

SWAMI RAMANAND TEERTH
MARATHWADA UNIVERSITY, NANDED

**SYLLABI
OF
STATISTICS**

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

Semester III (Third)

Paper-VI Continuous Probability Distributions

Paper VII Applied Statistics

Semester IV (Fourth)

Paper-VIII Exact Sampling Distributions

Paper-IX Estimation and Testing of Hypothesis

Practical (Annual Pattern)

Paper -X Practical - II

Paper -XI Practical - III

With Effect from June 2010-11

STATISTICS

B.A/ B. Sc (Second) Year

Semester III (Third)

Paper-VI Continuous Probability Distributions

Unit-I- Normal Distribution :- Probability density function, Normal distribution as a limiting form of binomial distribution, chief characteristics of normal distribution and normal probability curve, Mode, Median, Quartiles, Moment generating function and cumulant generating function moments. Additive property and 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.

Unit II: - i) Rectangular or Uniform distribution: Definition, Moments, Moment generating function, Mean, Variance, Mean deviation about mean, examples, problems and application, Relation with other distribution.

ii) Exponential Distribution: - Probability density function, Moment Generating function, Mean and Variance, lack of memory property, problems

Unit III:-i)Gamma Distribution- Definition, Gamma distribution with two parameters, Moment generating function, cumulant generating function, limiting form of Gamma distribution, Additive property of Gamma distribution

ii)Beta distribution:- Beta Distribution of first and second kind, Moments of Beta distributions, Problems, examples, Application, Relation between Exponential and Gamma Distribution.

Unit IV: - Weibull and Cauchy Distribution : -i) Weibull Distribution:- Probability density function of Weibull distribution with given shape and scale parameter, Moments of standard Weibull distribution, characteristics of Weibull distribution, **ii)Cauchy Distribution:-** Probability density function of Cauchy distribution, characteristics function of (standard)Cauchy distribution, Comment on non existence of standard Cauchy distribution

Unit V: Logistic Distribution: - Probability density function of Logistic distribution, moment generating function of Logistic distribution, problems Central Limit Theorem, De-moivre, Laplace Theorem, Applications 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 (Third)

Paper-VII Applied Statistics

Unit-I Correlation :- Multiple and partial correlation (for trivariate data) Yule's Notation, plane of regression, properties of residuals, 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, 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, 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.

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. Indices of Industrial production with 1956 and 1960 as Base years, Index of Industrial production with 1970 as Base years.

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 Statisitics.(Printice Hall of India 1969)

STATISTICS

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

Semester IV (Fourth)

Paper-VIII Exact 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 Skew ness 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, Yate's correction for 2x2 contingency table. (4) Homogeneity of three or more correlation coefficients.

Unit III: - t- Distribution, Students statistic t, 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 for testing the significance of an observed sample correlation coefficient

Unit-IV :-F- Distribution:-F- Statistic, Probability density function, moments of F-distribution, mode of F-distribution, F- test for equality of two population variances, Relation between F & t-distribution, F and Chi-square distribution.

Unit-V:-Fisher's Z –Distribution: -probability function of Fisher's Z-Distribution. Moment generating function of Z- distribution, Fisher's Z-Transformation

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. (Satyajeet Prakashan Pune-29)
- 6) Gopal K Kanji- 100 Statistical Tests(SAGE Publications)

STATISTICS

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

Semester IV (Fourth)

Paper-IX Statistical Inference

Unit-I:- Estimation :-Parameter space , parameter, statistic ,difference between estimate and estimator, characteristics of Estimators, Unbiasedness, consistency, Efficiency, Most Efficient Estimator, Minimum Variance Unbiased Estimators(MVUE), sufficiency, Methods of Estimation, Method of Maximum likelihood estimation, Method of moments.

Unit II: - Interval Estimation: -

I) Cramer-rao Inequality: - Information function, Application.

II) Interval Estimation: -Confidence interval and Confidence limits, Confidence interval for Mean, Variance and Proportions, Problems based on Interval estimation.

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

Unit IV: - Large Sample Tests: - Test of significance for large samples, Single proportion, difference of proportions, Test of Significance for single mean, Test of significance for difference of means, Problems and Application.

Unit V: - Non Parametric Tests: - Introduction, 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
Statisitcs:- 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. Shirvenkatarmana 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 Paper-X PRACTICAL - II

Sr. No.	Title of the 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 an observed 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 of maximum likelihood estimation	1
15	Construction of confidence interval for mean and proportion.	1
16	Unweighted Index number	1
17	Weighted Index number by Laspeyre's and Passche's Index number	2
18	Weighted Index number by Fisher's Index formula	2
19	Cost of Living Index number	1

STATISTICS

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

PAPER XI

PRATICAL – III

Sr. No.	Title of the Experiment	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-EXCEL)	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