Syllabus of B.Sc. (Statistics) Semester V
Syllabus effective from June 2016-2017

VEER NARMAD SOUTH GUJARAT UNIVERSITY,

SURAT

T.Y.B.Sc. Sem-V

PAPER – 501

MATHMATICAL STATISTICS-I

Unit-1:

- **Chebyshev's inequality.**
  - Generalized Chebyshev's inequality
  - Examples.
- Weak law of large numbers.(with known variance)
  - Condition when law of large numbers hold good.
  - Examples.
  - Bernoulli's law of large number.

Unit-2:

- **Characteristic function.**
  - Properties.
  - Examples.
  - Inversion theorem.
  - Examples.

Unit-3:

- **Central limit theorem.**
  - De –moivre's Laplace theorem.
  - Lindberg- Levy theorem.
  - Statement of Liapounff's central limit theorem.

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- Problems of above topics.

Books Recommended

(1) Loeve M.: "Probability theory."
(2) Burrill C.W. : "Measure, Integration & Probability."
(3) Ash Robert: "Real Analysis and probability Theory".
(4) Chang K.L.: "A course in probability".
(5) Dudley R.M. : "Real Analysis and probability", Wadsworth &Books

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Sem-V

PAPER – 502

MATHMATICAL STATISTICS-II

Unit-1:

- **Log normal distribution.**
  - Definition and derivation.
  - r^{th} raw moment about origine.
  - Mean, variance, coefficient of variance
  - Examples.
- Cauchy distribution.
  - Definition
  - Characteristic function.
  - Additive property.
  - Distribution of sample mean.
  - Quartiles.
- Laplace distribution. (double exponential distribution.)
  - Definition.
  - Characteristic function.
  - Mean, variance.
  - Examples.

Unit-2:

- **Trinomial distribution.**
  - Definition.
  - Moment generating function.

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- Moments and correlation coefficient.

Unit-3:

- **Bivariate normal distribution.**
  - Moment generating function.
  - Marginal distribution.
  - Conditional distribution
  - Examples.
- Distribution of order statistics.
  - Definition.
  - Cumulative distribution function of a single order statistics.

Books Recommended

(1) P.G.Hoel : "Introduction to mathematical statistics".
(2) Johnson N.L. and Kotz S.: "Distributions in statistics."; John Wiley.
(3) Fioz M.: "Probability theory and mathematical statistics.";John Wiley.
(4) Jaiswal M.C. : "Statistical distributions";(in Gujarati), University Book Publication Board.
(5) Patel J.K. et al.: "Hand book Statistical distributions"; Marcel Dekker.
(6) Mood A.M. , Graybill F. and Boes D.C. : "Introduction to the theory of Statistics"; MacGraw Hill.

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Syllabus of B.Sc. (Statistics) Semester V
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Sem-V

PAPER – 503

Statistical inference-I

Unit-I

- **Decision theory.**
  - Elements of decision theory.
  - Concept of decision function.
  - Loss function and risk function.
  - Admissible decision function.
  - Complete class of decision function.
  - Estimation and testing of hypothesis considered as decision problems.
  - Examples.

Unit-II

- Introduction of theory of estimation.
  - Characteristics of estimators.
  - Unbiasedness.
  - Consistency.
  - Sufficiency.
  - Efficiency.
  - Pitman's measure of closeness.
  - Examples.

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Unit-III

- Cramer Rao inequality.
  - Condition for the equality sign in Cramer Rao inequality.
  - Rao-Blackwell theorem.
  - One parameter family of exponential distribution.
  - Condition of existence of minimum variance unbiased estimator (UMVUE).
  - Simple examples of finding UMVUE.
- Examples to show that Cramer Rao lower bound may not be attained

Books Recommended

(1) Mood A.M., Graybill F.A. & Boes D. C.(2001): "An introduction to the theory of Statistics", McGraw Hill & Tata MaGraw Hill, ISBN: 0070445206, ISBN-13: 9780070445208,978-0070445208

(2) Goon A.M., Gupta M.K.& Dasgupta B. (2000): "An outline of statistical Theory" Vol. 1,2; The World Press Private Limited, ISBN: 8187567260 ISBN-139788187567264,978-8187567264

(3) M.C. Jaiswal: "Statistical distributions", (In Gujarati)

(4) WDF¶lWSFZL – 58[, : VF\S0FXF:+LI VG]DFGP

(5) Rohatgi V.K.(1976) : "An introduction to probability theory & Mathematical Statistics", John Wiley & Sons. ISBN-10 ,0471731358, ISBN-13; 9780471731351

(6) Mukhopadhayay P. (1996) : "Mathematical Statistics" ,New central Book Agency, Calcutta.

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Syllabus of B.Sc. (Statistics) Semester V
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T.Y.B.Sc. Sem-V

PAPER – 504

Statistical inference-II

Unit-1:

- **Methods of estimation.**
  - Method of moment.
  - Methods Maximum likelihood estimation.
  - Method of minimum χ^2 method.
  - Method of modified minimum χ^2 method.
  - Method of least squares.
  - Examples.

Unit-2:

- **Interval estimation.**
  - Pivotal quantity.
  - Definition of $100(1-\alpha)\%$ confidence intervals of the parameter of the distribution.
  - Construction of confidence interval for mean and variance of the parameters of normal distribution.
  - Confidence intervals for large samples.
  - Examples.

Unit-3:

- **Optimum linear combination of independent unbiased estimators of same parameter.**
  - Proof of sample mean as best linear unbiased

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estimator(BLUE) of the population mean.

Books Recommended

(1) Mood A.M., Graybill F.A. & Boes D. C.(2001): "An introductionitto the theory of Statistics", McGraw Hill & Tata MaGraw Hill, ISBN: 0070445206, ISBN-13: 9780070445208,978-0070445208

(2) Goon A.M., Gupta M.K.& Dasgupta B. (2000): "An outline of statistical Theory" Vol. 1,2; The World Press Private Limited, ISBN: 8187567260 ISBN-139788187567264,978-8187567264

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(6) Mukhopadhayay P. (1996) : "Mathematical Statistics" ,New central Book Agency, Calcutta.

(7) Zaven A. Karian & Edward J. Dudewicz (2010) : "Hand book of fitting statistical distributions with R ", Chapman & Hall/CRC, ISBN: 9781584887119,ISBN-10;1584887117.

(8) Mukhopadhayay Nitis (2006) : "Introductory statistical inference", Chapman & Hall /CRC, ISBN:9781574446135,ISBN-10;1574446134

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Syllabus of B.Sc. (Statistics) Semester V
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T.Y.B.Sc. Sem-V

PAPER – 505

OPERATION RESEARCH-I

Unit-1:

- **Introduction of OR.**
  - Various definition and scope of OR
  - The linear programming problem. (LPP)
  - Mathematical formulation of the problem.
  - Graphical methods.
  - Examples..

Unit-2:

- **General LPP and matrix formulation of General LPP**
  - Definitions ; Standard form of LPP, Solution, Feasible solution, Optimum solution, Slack and Surplus variables, Basic solution, Degenerate solution, Basic feasible solution.
  - Concave sets, properties of convex sets.

Unit-3:

- **Simplex method.**
  - Computational procedure.
  - Solution of LPP using Simplx method.
  - Examples.
- Big-M Method
  - Concept of Artificial variables.
  - Solution of LPP using Big-M method.
  - Examples.

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Books recommended

(1) K.swarup,GuptaP.K.& Man Mohan(2008): "Operation Research", S.Chand & Co. New Delhi, ISBN: 8180545350, ISBN-13; 9788180545351

(2) G. Hadley (2002): "linear programming" ; Narosa Book distributors pvt Ltd., ISBN; 8185015910,ISBN-13; 9788185015910

(3) Kasana H. S.& Kumar K.D. (2005) : "Introductory operation research Theory & Application", Springer Verlag, ISBN;8181282827, 9798181282827.

(4) Kapoor V.K. (2006): "Operation research", 7th edition , jain book depot , ISBN:8170148286

(5) Sharma S. D. (2005) : "Operation research";15 th edition , Kedarnath Ramnath & Co. Publisher, Meerut

(6) Hira D.S, Gupta,P.K.(2007) : "Operation research"; S.Chand & Co. New Delhi, ISBN: 81-219-0281-9

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Syllabus of B.Sc. (Statistics) Semester V
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Sc. Sem-V

PAPER – 506

SAMPLING

Unit-1:

- Sample survey.
  - Planning and execution of surveys.
  - Concept of population , sample.
  - Advantages of survey.
  - Principle steps in sample survey.
  - Determination of sample size.

Unit-2:

- **Simple random sampling.**
  - Selection of sample/estimation of mean, standard error and coefficient of variation of estimator.
  - Comparisons of variance of mean with SRSWR and SRSWOR.
  - Sampling for proportions and percentages.
  - Estimation of sample size.

Unit-3:

- **Stratified sampling.**
  - Estimation of mean, variance.
  - Allocation of sample size.
  - Optimum allocation (Neyman allocation)
  - Sampling for proportion for stratified sampling.
- Systematic sampling.

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- Mean and variance of systematic sampling.

Books recommended

(1) Cochran W.G.(1977) : "Sampling techniques", Ed-III ,John wiley & sons, New York, ISBN:047116240

(2) Kish L. (1995): "Survey sampling"; John wiley & Sons, Newyork; ISBN:0471109495; 9780471109495.

(3) Murthy M.N.: "Sampling theory & Methods", Statistical Publishing society, Calcutta.

(4) Raj D.: "Sampling theory", Mc graw –Hill Book co. New York.

(5) Raj D. & Chandhok P. (1998) : "Sample survey theory", ISBN: 8173191379,9788173191374.

(6) Sukhatme P.V, et al. (1997) : "Sampling theory of survey with applications";3rd edition , The Iowa State Univ. Press, Ames, Iowa, USA & Indian society of agricultural statistics , New Delhi.

(7) Snedecor G.W. & Cochran W.G. (1989) : "Statistical methods"; 8th edition , Wiley Black Well, ISBN: 0813815614,9780813815619

(8) Arijit Chaudhury (2005) : "Survey sampling, Theory & methods" 2nd edition Horst Stenger, Univ. of Mannheim, Germeny, Series ISBN-13: 9780824757540, ISBN:-10; 0824757548.

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T.Y. B.Sc. Semester – V

STATISTICS PRACTICAL PAPER – 501 : Based on Theory paper 501

STATISTICS PRACTICAL PAPER – 502 : Based on Theory paper 502

STATISTICS PRACTICAL PAPER – 503 : Based on Theory paper 503

STATISTICS PRACTICAL PAPER – 504 : Based on Theory paper 504

STATISTICS PRACTICAL PAPER – 505 : Based on Theory paper 505

STATISTICS PRACTICAL PAPER– 506 : Based on Theory paper 506

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Code-54

Proposed Syllabus of T.Y.B.Sc. (Statistics)
(IN FORCE FROM JUNE 2016-2017)

VEER NARMAD SOUTH GUJRAT UNIVERSITY, SURAT
T.Y.B.Sc. - SEM-V- STATISTICS
(GENERIC ELECTIVE) - NUMERICAL ANALYSIS

Unit-I

- Numerical Differentiation:
  - Newton's Foreward Difference Formula
  - Newton's Backward Difference Formula
  - Bessel's Formula
  - Sterling Formula
  - Newton's Divided Difference Formula
  - Lagrange's Interpolation Formula
  - Examples.

Unit-II

- Numerical Integration.
  - Trapezoidal Rule
  - Simpson $1/3^{rd}$ Rule
  - Simpson $3/8^{th}$ Rule
  - Boole's Rule
  - Weddle's Rule
  - Examples.

Unit-III

- Iterative Methods for Finding Roots
  - Iterative procedures:
  - Methods for finding Transcedental and Polynomial Equations
  - Methods for Solving Equations
  - Graphical Method
  - Bisection Method
  - Regula Falsi Method
  - Fixed Point Iteration Method
  - Newton-Raphson Method
  - Secant Method
  - Examples

Books Recommended

(1) Shastri, S.S.: Introductory methods of Numerical Analysis; Prentice Hall of India

(2) Jain, M.K., Iyengar, S.R.K. and Jain, R.K.: Numerical methods for

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scientific and Engineering Computations; New Age International (P) Ltd.

(3) Froberg, C.E.: Introduction to Numerical Analysis, Addition-Wesley, Reading Mass.

(4) Scheid, Francis: Theory and Problems of Numerical Analysis, Schaum Series, McGraw Hill, New York.

(5) Stanton, R.G.: Numerical Methods for Science and Engineering, Prentice Hall of India.

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