VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

Paper No	Title of the paper	Marks		
		Int.	Ext.	Total
I	Real Analysis & Probability Theory	30	70	100
II	Univariate Distributions & Estimation Theory	30	70	100
III	Linear Algebra & Multivariate Analysis	30	70	100
IV	Sample Survey & Stochastic Processes	30	70	100
V	MS excel and Computer Programming & Statistical Quality Control and Reliability	30	70	100
Practical paper-I	Practical Paper- I based on theory papers using MS excel	30	70	100
Practical paper-II	Practical Paper- II based on theory papers using MS excel	30	70	100
Project	At Department	50	--	50
Viva – Voce		30	70	100
Total		290	560	850

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

PAPER – I

REAL ANALYSIS & PROBABILITY THEORY

Section-A : Real Analysis

Recap of elements of set theory and Real number system. Limits of sequences of sets. Classes of sets. Generated classes, Boreal σ-field of R and R^k.

Finitely additive and σ-additive set functions. Measures, properties of measures.

Measurable space, simple functions, Measurable function. Borel measurable functions. Onvergence in measure and almost everywhere convergence.

Integration of measurable function with respect to a given measure.

REFERENCES

1. Ash Robert: "Real Analysis and Probability"; Academic Press.
2. Halos P.R.: "Measure Theory"; McGraw Hill.
3. Kingman JFC and Taylor S.J.: "Introduction to Measure and Probability"; Cambridge Uni. Press.
4. Burr ill C.W.: "Measure, Integration and Probability".

Section-B: Probability Theory

Concept of Probability.

Distribution of a random variable Weak convergence of sequences of distribution functions. The weak compactness theorem. Characteristic functions and their properties. Inversion theorem. Uniqueness theorem. Continuity theorem (statement only). Convolution of distribution functions. Characteristic function of convolution in terms of its components.

Independence. The multiplication theorem. Borel - Cantelli lemma, Borel zero-one law. Sequence of independent random variables. Tail σ-field. Kolmogorov zero-one law.

Convergence of sequences of random variables in distribution, in probability, in rth mean, and with probability one. Inter – relationships amongst these models of convergence.

Weak law of large number, The Central limit theorem.

REFERENCES

1. Loeve M.: "Probability Theory".
2. Burrill C.W.: "Measure, Integration and Probability".
3. Ash Robert: "Real Analysis and Probability"; Academic Press.
4. Chang K.L.: "A Course in Probability Theory".
5. Dudley R.M.: "Real Analysis and Probability";

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

PAPER II

UNIVARIATE DISTRIBUTIONS & ESTIMATION THEORY

Section-A : Univariate Distributions

Laplace, Lognormal and Cauchy distributions:
Idea of truncated distributions, Truncate
Poisson and Normal distributions.
Univariate compound distribution: Contagious distributions: Neyman type-A,
Poisson- Binomial and Poisson –Negative Binomial distribution:
Univariate Power series distributions.
Non-central distribution : Non-central chi-square, t and f distribution.
Ordered statistics, their distributions and Properties, distribution of r.

REFERENCES

1. Johnson N.L. and Kotz S.: "Distributions in Statistics"; John Wiley.
2. Fioz M.: "Probability Theory and Mathematical Statistics"; John Wiley.
3. Rohatgi V.K.: "An Introduction to 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. : "Handbook of Statistics Distributions"; Marcel Dekker.
6. Mood A.M., Graybill F. and Boes D.C.: "Introduction to the Theory of Statistics"; McGraw Hill.

Section-B : Estimation Theory

Different measures of closeness of an estimator: Some desirable Properties of estimators: factorization theorem for discrete case, Exponential families of distributions, Minimal sufficient statistics, complete sufficient statistics, Rao-Blackwell theorem. Minimum variance unbiased estimatimator.

Maximum likelihood estimator and its properties. Method of maximum likelihood, other methods of estimation:

Confidence intervals, Methods of finding confidence interval

REFRENCES

1. Rohatgi V.K.: "An Introduction to Probability Theory and Mathematical Statistics".
2. Rao C.R. : "Linear Statistical Inference and its Applications"; John Wiley.
3. Mood A.M., Graybill F. and Boes D.C. : "Introduction to the Theory of Statistics"; McGraw Hill.
4. Lehmann E.L.: "Theory of Point Estimation"; John Wiley.
5. Ferguson T.S.: "Mathematical Statistics : A Decision Theoretic Approach"; Academic Press.
6. Zacks S.: "Theory of Statistical Inference"; John Wiley.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

PAPER III

LINEAR ALGEBRA & MULTIVARIATE ANALYSIS

Section-A : Linear Algebra

Fields, Vector Spaces, subspaces, linear dependence and independence, basis and dimension of a vector space, finite dimensional vector space, completion theorem, examples of vector spaces over real and complex fields, linear equations.

Vector spaces with an inner product, Gram-Schmidt orthogonalization process, orthogonal basis and orthonormal basis and orthogonal projection of a vector.

Linear transformations, algebra of matrices, row and column spaces of a matrix, elementary matrices, Kronecker products.

Hermite canonical form generalized inverses, Moore-Penrose generalized inverse, solutions of matrix equations.

Real quadratic forms, reduction and classification of quadratic forms Characteristic roots and vectors, properties of characteristic roots and vectors of a real symmetric, Cayley-Hamilton theorem, minimal polynomial, similar matrices, orthogonal and unitary similarity, Jacobi's theorem, algebraic and geometric multiplicity of a characteristic root, spectral decomposition of a real symmetric matrix, simultaneous reduction of a pair of real symmetric matrices, Hermitian forms.

Singular values and singular value decomposition, Jordan decomposition, extrema of quadratic forms, vector and matrix differentiation,

REFERENCES

1. Gralbill F. A. : "Matrices with Applications in Statistics"; 2nd Ed., Wadsworth.
2. Rao C.R.: "Linear Statistical Inference and its Application"; 2nd Ed., John Wiley and Sons, Inc.
3. Searle S.R.: "Matrix Algebra useful for Statistics"; John Wiley and Sons, Inc.
4. Rao A.R. and Bhimasankaram P.: "Linear Algebra";

Additional Books

1. Bellman R.: "Introduction to Matrix Analysis"; 2nd. Ed., McGraw Hill.
2. Biswas S.: "Topics in Algebra of Matrices"; Academic pub.
3. Hadley G.: "Linear Algebra"; Narosa Pub. House.
4. Halmos P.R. : "Finite Dimensional Vector Spaces"; 2nd Ed., D. Van Nostrard Co. Inc.

5. Hoffman K. and Kunze R.: “Linear Algebra”; 2nd Ed., Prentice Hall, Inc.
6. Rao C.R. and Mitra S.K.: “Generalized Inverse of Matrices and its Application”; John Wiley and Sons, Inc.

Section-B : **Multivariate Analysis**

Multivariate distributions:

Wishart Distribution.

Distribution of HWH', $h'wh/h'\sum h$, $h'\sum^{-1}h/h'w^{-1}h$, Null and Non – null distribution of sample correlation coefficient r. Definition of Multiple and partial correlation coefficients.. Application in testing and Interval estimation.

Hostelling T^2 statistic.

Multivariate Analysis of variance (MANOVA): One-Way classification problem and use of Wilk’s $\wedge$ criterion.

Classification Problem and Fisher’s linear discriminant function, Probabilities of misclassification, Classification with more than Two multivariate normal populations.

Definition, use and computational method of principal components and canonical variables and canonical correlations.

REFERENCES

1. Anderson T. W. : “An Introduction to Multivariate Statistical Analysis”; John Wiley.
2. Johnson and Wichern : “Applied Multivariate Statistical Analysis”.
3. Kshirsagar A. M. : “Multivariate Analysis”; Marcel Dekker.
4. Morrison D.F.: “Multivariate Statistical Methods”; McGraw Hill.
5. Muirhead R.J. : “Abstracts of Multivariate Statistical Theory”; John Wiley.
6. Seber G.A.F. : “Multivariate Observations”; John Wiley.
7. Srivastava and Khatri : “An Introduction to Multivariate Statistics”; North Holland.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

PAPER – IV

SAMPLE SURVEY & STOCHASTIC PROCESSES

Section-A : Sample Survey

Concept of population, sample, sampling frame and sampling design, sampling strategy, Simple random sampling Probability Proportional to size sampling (with and without replacement), Stratified sampling, systematic sampling and cluster sampling (with equal and unequal cluster sizes), Two – stage sampling and its generalization.

Use of auxiliary information at estimation stage: ratio, product, difference and regression estimators, Sen-Midzuno sampling scheme and unbiased ratio estimators, Hartlay & Ross unbiased ratio type estimators: Two phase sampling for ratio and regression estimators.

REFERENCES

1. Cochran W. G. : “Sampling Techniques”; John Wiley & Sons, Inc., New York.
2. Hansen M. H., et al.: “Sample Survey Methods and Theory”; John Wiley & sons, Inc., New York.
3. Kish L. : “Survey Sampling”; John Wiley & Sons, Inc., New York.
4. Murthy M. N.: “Sampling Theory and Methods”; Statistical Publishing Society, Calcutta.
5. Raj D. : “Sampling Theory”; McGraw-Hill Book co., New York.
6. Raj D.: “The Design of Sample Surveys”; McGraw-Hill Book Co., New York.
7. Sukhatme P.V.,et al.: “Sampling Theory of Surveys with Applications"; The Iowa State Univ. Press, Ames, Iowa, USA and Indian Society of Agricultural Statistics, New Delhi.
8. Yates F.: "Sampling Methods in Censuses and Surveys"; Charles Griffin & Co. Ltd., London.
9. Goulden C. H.: "Methods of Statistical Analysis", Asia Publishing House, Bombay.
10. Snedecor G.W. and Cochran W.G.: "Statistical Methods"; The Iowa State Univ. Press, Ames, Iowa, USA.

Section-B : Stochastic Processes

Markov chain with finite and countable state space, Classification of stated, limiting behavior of n-step transition probabilities, stationary distribution; Random walks, Gambler’s ruin. Markov Processes in continuous time (Poisson Process, Birth and death processes).

Queueing Theory: Definition, Characteristics of a queueing system, Poisson Process and Exponential distribution, Classification of queues, Detailed study of M/M./1 and M/M/C queueing models.

REFERENCES

1. Karlin S.: "A First Course in Stochastic Processes"; Academic Press.
2. Parzen E.: "Stochastic Processes"; Holden-Day.
3. Feller W.: "An Introduction to Probability Theory and its Application"; Vol.I, 3rd Ed., John Wiley.
4. Hoel P.G., Port S. C. and Stone C. J. : "Introduction to Stochastic Processes"; Houghton Mifflin Co., Bosten.
5. K. Swarup, Gupta P.K. and Man Mohan : "Operations Research"; S. Chand & Co., New Delhi.
6. Sharma S.D.: "Operations Research"; Kedar Nath Ram Nath & Co. Publishers, Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhana-Magdalla Road,
Surat - 395 007.

M.A. : STATISTICS

Effective From: 2007 – 2008

M. A. -I

PAPER – V

MS EXCEL AND COMPUTER PROGRAMMING & STATISTICAL QUALITY CONTROL AND RELIABILITY

Section-A : MS excel and Computer programming

1.MS EXCEL
2. COMPUTER PROGRAMMING LANGUAGE – 'C'
3. Operators and Expressions
4. Data Input and Output
5. Control Statements
6. Functions
7. Arrays
8. Structures and Unions

REFERENCES

1. Mastering Excel 4 for windows - Townsend - BPB
2. Mastering Excel 4 for windows - Chester - BPB
3. Excel 5 for Windows Quick & Easy - Jones - Tech
4. Karnighan and Ritchie : " C programming Language " ; TMH.
5. Vijay Mukhi : " 'C' Odyssy " 6th Volume ; PHI.
6. Stephan Kochan : " Programming in 'C' " ; CBS.
7. Kelly and Bootle : " Mastering turbo C "; UPB.
8. Kanetkar Yashwant : " Let us C" ; BPB.
9. E Balaguruswamy : "Programming in C"
10. Robert Lafor : "Object - Oriented Programming in C" ; Galgotia Pub. Pvt. Ltd., New Delhi.

Section-B : Statistical Quality Control and Reliability

Quality Control :

Review of:
Quality and Statistical Quality control
Control Charts.
Acceptance sampling Plans, Cusum Charts, Standard Plans

Concept of Total Quality Management (TQM).

Strategic Quality Planning.

Productivity and Quality
The Cost of Quality.
Criteria for Quality Programs.
ISO 9000 and onwards.

Reliability:

REFERENCES

1. Hopper A.G. : "Basic Statistical Quality Control"; McGraw Hill, London.
2. Gupta R.C. : "Statistical Quality Control"; Khanna Publishers, New Delhi.
3. Ryan T.P. : "Statistical Methods for Quality Improvement"; John wiley & Sons.
4. Omachonu V.K. and Ross J.E. : "Principles of Total Quality"; S.Chand & Co.New Delhi.
5. Sinha S.K. : "Reliability and Life Testing"; Wiley Eastern Ltd., New Delhi.
6. I.Bazovksy : "Reliability Theory and Practice"; Prentice Hall International Series in Engineering.
7. Grant E. L. and Leavenworth R.: "Statistical Quality Control" ; Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
8. Inving W.B.: "Elementary Statistical Quality Control"; Marcel Dekker, Inc., New York.