Curriculum Design Committee, Uttarakhand

S. No.	Name & Designation			
1.	Prof. N.K. Joshi	Chairman		
	Vice-Chancellor, Sridev Suman Uttarakhand University, New Tehri			
2.	Vice-Chancellor, Kumaun University, Nainital	Member		
	Drof Jaget Singh Dight	Mombor		
3.	Vice-Chancellor, Soban Singh Jeena University Almora	Wienibei		
4.	Prof. Surekha Dangwal	Member		
	Vice-Chancellor, Doon University, Dehradun			
5.	Prof. O. P. S. Negi	Member		
	Vice-Chancellor, Uttarakhand Open University, Haldwani			
6.	Prof. M.S.M. Rawat	Member		
	Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand			
7	Prof. K. D. Purohit	Member		
, .	Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand			

<u>Final Draft</u>

Department of Statistics

B.Sc fourth and fifth year (VII, VIII, IX & X Sem.) degree with

Research and

P.G. Syllabus of Statistics

Year	Sem.	Paper Title	Theory/	CREDIT
			Practical	(L+P+T)
UG Fourth Year / PG First Year	UG VII / PG I Sem.	TOPOLOGY AND ADVANCED ANALYSIS	Theory	4 (4+0+0)
		MATRIX THEORY AND NON PARAMETRIC INFERENCE	Theory	4 (4+0+0)
		PROBABILITY THEORY	Theory	4 (4+0+0)
		STATISTICAL METHODS	Theory	4 (4+0+0)
		PRACTICAL EXAMINATION	Practical	4
		Research Proje	ct	4 (4+0+0)
	UG VIII / PG II Sem	SAMPLING THEORY	Theory	4 (4+0+0)
		LINEAR ESTIMATION & DESIGN OF EXPERIMENT	Theory	4 (4+0+0)
		STATISTICAL INFERENCE – I	Theory	4 (4+0+0)
		STATISTICAL INFERENCE –II	Theory	4 (4+0+0)
		PRACTICAL EXAMINATION	Practical	4
		Research Proje	ct	4 (4+0+0)
UG Fifth Year / PG Second Year	UG IX / PG III Sem	MULTIVARIATE ANALYSIS	Theory	4 (4+0+0)
		BIOINFORMATICS	Theory	4 (4+0+0)
		REGRESSION ANALYSIS	Theory	4 (4+0+0)
		TIME SERIES ANALYSIS AND DEMAND ANALYSIS	Theory	4 (4+0+0)
		PRACTICAL EXAMINATION	Practical	4

		Research Project		4 (4+0+0)
	UG X / PG IV Sem	STOCHASTIC PROCESSES AND RELIABILITY THEORY	Theory	4 (4+0+0)
		STATISTICAL COMPUTING	Theory	4 (4+0+0)
		ECONOMETRICS	Theory	4 (4+0+0)
		POPULATION STUDIES AND DEMOGRAPHY	Theory	4 (4+0+0)
		PRACTICAL EXAMINATION	Practical	4
		Research Proje	ct	4 (4+0+0)

Detailed Syllabus of Courses

UG VII /PG I Sem.

PAPER I: TOPOLOGY AND ADVANCED ANALYSIS

Topology:

UNIT I:Basic concept of topological spaces, closed sets, neighbourhoods and neighbourhood system, Accumulation point, Closure, interior, exterior and boundary of a setMetric spaces, Basic concepts with simple examples, continuous homomorphism , Completeness,

Advanced Analysis:

UNIT II:Functions of several variables, Concept of functions of two variables, Single valued and multiple valued functions, Simultaneous limits and iterated limits in functions of two variables,

UNIT III: Partial derivatives, interchange of order of differentiation, Composite functions, Linear continuity of function of two variables, Partial Derivatives, definition, existence and continuity, interchange of order of differentiation,

UNIT IV: Composite functions, Linear transformations, vector valued function, Differentiation of vector valued function.Conformal representation, Analytic continuation. The maximum modulus theorem, Schwartz's theorem. Hamard's three circle theorem, Integral functions, Fourier series and transforms.

BOOKS RECOMM ENDED:

Bartle RG. 1976. Elements of real Analysis. John Wiley.
Gautam N.D & Narayan Shanti. 1970. General Topology. S Chand Chatterjee SK. 1970. Mathematical Analysis. Oxford & IBH.
Priestley HA. 1985. Complex Analysis. Clarenton Press.
Rudin W. 1985. Principles of Mathematical Analysis. McGraw Hill.

PAPER II: MATRIX THEORY AND NON PARAMETRIC INFERENCE

(a) Matrix Theory: Inverse of a matrix, Characteristic roots and vectors, vector spaces, orthonormal basis of sub-spaces. generalized Inverse, solutions of non Homogenous equations, quadratic forms (real field).

(b) Non parametric Inference: Non- parametric methods, Sign test, Run test, Mann- Whitney Ustatistics, Kruskal Walls test, test for Randomness, Test for normality. Linear rank statistic and general two way sample problem, Linear rank tests for location and scale problems, rank test for one way and two way classified data, Multivariate non parametric test for one sample location problems, Asymptotic relative efficiency, examples of ARE tests.

BOOKS RECOMM ENDED:

Searle Sr. 1982. Matrix Algebra. Matrix Algebra useful for Statistics. John Wiley.
Hohn FE. 973. Elementry Matrix Algebra. Macmillan.
Vatssa BS. 1994. Theory of Matrices. 2nd Ed. Wiley Eastern.
Narayan Shanti. 1994. A Text book of Matrices. 9th Ed. S. Chand & Company
Gibbons. Non Parametric Statistical Inference.
Siegel S, Johan N & Castellan Jr. 1956. Non Parametric Test for Behavioral Sciences. John Wiley.

Paper III: PROBABILITY THEORY

Sets, Fields — Fields and Measurable functions, Definition of Measure and probability, Notion of Random Variable, Definition of Integral and expectation of Random variable, Distribution function of a Random variable and Decomposition Theorem, Characteristic function and its elementary properties. Uniqueness, Inversion and continuity theorems for C.F. Kolmogorov's inequality. Chebyshev's Inequality. Law of large numbers, Central limit theorem.

Convergence of sequence of random variables. Convergence in Probability, in mean square and almost sure. The weak law of large numbers, The strong law of large numbers, Bernoulli's, Kintchin's theorems, Central limit theorem Lindberg - Levy and Liapounov's form, Borel- Cantelli Lemma, Borel zero-one law.

BOOKS RECOMM ENDED:

Rohatgi VK & Saleh AK Md. E. 2005. An introduction to Probability and Statistics. 2nd Ed. John Wiley. Feller W. 1972. An Introduction to Probability Theory & Applications (Vol 1 and II). John Wiley. Marek F. 1963. Probability Theory and Mathematical Statistics. John Wiley. Bhatt BR. 1999. Moderen Probability Theory. 3rd Ed. New Age International

Paper IV: STATISTICAL METHODS

(a) **Discrete Probability Distributions:** Negative-binomial, Geometric and Hyper Geometric, Uniform, Multinomial - properties of these distributions and real life examples.

(b) Continuous Probability Distributions: Cauchy, Gamma, Beta of two kinds, Weibull, Lognormal, Logistic, Pareto, Inverse Gaussian, Exponential distributions, Extreme value distributions. Properties of these distributions . Probability distributions of functions of random variables. Order statistics, Distribution of order statistic. Truncated distribution. Compound distributions.

(c) **Sampling Distributions -** Sampling distributions of sample mean and sample variance from Normal Population, Central and non- central Chi-Square. t and F distributions, their properties and interrelationship. Distribution of quadratic forms, sampling distribution of correlation coefficient, regression coefficient, correlation ratio, Intra class correlation coefficient, etc.

BOOKS RECOMMENDED:

Rao CR.1965. Linear Statistical Inference and its application. John Wiley

Dudewicz EJ & A Mishra SN. 1988. Modern Mathematical Statistics. John Wiley.

Murek F. 1963. Probability Theory and Mathematical Statistics. John Wiley.

Huber P.J. 1981. Robust Statistics. John Wiley.

Johnson NI., Kotz S & Balakrishnan N. 2000. Discrete Univariate Distibutions. John Wilcy. Johnson NI., Kotz S & Balakrishnan N. 2000. Continuous Univariate Distibutions. John Wiley.

PAPER V: PRACTICAL EXAMINATION

A Practical examination based on above papers.

UG VIII /PG II Sem.

PAPER I: SAMPLING THEORY

UNIT I:. Small Area Estimation: Basic concepts, uses and introduction to methods used for small area estimation. Non Sampling errors, problems of Non Response, errors of measurement, Randomised Response techniques

UNIT <u>II</u>: Circular systematic sampling.Cluster Sampling: Estimates of mean and Variance for equal and unequal clusters, Efficiency in terms of Intra class correlation, Optimum unit of sampling.

UNIT <u>III</u>: Ratio and regression method of estimation. sampling with replacement and unequal probabilities, Estimation of mean and it's variance, Double sampling, Multistage sampling with special reference to two stage design, Interpenetrating sub-sampling,

UNIT <u>IV</u>: Sampling with varying probabilities with and without replacement, PPS sampling, Cumulative method and Lahiri's method of selection, Horvitz-Thompson estimator, Ordered and unordered estimators, Sampling strategies due to Midzuno-Sen, Sampford and Rao-Hartley-Cochran, inclusion probability proportional to size sampling, PPS systematic sampling,

BOOKS RECOMMENDED:

Cochran WG. 1977. Sampling Techniques. John Wiley.

Murthy MN. 1977. Sampling Theory And Methods. 2nd Ed. Statistical Publ. Soc., Calcutta.

Mukhopadhyay P. 1998. Theory and Methods of Survey Sampling. Prentice Hall of India Pvt. Ltd., New Delhi.

Des Raj & Chandhok P. 1988. Sample Survey Theory. Narosa Publ. House.

Sukhatme PV, Sukhatme BV, Sukhatme S & Asok C. 1984. Sampling Theory of Surveys with Applications. Sampling Theory of Surveys with Applications. Iowa State University Press and Indian Society of Agricultural Statistics, New Delhi.

Thompson SK. 2000. Sampling. John Wiley.

PAPER II: LINEAR ESTIMATION & DESIGN OF EXPERIMENT

UNIT I: Theory of Linear Estimation; Linear Model, Gauss Markoff set up, Aitken's transformation, Gauss Markoff Theorem, Test of linear hypothesis and related confidence interval, ANCOVA

UNIT II: Heterogeneity settings, connectedness, balance, orthogonal structures, contrasts, Balanced incomplete block design and Lattice design, Recovery of intra-block information, Latin square, mutually orthogonal latin squares, Youden squares,

UNIT III: Factorial Experiments- 2'' and 3^2 designs, confounding in factorial experiments,

UNIT IV: Missing Plot technique. Uniformity Trials. Split Plot and Strip plot Design.

BOOKS RECOMMENDED

Joshi DD. 1990. Linear Estimation and Design of Experiment. First reprint. Wiley Eastern Ltd. Cochran WG & Cox GM. 1957. Experimental Designs. 2nd Ed. John Wiley.

Federer WT. 1985. Experimental Designs. MacMillan

Nigam AK & Gupta VK. 1979. Handbook on Analysis of Experiments. IASRI Publ.

Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.

Fisher RA. 1953. Design and Analysis of Experiments. Oliver & Boyd.

PAPER III: STATISTICAL INFERENCE - I

UNIT II:Admissibility, Properties of good estimators- Efficiency, Sufficiency and completeness, Cramer —Rao inequality and its generalization, Bhattacharya's Bounds, Characteristics of distribution admitting sufficient statistic, Rao-Blackwell Theorem and Lehmann - Scheffe theorem.

UNIT III:Method of Estimation, Method of Maximum Likelihood, Method of Moments, Method of Chi-Square, Properties of M.L.E, existence of best asymptotic normal estimate under regularity conditions,.

UNIT IV:Interval Estimation Confidence Regions, Best Confidence Intervals, Interval Relationship with the Testing of Hypothesis.

BOOKS RECOMMENDED:

Rohatgi VK. 1984. Statistical Inference. John Wiley

Rohatgi VK & Sala AK. Md. E. 2005. An Introduction to Probability and Statistics. 2I'd Ed. John Wiley

Joshi DD. 1990. Linear Estimation and Design of Experiment. First reprint. Wiley Eastern Rao CR. 1973. Linear Statistical Inference And Its Applications. 2nd Ed. Wiley Eastern

PAPER IV: STATISTICAL INFERENCE -II

UNIT I:Testing of Hypothesis- Neyman Pearson Lemma and its generalization, UMP Tests, Unbiased Tests, UMPU Tests, Tests with Neyman structure and UMP similar tests, Likelihood Ratio tests and their large sample properties along with simple applications.

UNIT II: Restricted parameter estimation, General two way classification, without and with interactions, nested classification, Polynomial regression models and orthogonal polynomials.

UNIT III: Sequential Analysis- Need of Sequential Probability Ratio tests and it's properties, Wald's fundamental identity, OC and ASN function, Optimality of SPRT, Applications to Normal, Binomial and Poisson Distributions, Sequential estimation- Basic idea, Stein's two stage procedure.

UNIT IV:Bayesian Inference- General structure of a Bayesian Decision problem, role of loss function, Risk function, Prior information, Application of Bayes theorem in computing posterior distributions, Bayes estimators of the posterior mean under squared error loss, Bayesian notion of sufficiency, construction of conjugate priors, improper and diffuse priors.

BOOKS RECOMMENDED:

Rohatgi VK. 1984. Statistical Inference. John Wiley

Rohatgi VK & Sala AK. Md. E. 2005. An Introduction to Probability and Statistics. 2I'd Ed. John Wiley

Joshi DD. 1990. Linear Estimation and Design of Experiment. First reprint. Wiley Eastern

Wald A. 2004. Sequential Analysis. Dover Publ.

Sinha Sk 1998. Bayesian Estimation. New Age International.

Winkler. Introduction To Bayesian Inference

E. L Lehman. 1990. Testing of Hypothesis. John Wiley

PAPER V: PRACTICAL EXAMINATION

A Practical examination based on above papers

UG IX /PG III Sem.

PAPER I: MULTIVARIATE ANALYSIS

Non Singular and Singular Multivariate Normal distributions, Marginal and Conditional distributions, Characteristic Function and Moment Generating Functions, Maximum Likelihood Estimation of Mean and Co-Variance matrix, independence and joint sufficiency for these estimates, Hotelling's T2 statistic as a function of the Likelihood Ratio criterion, It's distribution and applications, Mahalanobis D2 statistic and it's distribution, Discriminant function (for two variables), Principal Components and Canonical Correlations. Path Analysis, Factor Analysis, Cluster Analysis, Discriminant Analysis, MANOVA

BOOKS RECOMMENDED:

Anderson, TW. 1958. An introduction to Multivariate Statistical Analysis. John Wiley. Dillon WR & Goldstein M. 1984. Multivariate Analysis - Methods and Applications . John Wiley.

Morrison DF. 1976. Multivariate Statistical Methods. McGraw Hill. Gill NC. Multivariate Statistical Inference

PAPER II: BIOINFORMATICS

UNIT I:Basic Biology: Cell, genes , gene structure, gene expression and regulation, Molecular tools, nucleotides, nucleic acid, markers , proteins and enzymes, bioenergetics, single nucleotide polymorphism, expressed sequence tag, Structural and functional Genomics, : Organization and structure of genomes, assembling of physical maps, strategies and techniques for genome sequencing and analysis

UNIT II:Computing techniques: OS and programming languages, - Linux, pert, biioperl, cgi, MySQL, phpMyAdmin: Coding for browsing Biological tables on the web, parsing and annotation of genomic sequences, Database designing, Computer Networks: Internet, World wide Web, Web , browsersEMBnet, NCBI, Database on public domain pertaining to Nucleic acid sequences, protein sequences, SNPs etc ,Searching sequence databases, Structural databases.

UNIT III:Statistical techniques: MANOVA, Cluster analysis, Discriminant Analysis, Principal Component Analysis, Principal Coordinate Analysis, Multi-dimensional scaling, Multiple regression analysis, Likelihood approach in estimation and testing, Resampling Techniques: Bootstrapping and Jack-knifing, Hidden Markov models, Bayesian estimation and Gibbs sampling.

UNIT IV:Tools for Bioinformatics: DNA Sequence Analysis- Features of DNA Sequence Analysis, Approaches to EST analysis, Pairwise alignment techniques, .Comparing two sequences, PAM and BLOSUM, Global Alignment(The Needleman and Wunsch algorithms)Local alignment(The Smith-Waterman Algorithm),Dynamic Programming, Pairwise database searching, Sequence Analysis- BLAST and other related tools,, Multiple alignment and database search using motif models, ClustalW, Phylogeny, Databases on SNPs, EMalgorithms and other methods to discover common motifs in biosequences, Gene production based on Neural Networks, Genetic Algorithms, Hidden Markov models, Computational analysis of protein sequences, structure and function, Design and Analysis of microarray experiments.

BOOKS RECOMMENDED

Baldi P & Brunak S. 2001. Bioinformatics: The Machine Learning Approach. 201 Ed. (Adaptive Computation and Machine Learning). MIT Press.

Baxevanis AD & Francis BF. (Eds.). 2004. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. John Wiley.

Bergeron BP. 2002. Bioinformatics Computing. Prentice Hall.

Ewens WJ & Grant GR. 2001. Statistical Methods in Bioinformatics: An Introduction (Statistics for Biology and Health). Springer.

Jones NC & Pevzner PA. 2004. An Introduction to Bioinformatics Algorithms. MIT Press.

Krane DE & Raymer ML. 2002. Fundamental Concepts of Bioinformatics. Benjamin /Cummings. Tisdall JD. 2003. Beginning Perl for Bioinformatics. O'Reilly & Associates.

Wunschiers R. 2004. Computational Biology Unix/Linux, Data Processing and Programming. Springer.

PAPER III: REGRESSION ANALYSIS

Simple and multiple Linear regression, Least squares fit- Properties and example, Polynomial Regression, Use of orthogonal polynomials

Assumptions of regression, diagnostics and transformations, Examination of Residuals, -Studentized residuals, applications of residuals in detecting outliers, identification of influential observations, Lack of fit, pure error, Testing homoscedaSticity and normality of errors, Durbin Watson test, Use of R^2 in examining goodness of fit, other measures of goodness of fit. Cook statistic, M-estimation.

Concepts of Least median of squares and its applications, Concept of Multicollinearity, Analysis of Multiple Regression Models, estimation and testing of regression parameters, sub hypothesis testing, restricted estimation

Weighted Least squares method: Properties and it's examples, Box-Cox family of transformation, Using of Dummy variables, Selection of variables, Forward Selection, Backward elimination, Stepwise and Stagewise regression

Introduction to non linear models, Non linear estimation: Least squares for non linear models.

BOOKS RECOMMENDED:

Balsley DA, Kuh E & Walsch RE. 2004. Regression Diagnostics --Identifying Influential Data and Sources Of Coll inearity. John Wiley.

Chatterjee S, Hadi A,& Price B. 1999. Regression Analysis by Examples. John Wiley.

Montgomery DC, Peck EA & Vining GG. 2003. Introduction to Linear Regression Analysis. 3rd Ed. John Wiley.

Draper & Smith.2005. Applied Regression Analysis, John Wiley

PAPER IV: TIME SERIES ANALYSIS AND DEMAND ANALYSIS

Components of a time series and their measurement Harmonic Analysis Autocorrelation and Partial Autocorrelation functions Correlogram and periodogram analysis, Linear Stationary models: Autoregressive, Moving Average and mixed processes, Linear non Stationary models, Autoregressive integrated moving average processes

Forecasting : Minimum mean square forecast and their properties, calculating and updating forecast

Model identification: techniques and objectives, initial estimates, Model estimation: Likelihood function, sum of squares function, Least square estimates, Seasonal models, Intervention analysis models and Outlier detection

Demand Analysis: Distribution of income, income and demand elasticities, Method of estimation of elasticities using family budget data and time series data, Engel's curve and Engel's law

BOOKS RECOMMENDED:

Barnett V & Lewis '1'. 1984. Outliers in Statistical Data. John Wiley.
Box GEP, Jenkins GM & Reinsel GC. 2007. Time Series Analysis: Forecasting and Control. 3"1
Ed. Pearson Edu
Douglas Montgomery. 2003. Introduction to Time Series Analysis and Forecasting. Wiley
Robert H Shumway. 2000. Time Series Analysis and it's Applications. Springer

PAPER V: PRACTICAL EXAMINATION

A Practical examination based on above papers

UG X /PG IV Sem.

PAPER I: STOCHASTIC PROCESSES AND RELIABILITY THEORY

STOCHASTIC PROCESSES: Definition of Stochastic processes, Markov Chain, one step and n- step transition probabilities, Chapman-Kolmogorov Equation, first passage and first return probabilities, classification of states, Markov Chains with continuous state space, Poisson Processes, Birth and death processes, elements of Markov Process

RELIABILITY THEORY: Definition of Reliability, Maintainability and Availability, Life distributions, failure rates and bath tub failure curve, exponential, Gamma, Weibull and Log Normal models, Linearly increasing Hazard model, mean time to system failure and mean time between failure components and system reliability, series and parallel configuration, Active and standby redundancy and Preventive Maintenance.

BOOKS RECOMMENDED:

Medhi J. 2001. Stochastic Processes. 2nd Ed. Wiley Eastern.Parzen E. 1962. Stochastic Processes. Holden-Day.Bhatt BR. 2000. Stochastic Models; Analysis and Applications. New AgeRavichandran N 1990. Stochastic Methods in Reliability Theory . New Age.Sinha SK. 1986. Reliability and Life Testing. Wiley Eastern Ltd.

PAPER II: STATISTICAL COMPUTING

Introduction to Statistical packages and computing, data types and structures, pattern recognition, classification, association rules, graphical methods, Data analysis principles and practice

Matrix computations in linear models, Analysis of discrete data

Numerical linear algebra, Numerical optimization, graphical techniques, numerical approximations, numerical integration and Monte Carlo Methods

Spatial Statistics, spatial sampling, hierarchical modeling. Analysis of cohort studies, case controlled studies and randomized clinical trials, techniques in the survival data and longitudinal studies, Approaches to handle missing data and meta analysis

Random number generators, Regression Analysis (both linear and non linear), ANOVA and ANCOVA, EML Algorithm, Gibbs Sampling, Some advanced statistical computing.

BOOKS RECOMMENDED

Agresti A. 2002. Categorical Data Analysis. 2nd Ed. John Wiley. 'Misted RA. 1998. Elements of Statistical Computing. Chapman & Hall. Ross S. 2000. Introduction to Probability Models. Academic Press. Rajaraman V. 1993. Computer Oriented Numerical Methods. Prentice-Hall. Ilan J & Kamber M. 2000. Data Mining : Concepts and Techniques. Morgan. Packages: SPSS/R/Statistica/SYSTAT

PAPER III: ECONOMETRICS

Models and identification, meaning of Econometrics, formulation of economic phenomenon with specification analysis, Simultaneous equations, meaning of structure and model problems involved in construction of economic models, Endogenous and Exogenous Variables, concept of

Multicollinearity, Identification Problems, rank and order condition of Identifiability, identification under bilinear restrictions, identifiability everywhere in the parametric space, WALA'S criterion of identification, Estimation: method of estimation, two stage and three stage least squares, K- class estimates with properties(Bias and Moment matrix), Maximum Likelihood estimators, full information and limited information maximum likelihood estimators ,Monte Carlo Studies

BOOKS RECOMMENDED:

Koop G. 2007. Introduction to Econometrics. John Wiley.

Maddala GS. 2001. Introduction to Econometrics. 3rd Ed. John Wiley.

Pindyck RS & Rubinfeld DL. 1998. Econometric Models and Economic Forecasts. 4`11 Ed. McGraw Hill.

Verbeek M. 2008. A Guide to modern Econometrics. 3rd Ed. John Wiley.

G. M. K Madnani. 2008. Introduction to Econometrics.8th Ed. Oxford and IBH

PAPER IV: POPULATION STUDIES AND DEMOGRAPHY

UNIT I: History, definition, nature and scope of Population Studies, relationship of other social sciences with population studies, Population Surveys: Meaning, Scope, uses, limitations; Major surveys: National Sample Surveys (NSS), World Fertility Survey (WFS), Demographic Health Surveys (DHS), Reproductive and Child Health Survey (RCHS). National Family Health Surveys (NFHS)

UNIT II: Method of Population Projection: Mathematical methods of population projection (Linera, Exponential, Polynomial, Gompertz and Logistic Growth Curves for Population Projection); Component method of Population projection; Sub-national population projection;

UNIT III: Demography: Its definition, nature and scope, its relation with other disciplines, Theories of population-Malthusian Theory, Optimum theory of population and theory of Demographic Transition. Sources of Demographic data, limitations and uses of demographic data,

UNIT IV:Vital rates and Ratios, definition and construction of life tables from Vital Statistics, census returns, uses of life table, , measure of fertility gross net reproduction rates, stationary and stable population theory, uses of Lothka's stable population theory in the estimation of demographic parameters, method of inter-censal and post-censal estimation.

BOOKS RECOMMENDED:

Cox DR. 1957. Demography. Cambridge Univ. Press.

Rowland Di'. 2004. Demographic Methods and Concepts. Oxford Press. Sigel JS & Swanson DA. 2004. The Methods and Material of Demography. 2"d Ed. Elsevier. Woolson FR. 1987. Statistical Methods for the Analysis of Biomedical Data. John Wiley. Wald H. Demand Analysis Kendall MG. Advanced Theory of Statistics Vol-11

PAPER V: PRACTICAL EXAMINATION

A Practical examination based on above papers.