student's <i>t</i> -distribution	353
14.2.2 Fisher's ' <i>t</i> ' (Definition)	354
14.2.3 Graph of ' <i>t</i> ' Distribution	355
14.2.4 Probability Tables of <i>t</i> -distribution	355
14.2.5 Applications of <i>t</i> -distribution	356
14.2.6 Test for Single Mean	356
14.2.7 <i>t</i> -Test for Difference of Means	360
14.2.8 <i>t</i> -Test for Testing Significance of an Observed Sample Correlation Coefficient	369
14.3 F-statistic (Definition)	370
14.3.1 Applications of <i>F</i> -distribution	370
14.3.2 <i>F</i> -test for Equality of Population Variance	370
15. Theory of Estimation	375 – 391
15.1 Introduction	375
15.2 Characteristics of Estimators	375
15.2.1 Consistency	375
15.2.2 Unbiasedness	376
15.2.3 Efficient Estimators	379
15.2.4 Sufficiency	380
15.3 Method of Estimation	381
15.3.1 Method of Maximum Likelihood Estimation	381
15.4 Rao-Cramer Inequality	388
16. Testing of Hypothesis	392 – 404
16.1 Introduction	392
16.2 Statistical Hypothesis – Simple and Composite	392
16.2.1 Test of a Statistical Hypothesis	392
16.2.2 Null Hypothesis	392
16.2.3 Alternative Hypothesis	393
16.2.4 Critical Region	394
16.2.5 Two Types of Errors	395
16.2.6 Level of Significance	396
16.2.7 Power of the Test	396
16.3 Steps in Solving Testing of Hypothesis Problem	396
16.4 Optimum Test under Different Situations	397
16.4.1 Most Powerful Test (MP Test)	397
16.4.2 Uniformly Most Powerful Tests (UMP Test)	397
16.5 Neyman J and Pearson, ES Lemma	398
17. Analysis of Variance	405 – 420
17·1 Introduction	405
17·2 One-way Classification	406

17·2·1	Mathematical Analysis of the Model	408
17·3	Two-way Classification	414
18.	Design of Experiments	421 – 449
18·1	Introduction	421
18·2	Terminology in Experimental Designs	421
18·3	Principles of an Experimental Design	423
18·3·1	Replication	423
18·3·2	Randomisation	426
18·4	Size of the Plot	427
18·5	Completely Randomised Design (<i>C.R.D.</i>)	429
18·5·1	Statistical Analysis of <i>C.R.D.</i>	430
18·6	Randomised Block Design (<i>R.B.D.</i>)	433
18·6·1	Statistical Analysis of <i>R.B.D.</i> for one Observation per Experimental Unit	435
18·6·2	Efficiency of <i>R.B.D.</i> relative to <i>C.R.D.</i>	438
18·7	Latin Square Design	442
18·7·1	Statistical Analysis of $m \times m$ <i>L.S.D.</i> for one Observation per Experimental Unit	444
19.	Design of Sample Surveys	450 – 482
19·1	The Principal Steps in a Sample Survey	450
19·2	Principles of Sample Survey	453
19·3	Sampling and Non-sampling Errors	453
19·4	Advantages of Sampling over Complete Census	456
19·5	Limitations of Sampling	458
19·6	Types of Sampling	458
19·6·1	Subjective or Purposive or Judgement Sampling	458
19·6·2	Probability Sampling	459
19·6·3	Mixed Sampling	459
19·7	Simple Random Sampling	459
19·7·1	Probability of Selecting any specified Unit in the Sample	460
19·7·2	Selection of Simple Random Sample	461
19·7·3	Notations and Terminology	464
19·7·4	Merits and Limitations of Simple Random Sampling	468
19·8	Stratified Random Sampling	470
19·8·1	Principal Advantages of Stratified Random Sampling	471
19·8·2	Notations and Terminology	471
19·8·3	Allocation of Sample Size	473
19·8·4	Comparison of Stratified Random Sampling with Simple Random Sampling without Stratification	477
19·9	Systematic Sampling	480
19·9·1	Notation and Terminology	481
	Appendix: Numerical Tables	483 – 494

Snapshot of the Book

<i>Sl. No.</i>	<i>Chapter Name</i>	<i>Pages</i>	<i>Pages</i>	<i>Examples</i>	<i>Exercises</i>
1.	Introduction – Meaning and Scope	1–7	7	–	–
2.	Frequency Distributions and Measures of Central Tendency	8–33	26	11	36
3.	Measures of Dispersion, Skewness and Kurtosis	34–61	28	12	37
4.	Theory of Probability	62–108	47	29	63
5.	Random Variables and Distribution Functions	109–147	39	21	52
6.	Mathematical Expectation and Generating Functions	148–180	33	16	38
7.	Theoretical Discrete Distributions	181–213	33	20	39
8.	Theoretical Continuous Distributions	214–248	35	16	30
9.	Curve Fitting and Principle of Least Squares	249–259	11	7	18
10.	Correlation and Regression	260–289	30	13	38
11.	Theory of Attributes	290–306	17	10	23
12.	Sampling and Large Sample Tests	307–333	27	16	21
13.	Exact Sampling Distribution (Chi-Square Distribution)	334–351	18	7	16
14.	Exact Sampling Distributions (<i>Continued</i>) – <i>t</i> , <i>F</i> and <i>Z</i> Distributions	352–373	22	12	22
15.	Theory of Estimation	375–391	18	7	8
16.	Testing of Hypothesis	392–404	13	1	7
17.	Analysis of Variance	405–420	16	1	5
18.	Design of Experiments	421–449	29	4	15
19.	Design of Sample Surveys	450–482	33	2	15
	<i>Appendix: Numerical Tables</i>	483–494	12	–	–
	Total	496		205	483

An Introduction to Matrices

Dr. S.C. Gupta

About the Book

It is a textbook for B.A./B.Sc. Pass and Honours courses of Mathematics and Statistics; and subsidiary courses of Physics (Hons.) and Chemistry (Hons.) of all Indian universities.

Salient Features

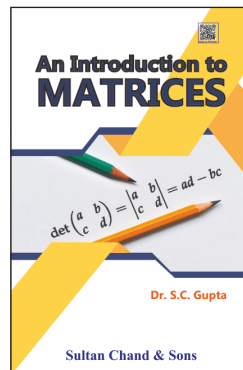
- Lucid style and simple expression.
- A comprehensive and analytic treatment is given of all the topics.
- A number of stimulating problems have been solved as illustrations.
- Large number of carefully graded problems.
- Answers to all the problems are given.

Contents

- Algebra of Matrices
- Matrices Associated with a Given Matrix
- Determinants
- Adjoint and Inverse of a Matrix
- Rank of a Matrix
- Linear Equations
- The Characteristic Roots and the Characteristic Equation of a Matrix
- Quadratic Forms.

Bibliography

Index.



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ISBN 978-81-8054-700-3



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