

*Swami Ramanand Teerth Marathwada University,
Nanded.*



**SYLLABUS
Of
STATISTICS
B.A. / B. Sc. (Second) year
(June 2014)**

Semester III

Continuous Probability Distributions

Paper-VI

Applied Statistics

Paper VII

Semester IV

Sampling Distributions

Paper-VIII

Statistical Inference

Paper-IX

Practical (Annual Pattern)

Paper -X (Practical - II)

Paper –XI (Practical – III)

STATISTICS

B.A/ B. Sc (Second) Year

Semester III

Paper-VI Continuous Probability Distributions

Unit I: -

I) **Rectangular or Uniform distribution:** Definition, Moments, Moment generating function, Mean, Variance, Mean deviation about mean, examples, problems and application, Relation with other distributions, Properties of Rectangular distribution. Distribution of distribution function of continuous random variable.

II) **Exponential Distribution:** - Probability density function, Moment Generating function, Mean and Variance, lack of memory property, problems, Relation between exponential distribution and uniform distribution.

Unit-II- Normal Distribution :-

Probability density function, Normal Distribution as a limiting form of Binomial Distribution Important characteristics of Normal Distribution and Normal Probability curve, Mode, Median, Quartiles, Moment Generating Function and Cumulant Generating Function, Moments, Additive property for Linear combination of two independent normal variables, Mean deviation about mean, Area property (Normal probability integral), Importance of normal distribution, fitting of normal distribution, Use of Normal Probability plot

Unit III:-Gamma Distribution-

Definition, Gamma Distribution with two parameters, Moment Generating Function, Cumulant Generating Function, limiting form of Gamma Distribution, Additive property of Gamma Distribution, Beta Distribution of first and second kind, Moments of Beta Distributions, Problems, examples, Application, Relation between Exponential and Gamma Distribution as a sum of i.i.d. exponential random variables.

Unit IV: - Weibull and Cauchy Distribution: -

a) Weibull Distribution:- Probability Density Function of Weibull Distribution with given shape and scale, parameter, Moments of standard Weibull Distribution, Characteristics of Weibull distribution, Relation with exponential distribution

b) Cauchy Distribution:- Probability density function of Cauchy Distribution, Characteristics of standard Cauchy Distribution, Comment on non existence, moments of standard Cauchy Distribution, Relation with normal distribution.

Unit V: a) Logistic Distribution: - Probability density function of Logistic distribution, moment generating function of Logistic distribution, problems

b) Central Limit theorem, Laplace De-moivre Theorem and its applications, Central Limit theorem for i.i.d. random variables with finite mean and variance, application of Central Limit theorem

Scope of syllabi:-

(i) Fundamentals of Mathematical statistics S.C. Gupta V.K. Kapoor
(11 th Education) Sultan chand and sons Delhi

Chapter 9 :-

9.2, 9.2.1, 9.2.2, 9.2.3, 9.2.4, 9.2.5, 9.2.6, 9.2.7,

9.2.8, 9.2.10, 9.2.11, 9.2.13, 9.2.14

9.3.-, 9.3.1, 9.3.2, 9.3.4, 9.8, 9.8.1

9.5, 9.5.1, 9.5.2, 9.5.3, 9.6, 9.6.1, 9.7, 9.7.1, 9.8, 9.8.1

9.10, 9.10.1, 9.10.2, 9.11, 9.11.1, 9.12, 9.12.1, 9.12.2

9.13, 9.13.1, 9.13.3

Reference Books:-

1) P.G. Dixit , P.S. Kapre -Statistics (Nirali Publication Pune)

2) Freund J.E. Prentics –Mathematical Statistics Hall of India.

3) V.K. Rohatgi- An Introduction to Probability Theory and Mathematical Statistics

4) A.M. Goon Gupta and Das Gupta- Fundamentals of statistics volume-I, (world press Kolkata)

5) S.P. Gupta. -Statistical methods - (Sultan Chand and Sons Delhi)

STATISTICS

B. A. / B. Sc. (Second) Year

Semester III

Paper-VII Applied Statistics

Unit-I Correlation:-

Multiple and Partial Correlation (for tri variate data), Yule's Notation, Plane of Regression, residuals and its properties, Variance of the residual, coefficient of Multiple correlation, properties of Multiple correlation coefficient and Partial correlation coefficient.

Unit II:- Time Series:-

Meaning of time series, Components of time series, Trend, Seasonal variation, cyclical variation, Irregular component, Models of time series, Analysis of time series, Applications of time series, Autoregressive model AR (I)

Unit III: - Measurement of Trend:-

Graphical Method, Method of Exponential Smoothing, Method of moving averages, Method of least squares, Measurement of Seasonal fluctuations by Method of simple averages, Ratio to Trend method, Ratio to moving average method

Unit IV: - Index Number: -

Introduction, problems involved in the construction of Index Numbers, calculation of price and quantity Index numbers, simple (un weighted) Aggregate method, Weighted Aggregates Method, Average of Price relatives, weighted average relatives .Chain Indices, Procedure of construction of chain indices. The criteria of a good Index Numbers, Unit Test, Time Reversal Test, Factor reversal test, Circular Test, Uses and Limitations of Index Number, Laspeyre's price Index, Paasche's price Index, Drobish-Bowley price Index numbers, Marshllleara - Edgeworth price Index, Irving Fisher's Ideal Index number. Quantity Index numbers, Value Index numbers.

Unit V:- Cost of Living Index Number:-

Main steps in construction of Cost of living Index Numbers, Weighted Aggregates methods, and Method of Weighted price relatives. Base shifting, splicing and Deflating of Index Numbers, Uses of cost of living Index Number, Interim Index of Industrial production revised Index of Industrial production, Bombay Stock Exchange (BSE), SENSEX and NIFTY.

Scope of syllabi:-

(i) Fundamentals of Mathematical statistics :- S.C. Gupta V.K. Kapoor
(Sultan Chand and Son New Delhi)

Chapter 12:- 12.4, 12.4.1, 12.5, 12.6, 12.6.1, 12.7, 12.7.1, 12.8, 12.8.1

(ii) Fundamentals of Applied Statistics: - S.C. Gupta V.K. Kapoor
(Sultan chand and sons)

Chapter: 2.1, 2.2.1, 2.2.2, 2.2.3, 2.3,

2.3.1,2.4,2.4.1,2.4.2,2.4.3,2.4.4,2.5,2.5.1,2.5.2,2.5.3,2.7.1,2.7.2,

Chapter 3: - 3.1, 3.2, 3.3, 3.4, 3.6, 3.6.1, 3.6.2, 3.6.3,3.7,3.7.1,3.7.2,3.7.3
- 3.8, 3.8.1, 3.8.2, 3.8.3,3.8.4, 3.9, 3.10

Reference Books:.

i) Goon A.M. Gupta M.K. Dasgupta B.-Fundamentals of Statistics Volume-II(1991) (World Press Calcutta)

ii) P.G. Dixit, P.S. Kapre -Statistics :- (Nirali Prakashan Pune.)

Iii) B.R. Bhat T. Shirvenkatarmane K.I. Madhav Rao Statistics :-
A Beginner's Text Volume-I (New Age International (P) Ltd.)

iv) S.P.Gupta –Statistical Methods.(Chand and Son New Delhi)

v) Croxton .F.E. and Cowden D.J.=Applied Genral Statisites.(Printice Hall of India 1969)

STATISTICS

B.A/ B.Sc. (Second) Year

Semester IV

Paper-VIII Sampling Distributions

Unit I:-Chi-square Distribution: -

Chi-Square variate, Derivation of Chi-Square Distribution (Using method of moment generating function), Nature of Chi-Square probability curve, moment generating function, Cumulant Generating Function, limiting form of Chi-Square Distribution for large Degrees of Freedom Moments, Mode and Skewness of Chi-Square Distribution, Additive property of Chi-Square Distribution

Unit II:-Applications of Chi-square distribution:-

Applications of Chi-square Distribution for Testing of Hypotheses (1) Population variance (2) goodness of fit 3)Test of independence of attributes, contingency table, Yates correction for 2x2 contingency table (4) Homogeneity of three or more correlation Coefficients, Problems

Unit III: - t- Distribution:-

Students 't' statistic, Derivation of student's t distribution, Fisher's t, Distribution of Fisher's t, moments of t- distribution, limiting form of t-distribution, graph of t-distribution. Applications of t – distribution for testing of hypothesis.(1)t-test for single mean, (2) t-test for difference of means (paired & unpaired), (3) t-test correlation coefficient ,problem

Unit-IV :-F- Distribution:-

F- Statistic, Probability density function, moments of F-distribution, mode of F-distribution, F- test for equality of two variances, Relation between F & t-distribution, F and Chi-Square Distribution, problem

Unit-V:-Fisher's Z –Distribution: -

Probability density function of Fisher's Z Distribution, Moment generating function of Z- distribution, Fisher's Z Transformation, problems

Scope of syllabi:-

(I) Fundamentals of Mathematical statistics S.C. Gupta V.K. Kapoor

(11 th Education) Sultan chand and sons Delhi

Chapter 15:- 15.1, 15.2, 15.3, 15.3.1, 15.3.2, 15.3.4

15.3.5, 15.3.6 , 15.6, 15.6.1, 15.6.2, 15.6.3, 15.6.4, 15.6.6

(III) Chapter16:- 16.1, 16.2, 16.2.1,16.2.2,16.2.3, 16.2.4, 16.2.5, 16.2.6,

16.3.1, 16.3.2, 16.3.3, 16.3.4 ,16.2.2, 16.2.3

16.5, 16.5.1, 16.5.2, 16.5.3, 16.6.1, 16.7, 16.8

16.9,16.9.1,16.10,16.10.1

Reference Books:-

1) Freund J.E. Prentics -Mathematical Statistics Hall of India.

2) V.K. Rohatgi -An Introduction to Probability Theory and Mathematical statistics - (Wiely Estem ltd)

3) A.M. Goon, Gupta and DasGupta -Fundamentals of statistics volume-I (world press Kolkotta)

4) S.P. Gupta -Statistical methods -. (Sultan chand and sons Delhi)

5) Kulkarni M.B. Ghatpande S.B, Gore S.D.,Common Statistical Tests. (Satyajeeet Prakashan Pune-29)

6) Gopal K Kanji- 100 Statistical Tests(SAGE Publications)

STATISTICS

B. A. / B. Sc. (Second) Year

Semester IV

Paper-IX Statistical Inference

Unit-I:- Point Estimation :-

Basic concept Parameter, space, statistic, difference between estimate and estimator characteristics of Estimators, Unbiasedness, Efficiency, Most Efficient Estimator, Minimum Variance Unbiased Estimators (MVUE)

Unit II :-Methods of Estimation:-

Method of Moment, Maximum likelihood estimation, Concept of sufficiency, Minimal sufficiency, Information function, Cramer Rao inequality, Rao –Black well theorem Factorization theorem UME, UMVE.

Unit III: - Interval Estimation: -

Confidence interval and Confidence limits, Confidence interval for Mean, Variance and Proportions, Problems based on Interval estimation .Relation between confidence interval and critical interval, problems

Unit III: - Testing of Hypothesis:

Introduction, Null Hypothesis, Simple Hypothesis, Composite hypothesis, Alternative hypothesis two types of Errors, Critical region, Level of Significance, P-value, Power of the Test, Nyman's Persons lemma, Most powerful test, and Uniformly most powerful test.

Unit IV: - Large Sample Tests and Non Parametric Tests: -

a) Large Sample Tests: Test of significance for large samples, Single proportion, difference of proportions, single mean, difference of means, Problems and Application.

b) Non Parametric Tests: Sign test, Wilcoxon Signed rank test, Run test, Median test, Mann-Whitney U- test, Merits and Demerits of Non Parametric test.

Scope of syllabi:-

(i) Fundamentals of Mathematical statistics :- S.C. Gupta V.K. Kapoor
(Sultan Chand and Son New Delhi)

Chapter 17:-17.1, 17.2, 17.2.1, 17.2.2, 17.2.3, 17.3, 17.2.4, 17.3,
17.6.2,17.6.3,17.7,17.7.1

Chapter 14:- 14.6, 14.7, 14.7.1, 14.7.2, 14.8.3, 14.8.4, 14.8.5

Chapter 18:- 18.1, 18.2, 18.2.1, 18.2.2, 18.2.3, 18.2.4, 18.2.5,
18.2.6, 18.2.7, 18.3, 18.4., 18.4.2

(ii) Statistical Methods –A.R.Chandekar (S.Chand & Co.Ltd Delhi)

11.1, 11.2, 11.3, 11.4, 11.5, 11.7

Reference Books:.

i) Goon A.M. Gupt M.K. Dasgupta B.-Fundamentals of Statistics Volume-
I,(1991) (World Press Calcutta)

(ii) Mood A.M.Graybill F.A. Boes D.C.- Introduction to the Theory of
Statisites:- Mc GrawHill (1974)

(iii) Hodges J.L., Lehman E.L.-Basic Concepts of Probability and Statistics:_-
, Holden Day.

iv) P.G. Dixit, P.S. Kapre ---Statistics :- (Nirali Prakashan Pune.)

v) B.R. Bhat T. Shirvenkatarmna K.S. Madhav Rao.-Statistics :-
A Beginner's Text Volume- II (New Age International (P) Ltd.)

vi) Gopal K Kanji- 100 Statistical Tests(SAGE Publications)

STATISTICS
 B.A./ B.Sc. Second Year
PRACTICAL - II
 Paper-X (Annual Practical

Sr. No.	Title of Experiments	No. of Experiments
1	Fitting of Normal distribution	2
2	Problems based on area property of Normal distribution	1
3	Chi-square test for population variance	1
4	Chi-square test for goodness of fit	3
5	Chi-square test for 2x2 contingency table also using Yates correction	2
6	Chi-square test for Independence of attributes	2
7	Chi-square test of Homogeneity of Correlation coefficients	1
8	t - Test for single mean	1
9	t - Test for difference of means	1
10	Paired t – test	1
11	t - Test for testing the significance of sample correlation coefficient	1
12	F-Test for equality of two population variances	2
13	Estimation by method of moments	1
14	Estimation by method maximum like lihood estimation	1
15	Construction of confidence interval for mean and proportion	
16	Unweighted Index number	1
17	Weighted Index number by Laspeyre's and Passche's Index number	2
18	Weighted Index number Fisher's Ideal Index formula	2
19	Cost of Living Index number	1

STATISTICS
 B.A./ B.Sc. Second Year
 PRACTICAL – III Paper-XI (Annual Practical)

Sr. No.	Title of Experiments	No. of Experiments
1	Measurement of Trend by method of Exponential smoothing	1
2	Measurement of Trend by moving averages	1
3	Measurement of linear Trend by method of least squares	3
4	Fitting of AR (1) model	1
5	Measurement of seasonal variation by method of simple averages.	1
6	Measurement of seasonal variation by ratio to trend method	1
7	Measurement of seasonal variation by Ratio to moving average method	1
8	Large sample test for single mean	1
9	Large sample test for difference of means	1
10	Large sample test for single proportions	1
11	Large sample test for difference of proportions	1
12	Multiple Correlation coefficient Fitting of regression plane (Using MS-EXAL)	2
13	Partial Correlation coefficient	1
14	Wilcoxon signed rank test	1
15	Sign test for single sample & two sample	2
16	Run Test	2
17	Median Test	2
18	Mann - Whitney U Test	2
19	Applications of Fisher's Z-Transformation	2