

APPENDIX-10(2)
MADRAS UNIVERSITY
BRANCH-II-STATISTICS
(Semester System with credits)

SYLLABUS
(Effective from the academic year 2003-2004)

MAJOR PAPER-I

DESCRIPTIVE STATISTICS

UNIT 1:

Nature and scope of statistical methods and their limitations-Preparation of questionnaire and schedule primary and secondary sources of data-nominal,ordinal,ratio and interval scale-complete enumeration,controlled experiment,observational studies and sample surveys,sources of secondary data including some government publications.

UNIT 2:

Presentation by tables and diagrams construction of tables with one,two and three factors of classifications-diagrammatic representations,frequency distributions for continuous and discrete data,graphical representation of a frequency distribution by histogram and frequency polygon ,cumulative frequency distributions(inclusive and exclusive methods) and ogives.

UNIT 3:

Measures of location dispersion,moments and measure of skewness and kurtosis for both grouped and ungrouped data.Use of Shepard's correction for grouped data.Bivariate data .

UNIT 4:

Scatter diagram,regression curve between two variables and concept of error in regression,principle of least squares and fitting of first,second degree and exponential curves,concept of correlation coefficients and its properties.Spearman's rank correlation.Multivariate data. Multiple regression, multiple correlation and partial correlation in three variables-their measures and related results.

UNIT 5:

Fundamental set of frequencies, consistency of data,conditions for consistency,contingency table association of attributes,and various measures of associations.

BOOKS FOR STUDY:

Hogg,R.V. and Craig,A.T.(1998):Introduction to Mathematical statistics,4th ed.Academic Press.

Hoel,P.G.(1971):Introduction to Mathematical Statistics,Asia publishing house.

A.M.Goon,A.M. Gupta M.K and .DasguptaB(1991):Fundamentals of statistics,Vol.1,world press,Calcutta.

Bhat B.R,Srivenkataramana T,and Madhava K.S.(1996)Statistics:A beginner's text Vol.1,New Age International(p)Ltd.

BOOKS FOR REFERENCE:

- G.U.Yule and M.G.Kendall(1956):An introduction to theory of statistics,Charles Griffin.
M.R.Spiegel(1961):Theory and problem of statistics,Schaum's outline series.
Snedecor and Cochran(1967):Statistical methods,Iowa State University Press.
Anderson,T.W. and Sclove S.L.(1978):An introduction to statistical analysis of data, Houghton Mifflin/co.
Croxtan F.E, and Cowden D.J. and Kelin S(1973)Applied General Statistics,Printice Hall of India.

MAJOR PAPER – II **PROBABILITY AND DISTRIBUTIONS-1**

UNIT 1:

Random experiment,sample point,sample space,event,algebra of events,operations on events.Classical and relative frequency approach to probability-discrete probability space,axiomatic approach to probability.

UNIT 2:

Addition theorem of probability,conditional probability,independence of events-multiplication theorem-Bayes theorem and its applications.

UNIT 3:

Defintion of discrete and continous randaom variable-probability mass function,distribution functions and probability density functions their properties.

Expectation of random variables and its properties.

UNIT 4:

Moment generating functions, characteristic function, cumulant generating function-their properties,moments,measures of locations,dispersion,skewness and kurtosis for discrete and continous variates.

UNIT 5:

Bivariate distributions-discrete and continuous type, cumulative distribution function (c.d.f), probability mass function (p.m.f) and probability density function (p.d.f). Marginal expectation. Covariance, Correlation, Regression.

BOOKS FOR STUDY:

A.M.Mood,F.A.Graybill and D.C.Boes(1974):Introduction to the theory of statistics, International student ed. McGraw Hill.

Hogg,R.V. and Craig, A.T.(1998):Introduction to Mathematical Statistics,4th ed.Academic Press.

A.M.Goon,M.K. Gupta & B.Dasgupta(1980):An Outline of Statistical theory,Vol. 1,6th revised ed.,World Press.

BOOKS FOR REFERENCE:

Rohatgi,V.K.,(1984):An Introduction to probability theory and mathematical statistics.

P.G.Hoel(1971):Introduction to Mathematical Statistics,Asia publishing house.

Murry R.Spiegal(1982):Theory and problems of Probability and Statistics,Schaum's outline series,McGraw Hill.

Seymour Lipshutz(1982):Theory and problems of probability, Schaum's outline series,McGraw Hill.

Marek Fisz(1961):probability theory and Mathematical Statistics,John Wiley.

K.L.Chung(1983):Elementary probability theory with stochastic processes,Springer International student edition.

William Feller(1968):An Introduction to probability theory and its applications,Vol I,3rd ed.,John Wiley & Sons.

MAJOR PAPER-III

PROBABILITY AND DISTRIBUTIONS-II

UNIT 1:

Standard univariate distributions-Point distribution,Power series,Uniform,Binomial,Poisson,Geometric,Hypergeometric,Multinomial,Negative Binomial distributions and their properties,moment generating functions,characteristic functions for the above distributions.

UNIT 2:

Standard continuous distributions-Uniform, Exponential, Gamma, Weibull, Beta, Pareto, Cauchy, Laplace, Lognormal distributions and their properties, moment generating functions,characteristic functions for the above distributions-simple problems.

UNIT 3:

Normal, and Bivariate Normal distributions and their properties, moment generating functions,characteristic functions for the above distributions-concepts and simple distributions.

UNIT 4:

Limit Laws- Chebychev's inequality-convergence in probability-Weak Law of Large Numbers(W.L.L.N), Definition of almost sure convergence Strong Law of Large Numbers(S.L.L.N.)(Statement only)and applications.

UNIT 5:

Convergence of distributions-Binomial to Poisson De-moivre's-Laplace theorems, Central Limit Theorem due to Lindeberg-Levy's CLT for *iid* statements of continuity theorem, uniqueness theorem and inversion theorem.

BOOKS FOR STUDY:

A.M.Mood, F.A. Graybill and D.C.Boes(1974):Introduction to the theory of statistics,International student ed.,McGraw Hill.

Hogg,R. V. and Craig,A.T.(1998):Introduction to Mathematical Statistics,4th ed.,Academic Press.

A.M.Goon,M.K. Gupta and B.Dasgupta(1980):An outline of Statistical theory,Vol.I,6th revised ed.,World Press.

BOOKS FOR REFERENCE:

A.M.Mood,F.A.Graybill and D.C.Boes(1974):Introduction to the theory of statistics, International student ed. McGraw Hill.

Hogg,R. V. and Craig, A.T.(1998):Introduction to Mathematical Statistics,4th ed.Academic Press.

A.M.Goon,M.K. Gupta & B.Dasgupta(1980):An Outline of Statistical theory,Vol. 1,6th revised ed.,World Press.

BOOKS FOR REFERENCE:

Rohatgi,V.K.,(1984):An Introduction to probability theory and mathematical statistics.

P.G.Hoel(1971):Introduction to Mathematical Statistics,Asia publishing house.

Murry R.Spiegel(1982):Theory and problems of Probability and Statistics,Schaum's outline series,McGraw Hill.

Seymour Lipschutz(1982):Theory and problems of probability, Schaum's outline series,McGraw Hill.

Marek Fisz(1961):probability theory and Mathematical Statistics,John Wiley.

K.L.Chung(1983):Elementary probability theory with stochastic processes,Springer International student edition.

William Feller(1968):An Introduction to probability theory and its applications,Vol I,3rd ed.,John Wiley & Sons.

MAJOR PAPER-IV

STATISTICAL INFERENCE-I

UNIT 1:

Sampling distributions-concept-distributions of mean and variance from normal population. Sampling distributions of Chi-Square, t and F statistics.

UNIT 2:

Point Estimation-Problem of Point Estimation-Properties of estimators-Consistency and Efficiency of an estimator.Sufficiency of a statistic-Neyman-Fisher factorization theorem(discrete case)-Simple problems.

UNIT 3:

Unbiasedness-Properties,MVUE,BLUE,Rao-Blackwell theorem-Sufficiency and completeness,Lehman-Scheffe theorem,Cramer Rao inequality-simple problems.]

UNIT 5:

Interval Estimation-Confidence Interval for proportions,mean(s),variance and variance ratio based on chi square, student's t,F and Normal distributions.Tests of significance:concepts-text based on normal,t,F and Chi Square.

BOOKS FOR STUDY:

A.M.Mood, F.A. Graybill and D.C.Boes(1974):Introduction to the theory of statistics,International student ed.,McGraw Hill.

Hogg,R.V. and Craig,A.T.(1972):Introduction to Mathematical Statistics,3rd ed.,Academic Press,USA.

A.M.Goon,M.K. Gupta and B.Dasgupta(1980):An outline of Statistical theory,Vol.I,6th revised ed.,World Press limited, Calcutta.

BOOKS FOR REFERENCE:

Hoel,P.G.(1971):Introduction to mathematical statistics,Asia publishing house.

Rohatgi,V.K. and Craig,A.T.(1972):An Introduction to probability theory and mathematical statistics,Wiley Eastern.

Degroot,M.H.(1975):Probability and Statistics,Addison-Wiley.

Marek Fisz(1961):Probability theory and Mathematical statistics,John Wiley.

Speigal,M.R.(1982):Theory and problems of probability and statistics,Schaum's outline series,McGraw Hill.

Snedcor,G.W. and Cochran,W.G.(1967):Statistical Methods 6th editon,Oxford IBH Publishing Co.

Wilk,S.S.(1962):Mathematical statistics-John Wiley & Sons.

MAJOR PAPER-V

STATISTICAL INFERENCE-II

UNIT 1:

Testing of Hypothesis –Neymann-Pearson theory-Statistical Hypothesis-Simple and composite hypothesis,Null and alternative Hypothesis-Two types of errors-critical region-powers of a test.Most powerful test-NP lemma-simple problems.

UNIT 2:

Uniformly most powerful tests.Tests based on t,Chi-Square,F and normal distribution(without proof),Likelihood ratio criterion-Definition and test for means and variance(one sample only).

UNIT 3:

Sequential Probability Ratio Test:Definition-properties and simple problems.

UNIT 4:

Non-Paremetric tests-Run,Median,sign and Mann Whitney tests(one sample and two sample)problems.Wilcoxon Signed rank test,test sum test,Kolmogorov's Smirnov one sample test,and Krushkal Wallis test.

UNIT 5:

Basic ideas on decision theory-Loss functions-Risk functions-Prior distributions-Bayes Risk-Simple problems based on Bayes estimation and testing.

BOOKS FOR STUDY:

A.M.Mood, F.A. Graybill and D.C.Boes(1974):Introduction to the theory of statistics,International student ed.,McGraw Hill.

Hogg,R.V. and Craig,A.T.(1972):Introduction to Mathematical Statistics,3rd ed.,Academic Press,USA.

A.M.Goon,M.K. Gupta and B.Dasgupta(1980):An outline of Statistical theory,Vol.I,6th revised ed.,World Press limited, Calcutta.

BOOKS FOR REFERENCE:

Hoel,P.G.(1971):Introduction to mathematical statistics,Asia publishing house.

Rohatgi,V.K. and Craig,A.T.(1972):An Introduction to probability theory and mathematical statistics,Wiley Eastern.

Degroot,M.H.(1975):Probability and Statistics,Addison-Wiley.

Marek fisz(1961):Probability theory and Mathematical statistics,John Wiley.

Speigal,M.R.(1982):Theory and problems of probability and statistics,Schaum's outline series,McGraw Hill.

Snedcor,G.W. and Cochran,W.G.(1967):Statistical Methods 6th editon,Oxford IBH Publishing Co.

Wilk,S.S.(1962):Mathematical statistics-John Wiley & Sons.

MAJOR PAPER VI

DESIGN OF EXPERIMENTS

UNIT 1:

Fundamental Principles of Experiments-Replications,Randomization and Local Control Techniques-Size of experimental unit-Metohs of determination of experimental units-(Maximum curvature methods-Fairfield Smith's variance law).

UNIT 2:

Analysis of Variance-one-way,two-way clasification(without interaction)-Multiple range tests: n Neymann Keul's test-Duncan's multiple range test.Tukey's test-Transformations-Square root,angular and log transformations.

UNIT 3:

Linear Model and its classifications.Completely Randomized design(CRD),and its analysis-Randomized Block Design(RBD) and its analysis-RBD-more than one but equal number of observations per cell-Latim Square Design(LSD) and its analysis.

UNIT 4:

Missing plot technique-Meaning-Least square method of estimating missing observations and two observations missing in RBD and LSD-Analysis of covariance technique in CRD and RBD(without derivation).

UNIT 5:

Factorial experiments-Definition 2^2 , 2^3 and 3^2 factorial experiments and their analysis-Principles of confounding-Partial and Complete confounding in 2^3 -Split plot design and its analysis,BIBD concept and parametric Relations.

BOOKS FOR STUDY

Dass M.N. and Giri N.C(1986) Design and Analysis of Experiments,Wiley Eastern,New Delhi.Kempthorne,(1956) Design and Analysis of Experiments,John Wiley ,New York.

BOOKS FOR REFERENCE

Montgomery,D(1972) Design of Experiments,John Wiley and Sons.

MAJOR PAPER VII

TIME SERIES, INDEX NUMBERS AND OFFICIAL STATISTICS

UNIT 1:

Time series-Concept –Components of time series-Additive and multiplicative models-Measurement of trend-Moving average method-Least square method.

UNIT 2:

Measurement of seasonal variations-Simple Average method-Ratio to trend method-Ratio to moving average method –Link relative method-Variate Difference method.

UNIT 3:

Index Numbers:uses,classification of index numbers-Problems in the construction of index numbers-Methods of constructing index numbers-Unweighted index numbers-weighted index numbers.

UNIT 4:

Quantity index numbers-Fixed and chain base index numbers-Optimum test for index numbers-Time reversal test-factor reversal test-cost of living index numbers.

UNIT 5:

Official Statistics:Statistical System in India CSO and NSSO and its functions-Present structure of the Indian Statistical system-Functions of a statistical system-Agricultural statistics-Industrial statistics-Trade statistics-Labour statistics-transport and communication statistics, Statistical Heritage.

BOOKS FOR STUDY

Kapoor, V.K. and Gupta S.C.(1978):Fundamentals Of Applied statistics, Sultan Chand & Sons.Saluja, M.R.(1972):Indian Official statistical systems;Statistical publishing society, Calcutta and The Indian Econometric Society, Hyderabad.

BOOKS FOR REFERENCE

Gupta, S.P. (1999): Statistical Methods, Sultan & Sons, New Delhi.
Croxtton, F.E.Cowdon, D.J.: Applied general statistics, Prentice Hall.

MAJOR PAPER VIII

PROGRAMMING IN C++

UNIT 1:

Basic concepts of object oriented programming(OOP) OOP vs procedure programming, benefits of OOP-object oriented languages.Data abstraction, encapsulation.Classes and objects.over loading of functions, single/multiple inheritance, polymorphism and dynamic binding. Overview of some OOP languages-Simlua, Small Talk, Eiffel, common lisp objects systems.

UNIT 2:

C++ programming language-History, Data types, expression statements, type cast operator, operator overloading-control structures-Function in c++-main function, function prototyping, call by value, return by reference, inline functions-function overloading, friend and virtual functions.

UNIT 3:

Classes and Objects-Specifying a class-defining member functions-Constructors and Destructors-Parametrizes constructors-nesting of member functions-private member functions-arrays within a class-arrays of objects-objects as function arguments.

UNIT 4

Operato overloading and Type conversion-inheritance; extending classes defining derived classes.Single-Multilevel-Inheritance-Hierarchial, Hybrid inheritance-Virtual base classes-pointers, virtual functions and polymorphism, managing console I/O operations-templates and exception handling.

UNIT 5:

File handling in C++, graphics(2D) using built in functions, programming using (a) link list (b) inheritance (c) polymorphism and (d) function overloading.

BOOKS FOR STUDY:

Balagurusamy,E.(1998):Object Oriented Programming with C++,Tata Hill.

BOOKS FOR REFERENCE:

Stephen Prata(1996):C++ primer plus,Galgotia Publications Pvt Ltd.

Barkakati,N.(1997):Object oriented programming in C++,Prentice Hall of India.

Robert Lafore:OOP in Turbo C++.

Stroustrup,Bjarne:C++ Programming Language.

Stroustrup,Bjarne:The Design and evaluation of C++,BPB publication

MAJOR PAPER IX

SAMPLING TECHNIQUES

UNIT 1:

Design – organization and execution of sample surveys – principal steps in sample survey- pilot survey – principles of sample survey – sampling and non -sampling errors – advantages of sampling over complete census – limitations of sampling.

UNIT 2:

Sampling from finite population – simple random sampling with and without replacement – unbiased estimate of the mean variance of the estimate of the mean finite population correction - estimate of standard error from a sample – determination of sample size.

UNIT 3:

Stratified random sampling – properties of the estimates – unbiased estimates of the mean and variance of the estimates of the mean – optimum and proportional allocations – relative precision of a stratified sampling and simple random sampling - estimation of gain in precision in stratified sampling.

UNIT 4:

Systematic sampling – estimate of mean and variance of the estimated mean – comparison of simple and stratified with systematic random sampling.

UNIT 5:

Ratio estimators : Ratio estimates, variance of the ratio estimates – Bias of the ratio estimates. Regression estimators: Linear regression estimate regression estimates with pre assigned b-regression estimates when b is computed from the sample. PPS sampling – randomized response method – concept only – cumulative method and Lahiri method.

BOOKS FOR STUDY:

William , G.Cochran(1984): Sampling techniques , Wiley Eastern.

BOOKS FOR REFERENCE:

Des Raj (1976): Sampling Theory , Tata McGraw Hill.

Daroga Singh & Chaudhary , F.S.(1986): Theory and Analysis of Sample Survey Designs, Wiley Eastern

Sukhatme P.V. et al(1984): Sample survey methods and its applications, Indian Society
Agricultural Statistics, New Delhi.

Murthy, M.N.(1967): Sampling theory and methods, Statistical Publishing Society, Calcutta.

Sampath S. (19): Sampling theory and methods,--

MAJOR PAPER X

STATISTICAL QUALITY CONTROL

UNIT 1:

Need for Statistical Quality Control techniques in Industry – Causes of Quality variation – control charts – Use of the Shewhart – control chart – Specification and tolerance limits – 3sigma limits – warning limits – application of theory of runs in quality control.

UNIT 2:

Control chart for variables – Xchart – R chart – purpose of charts – Basis of
Sub-grouping – plotting X and R results – determining the trial control limits – Interpretation of control charts X and R.

UNIT 3:

Control chart for attributes – purpose of the chart – P chart – np chart – construction of P and np chart –
choice between chart for P and chart for np – construction of c-chart.

UNIT 4:

Acceptance of sampling plans for attributes – Producer's risk and consumer's risk – concepts of
AQL,LTPD,AOQ,AOQL,ATI and ASN – single, double and Multiples sampling plans – OC,AOQ,ATI and curves for
single and Double sampling plans.

UNIT 5:

Variable sampling plans – Sigma known and sigma unknown determination of n and k for one sided
specification – OC curve.

BOOKS FOR STUDY:

Kapoor, V.K. and Gupta, S.P.(1978): Fundamentals of applied statistics, Sultan Chand & Sons.

Gupta, R.C.(1974): Statistical Quality Control.

Montgomery, D.C.(1983): Introduction to Statistical Quality Control.

Ekambaram, S.K.(1963): Statistical basis of Acceptance sampling, Asia Publishing House.

BOOKS FOR REFERENCE:

Grant, E.L. and Laven Worth, R.S.: Statistical Quality Control, McGraw Hill.

MAJOR PAPER XI

OPERATION RESEARCH

UNIT 1:

Introduction to OR Linear programming problem – Formulation of LPP – Solving the LPP by graphical method – Solving the LPP by simplex method (degeneracy and cycling) Simple problem only. Duality in LPP(simple problem only) Dual simplex method.

UNIT 2:

Application of LPP, Transportation problem obtaining initial, feasible and optimal solutions. Optimality test degeneracy, Unbalanced transportation problem, Assignment problem and Unbalanced Assignment problem – Travelling salesman problem.

UNIT 3:

Game theory – two person zero games, The maximum – minimax principle – Games without saddle pts Mixed strategies – Graphical solution of $2 \times n$ and $n \times 2$ games Dominance property. Sequencing – ‘n’ jobs through 2 machines - ‘n’ jobs through 3 machines - ‘n’ jobs through m machines, Two jobs and ‘m’ machines.

UNIT 4:

Network analysis by CPM/PERT Basic concepts – constraints in Network – construction of the network – Time calculations - Concepts of slack and float network – Analysis – Network – Finding optimum project duration and minimum project cost.

UNIT 5:

Basic concepts of Queuing theory – Characteristics of a queuing model – average waiting time, expected queue length $E(q)$, variance of Queue length $(V(q))$.

Expression for probability of n customers in the system $p(n)$ for the queuing model

M/M/1 and M/M/C model (C/FIFO) and (?/FIFO) queue discipline (steady state case only)

BOOKS FOR STUDY AND REFERENCE:

Handy A. Taha: Operations Research, 6 ed. Prentice Hall of India.

Kanti Swarup et al: Operations Research, sultan chand and sons, New Delhi.

Goel & Mittal(1982): Operations Research, Pragati Prakashan, Meerut.

Gupta R.K.(1985): Operations Research, Krishna Prakashan, Mandir, Meerut.

Schaum's outline series: Operations Research.

Frederick S.Hillier & Gerald J.Lieberman: Operations Research,CBS publishers & Distributors, Delhi.

Sharma J.K. (2001): Operations Research.Theory and applications, Macmillan India Ltd.

Sharma J.K. (2002): Operations Research.Problems and solutions, Macmillan India Ltd.

MAJOR PAPER XII

Any one of the following Electives

(i) REGRESSION ANALYSIS AND APPLICATIONS

UNIT 1:

Partial and multiple correlation coefficients, relationships among simple, multiple and partial correlation coefficients.

UNIT 2:

Simple linear regression model: Description of the data model – estimation and test of hypothesis – index of fit – predicted values and standard errors – evaluation of fit – analysis of residuals.

UNIT 3:

Effective of outliers in simple regression – model, adequacy and residual plots – deletion of data points – transformation of variables – transformation to achieve linearity – transformation to stabilise variance – removal of heterogeneity – principles of weighted least squares.

UNIT 4:

Multiple regression model: Description of the data model – properties of least squares estimators – predicted values and standard errors in multiple regression coefficient test of hypothesis on the linear model – assumption about the explanatory variable – testing a subset of regression coefficients equal to zero – testing of equality of regression coefficients.

UNIT 5:

Multi-collinearity and its effects on inference and forecasting – detection of multi-collinearity – searching of linear functions of regression coefficients – Ridge method – selection of variables(Forward selection procedure and Backward elimination procedure) – Stepwise method(algorithm only).

BOOKS FOR STUDY:

Chatterjee, S. and Price, B.(1977): Regression analysis.

Kapoor, V.K & Gupta, S.C.:Fundamentals of mathematical statistics.

BOOKS FOR REFERENCE:

Johnston, J.(1984): Econometric methods.

(ii) FINANCIAL ACCOUNTING

UNIT 1:

Basic accounting concepts and conventions-Accounting Equation-meaning of accounting-groups interested in accounting information-Trial balance,final accounts(emphasis be given to important adjustments)-rectification of errors-suspense account-rank reconciliation statement-Depreciation accounting-Meaning of depreciation-Methods of providing depreciation-Fixed percentage on original cash-Fixed percentage on diminishing balance(including change in the method of depreciation).

UNIT 2:

Single Entry: Definition and salient features – statement of affairs method-Conversion method.

UNIT 3:

Average due date, account current and investment accounts.

UNIT 4:

Branch Accounts: Debtors system-Profit and loss account- Stock and debtors system-distinction between wholesale profit and retail profit-Independent branch (Foreign branches excluded) Departmental Accounts: Basic for allocation of expenses – Inter departmental transfer cost or selling price – Treatment of expenses which cannot be allocated.

UNIT 5:

Hire Purchase and Installment Purchase: Meaning and legal position – Accounting aspects – default and repossession – Hire purchase trading account – Installment system – Accounting aspect. Sale or Return: Meaning and legal position – Accounting procedure under different circumstances.

BOOKS FOR STUDY AND REFERENCE:

Gupta R.L. Advanced Accountancy, S.Chand, Delhi.
Agarwala,A.N.,Higher Science of Accountancy, Kitab Mahal, Allahabad.
Gillespie, Accounting System, Procedures & Method, Prentice Hall India Ltd., Delhi.
Prescribed by the BOS in Commerce to be offered by the Dept. of Commerce.
(Ref: B.Sc.,(Non-Semester)-Regulations and Syllabuses – 1992- page 224-225)

MAJOR PRACTICAL I BASED ON MAJOR PAPER – I & PAPER – II

NOTE:Record 20 Marks , Practical Examination 60 Marks and Viva – Voce 20 Marks

Duration of the Examination :Three Hours.
Five questions are to be set without omitting any unit.
Candidates are to answer any three questions.
All questions carry equal marks.
(Outline of the exercises to be carried out)

UNIT I :

Construction of univariate and bivariate frequency distributions with samples of size not exceeding 200.

a) Diagrammatic and Graphical representation of data and Frequency distribution – Pie diagram , Bar diagram , Multiple Bar diagrams , Sub divided Bar diagrams, percentage bar diagrams, Line diagram, Frequency polygon , Frequency curve , Histogram , Ogives , Lorenz curves .

UNIT 2:

b) Numerical computations of measures of location and dispersion (absolute and relative) moments, measures of Skewness and kurtosis for both grouped and ungrouped data – Sheppard's correction for grouped data.

UNIT 3:

Construction of contingency tables , testing the consistency of data . Computations of various measures of association of attributes.

e) Fitting of first degree, second degree and exponential curves by method of least squares.

UNIT 4:

Computation of correlation coefficient , regression lines for raw and grouped data. Rank correlation coefficient , linear predictions .

g) Computation of partial regression , partial correlation and multiple correlation coefficients given total correlation coefficients(involving three variables)

UNIT 5:

Algebraic operations on matrices of order $p \times q$ ($p, q \leq 4$)

Determination of the rank of a matrix of order $p \times q$ ($p, q \leq 4$)

Inverse of a non – singular matrix of third and fourth order by (1) Sweep out method and by (2) partitioning of matrices.

Determination of a solvability of a set of linear equations and identification of Possible solutions.

Determination of characteristics roots (only real) and characteristic vectors of Second and third order square matrices.

MAJOR PRACTICAL II BASED ON MAJOR PAPER – I & PAPER – II

NOTE:

Record 20 Marks , Practical Examination 60 Marks and Viva –voce 20 Marks

Duration of the Examination: Three Hours.

Five questions are to be set without omitting any unit.

Candidates are to answer any three questions.

All questions carry equal marks.

(Outline of the exercises to be carried out)

UNIT 1:

Fitting of distributions and testing goodness of fit for binomial , Poisson Negative Binomial and Normal.

UNIT 2:

Drawing random samples of size not exceeding 25 from (1) Binomial (2) Poisson (3) Uniform distribution , (4) Cauchy distribution (5) Normal distribution and (6) Exponential with known mean and variance using random number tables. Numerical problems involving derivation of marginal and conditional probability density function and related measures of moments.

UNIT 3:

Estimation of parameters by the method of (1) Moments and (2) maximum likelihood (3) Method of minimum chi-square and (4) Method of least square with regard to discrete and continuous distributions.

UNIT 4:

Confidence intervals for proportions, means, variance and variance ratio .

UNIT 5:

Standard asymptotic and exact tests of significance with regard to proportion, mean, variance, coefficient of correlation, regression coefficients, partial and multiple correlation coefficients. Independence tests by contingency tables of order (p x q) (p,q =5)

MAJOR PRACTICAL III

NOTE:

Record 20 Marks , Practical Examination 60 Marks and Viva-voce 20 Marks

Duration of Examination: Three Hours.

Five Questions are to be set without omitting any unit.

Candidates are to answer any three questions.

All questions carry equal marks.

(Outline of the exercises to be carried out)

UNIT 1:

Critical regions and power curves concerning testing of hypothesis on the parameters of the following distributions, when alternatives are one sided as well as two sided Binomial distributions, Normal distributions, Exponential and Cauchy distributions. Non parametric tests – sign test-Median test-Run test-Mean-Whitney test (one and two sample problems). Wilcoxon signed rank test. Kolmogorov Smirnov one sample test, Kruskal Wallis test.

UNIT 2:

(Design of experiment): Analysis of variance – one way and two way classification Analysis of CRD, RBD, and LSD layouts and their efficiency, Missing plot techniques in RBD and LSD, Multiple range test, Analysis of covariance- one way and two way classification with one concomitant variable. Analysis of factorial experiments of 2^n series for $n=2(1)5$ with and without confounding. 3^2 factorial experiments. Analysis of split plot design in RBD layout.

UNIT 3:

(Sampling techniques): Selection of sample and determination of sample size-simple random sampling with or without replacement-estimation of population mean and variance and variance of the estimator, stratified random sampling-allocations, Estimation of mean and variance of populations and variance of the estimator of mean under proportional allocation and optimum allocation. Gain due to stratification, systematic sampling, ratio and regression methods of estimation for population mean and total based on simple random sampling.

UNIT 4:

(Statistical Quality Control): Control charts for attribute and variables- \bar{x} , R, p, np and C chart-OC, AOQ, ATI curves for single, double and sequential sampling plans.

UNIT 5:

(Time series): Fitting of linear and quadratic secular trend polynomial by the method of least squares, estimating the trend by moving average method, determination of seasonal indices, application of variate difference method to determine the degree of secular trend polynomial to be fitted in and to estimate the variance of the random component.

(Index numbers): Construction of fixed and chain base index numbers Laspeyres, Paasche's, Bowley's, Fisher's and Marshall-Edgeworth index numbers construction of cost of living index numbers.

MAJOR PRACTICAL IV

NOTE: Record 20 Marks, Practical Examination 60 Marks and Viva-voce 20 Marks

Duration of the Examination: Three Hours.

Two questions have to be set with internal choice. Each carries 30 Marks.

- Write and test run the program in C++ for the following problems.
- Find the mean and median of ungrouped data.
- Find the mean and standard deviation of ungrouped data.
- Form the frequency distribution with k classes given N observations with k known.
- Find the Skewness and Kurtosis of an Empirical distribution.
- Fitting of Binomial and Poisson Distribution for the given frequency distribution and test the goodness of fit.
- Regression and Correlation Coefficient .
- Chi-square test for (i) Goodness of fit (ii) Independence of attributes.
- Analysis of variance for one-way and two-way classifications.
- Matrix addition and subtractions.
- Matrix multiplication.
- Inverse square matrix and solution of simultaneous equations.
- Counting number of words in a given sequence, palindrome.
- Generation of fibonacci sequence.
- Single and two sample t tests, paired t test.
- F test for testing the equality of two population variances based on samples from these.

ALLIED III: PROGRAMMING IN 'C'

UNIT 1:

Introduction to C, variables, Data types- Declarations, Type conversions, increment and decrement operators, Bitwise, Logical and Assignment operators.

UNIT 2:

Expression and Conditional Expressions, Control structures, If- Else, SWITCH, WHILE, FOR and DO WHILE Loop structures. Break continue, GO o's and Label Statements. Function, function returning, Non-integers. Function arguments- Static and register variables.

UNIT 3:

Arrays and Strings- Array Declaration Multi dimensional Array Strings/ Character Arrays, Array initialization- Pointers and Addresses. Pointers and Arrays- Pointer to functions.

UNIT 4:

Structures and functions, Array of structures, Fields, Unions- type definition standard input and output- formatted output- output- Access to the standard library.

UNIT 5:

File Access, File handling in C- File descriptions- Error handling- “Low level i/o- Read and Write”. Open, Create, Close, Unlink- Random Access- seek and lseek.

BOOKS FOR STUDY:

Balaguruswamy : Programming in C

BOOKS FOR REFERENCE:

Byron, S. Gottfried (1990): Programming with C. Schaum’s outline series, Mc Graw Hill, International Edition.

Bruce, H. Hunter: Introduction to ‘C’.

Jayasri, J.(1993): The ‘C’ language trainees with C graphics and C++, New Age International Pvt. Ltd. Publishers, Madras.

Structures and functions, Arrays of structures, Fields, Unions-type definition standard input and output- formatted output- output- Access to the standard library.

ALLIED IV : NUMERICAL METHODS

UNIT 1:

Finite differences –forward and backward differences operators E and delta, and their basic properties- interpolation with equal intervals-Newton’s forward and backward differences formulae-simple problems.

UNIT 2:

Interpolation with unequal intervals- divided differences and their properties-Newton’s divided differences formula-Lagrange’s formula- simple problems.

UNIT 3:

Central difference interpolation formula-Gauss forward and backward differences formulae-Stirling, Bessel’s, Everett’s central difference formula.

UNIT 4:

Inverse interpolation – Lagrange’s method – iteration of successive approximation method – simple – problems .
Numerical differentiation – Numerical differentiation upto 2nd order only – simple problems.

UNIT 5:

Numerical integration – trapezoidal rule – Simpsons 1/3 and 3/8th rules-Weddle's rule - Euler's summation formula. Numerical methods of solution of ordinary differential equations – Taylor's series method – Euler's method and Runga kutta upto 2nd order – simple problems only.

BOOKS FOR STUDY:

Gupta p.p and Malik G.S .:Calculus of finite differences and numerical analysis.

BOOKS FOR REFERENCES:

Whittakar and Robinson: Calculus of observations ,Blackie and sons.
Scarborough ,B.:Numerical Mathematical Analysis,OUP.
Sastry,S.S .:Introductory method of numerical analysis,P.H.I.
Ramasamy ,M.M. and Palaniappan,K.: Numerical mathematics.
Balasubramanian: Numerical mathematics,Vol.II and I.

ALLIED II PRACTICAL

NUMERICAL METHODS AND PROGRAMMING IN 'C'

Time : 3 hours

(Practical 40 + Record 10)

Max.Marks:50

Two question with internal choice.

First question based on Unit 1 and second question based on Unit 2.

UNIT 1 ('C')

Solution of polynomial equation – Newton Rapson method. Solution of system of simultaneous equation – Gauss elimination method. Lagrange interpolation.Numerical integration by Trapezodial, Simpson's and Weddle's rules. Calculate the value of π (upto five significance decimal places given the infinite series).($\pi/4=1-1/3+1/5-1/7+\dots$)
Check the accuracy of the built in functions Sin(x),Cos(x),(x in radians) e^x,e^{-x} .Evaluate these functions by summing the given series, by setting up a loop in which each successive terms is obtained from previous terms until the term is smaller than the desired error.(eg. .001,.0001,00001)
Generation of Fibonacci sequence.
Matrix addition,multiplication, inverse, transpose, determinant of square matrix.
Solution of simultaneous equation by using Iterative methods and by using inverse .

UNIT 2:

Measures of central tendency-Measures of dispersion . Correlation coefficient,regression coefficient , fitting of straight line and fitting of distributions-Binomial,Poisson.Tests of significance based on t,F,chi-square and normal distributions.

APPLICATION ORIENTED SUBJECT-I

DEMOGRAPHY AND ACTUARIAL STATISTICS

UNIT 1:

Sources of demographic data - civil registration – Population census – Population registers – Errors in demographic data – Methods of improvement. Fertility and Mortality measurements – General and specific rates – Standardised rates – age pyramid of sex composition gross and net reproduction rates.

UNIT 2:

Life table- Structure – Construction – Relationship between the function of a life table – Abridged life table – Population estimation – Growth rates – Gross and net reproduction rates – Component method a population projection – Forces of mortality – Gompertz and Makcham law – logistic curve fitting and its uses.

UNIT 3:

Elements of compound interest (nominal and effective rate of interest; annuities certain; present values; accumulated amounts ; deferred annuities). The functions included in compound interest and their uses. Redemption of Loans , Sinking Funds. The average yield on the Life Fund of an assurance office .

UNIT 4:

Premiums; general principles, natural premiums , office premiums, loading for expenses with and without profit premiums, adequacy of premiums , relative consistency.

UNIT 5:

Life Office Valuations; General Principles, Policy values, retrospective and prospective methods of valuations of liabilities (net premium, gross premium and bonus reserve; sources of surplus, principle methods of surplus.

NOTE: Numeric problems can be asked in the theory question paper)

BOOKS FOR STUDY AND REFERENCE:

Federation of Insurance Institutes Study Courses: Mathematical Basis of Life Assurance, F.I.21 (Published by the Federation of Insurance Institutes , Bombay).

Supplement to Federation of Insurance Institutes Study Courses: F.I.21 (Published by the Federation of Insurance Institutes , Bombay).

Donald, D.W.A. (1970) - Compound interest and annuities. Heinemann, London.

Benjamin, B. & Pollard, J.H. (1980): Analysis of Mortality and other Actuarial

Statistics, 2/e, Heinemann, London. Elandt-Johnson, R.C. & Johnson N.L. (1980): Survival models & Data Analysis. John Wiley.

Neil, A. (1977): Life Contingencies, Heinemann, London.

Barcklay,G.W.(1959): Techniques of Population Analysis.
Benjamin,B.(1968): Vital Statistics, Allen & Unwin.
Srivastava,O.s.(1983): A text book of Demography, Vikas Publishing.
Bogue,Donald,J.: Principles of Demography,(1976)John Wiley,New York.
Studies on Consumer behaviour,Monographed Series,Indian Statistical Institutes.

APPLICATION ORINETED SUBJECT-I

STOCHASTIC PROCESSES AND THEIR APPLICATIONS

UNIT 1:

Basic concepts: definitions and examples of stochastic process, classification of general stochastic processes into discrete/continuous time, discrete/continous state spaces, type of stochastic processes, elementary problems.

UNIT 2:

Markov chains: definition and examples of Markov chain, transition probability matrix, classification of states, recurrence and simple problems.

UNIT 3:

Basic limit theorem of Markov chain (statement only), stationary probability distribution, applications.

UNIT 4:

Continuous Time Markov chain: pure birth process and Poisson process, birth and death process, problems.

UNIT 5:

Branching process:Definition and examples of discrete time branching process,probability generating function,mean and variance,probability of extinction,problems.

BOOKS FOR REFERENCE:

Karlin,S. and Taylor,H.M.(1975):A first course in Stochastic processes,Academic press.
Hoel,P.mG and Stone,C.J.(1991):Introduction to Stochastic processes,Universal Book Stall.
Parzen,E.(1962):Stochastic processes,Prentice Hall.
Cinlar,E.(1975) Introduction to Stochastic processes,Prentice Hall.
Adke,S.R.. and Manjunath,S.M.(1984):An introduction to finite Markov Processes,Wiley Eastern.
Medhi,J.(1996):Stochastic processes,New Age International(p) Ltd.
Ross,S.M.(1983): Stochastic processes,John Wiley.
Taylor,H.M. and Karlin,S.(1999):Stochastic Modelling,Academic press.

LIST OF ALLIED SUBJECTS IN STATISTICS FOR B.Sc DEGREE COURSES

For B.Sc.Branch I-Mathematics

**ALLIED:PAPER I-MATHEMATICAL STATISTICS-I
PAPER II- MATHEMATICAL STATISTICS-I**

For B.Sc.V.Botony Br. XII Computer Science & B.Sc.Geology

**ALLIED :PAPER I-STATISTICAL METHODS ND THEIR APPLICATIONS-I
PAPER I-STATISTICAL METHODS ND THEIR APPLICATIONS-II**

For B.Sc.Br.VIII Geography

**ALLIED:PAPER I-APPLIED STATISTICS-I
PAPER II- APPLIED STATISTICS-II**

For B.Sc. Br,VI Zoology/Bio-chemistry

**ALLIED PAPER I-BIO- STATISTICS -I
PAPER II-BIO- STATISTICS -I**

SYLLABI FOR ALLIED SUBJECT IN STATISTICS FOR B.Sc./B.A. DEGREES

For B.Sc. Branch I-Mathematics

ALLIED: PAPER I-MATHEMATICAL STATISTICS-I

UNIT 1:

Concept of sample space-Events,definition of Probability(classical,statistical & axiomatic)-addition and multiplication law of probability-independence-conditional probability-Bayes' theorem-simple problems.

UNIT 2:

Random variables(discrete and continous) Distribution function-Expected values & moments-Moment generating function-probability generating function-examples.

UNIT 3:

Charecteristic function-Uniqueness and Inversion theorems(statements and applications only) cumulants,Chebychev's inequality-simple problems.

UNIT 4:

Concept of bivariate distribution-Correlation and regression-Linear prediction-Rank correlation coefficient-Concepts of Partial and Multiple Correlation coefficients-Simple problems.

UNIT 5:

Standard Distributions-Binomial, Poisson, Normal and Uniform distributions-Geometric, Exponential, Gamma and Beta distributions. Inter relationship between distributions.

BOOKS FOR STUDY AND REFERENCE:

Hogg,R.V. & Craig,A.T.:Introduction to Mathematical Statistics,Macmillan.
Mood A.M. & Graybill F.A. & Boes,D.G.:Introduction to theory of Statistics,McGraw Hill.
Snedecor, G.W. & Cochran W.G.:Statistical Methods,Oxford and IBH.
Hoel P.G.(1971):Introduction to Mathematical Statistics,Wiley.
Wilks,S.S.:Elementary Statistical Analysis,Oxford and IBH.

ALLIED:PAPER II-MATHEMATICAL STATISTICS-II

UNIT 1:

Sampling Theory-Sampling distributions-Concepts of standard error-Sampling distribution based on Normal distribution:t,Chi square and F distributions..

UNIT 2:

Point estimation-concepts of unbiasedness,consistency,efficiency and sufficiency-Cramer Rao inequality-methods of estimation:Maximum likelihood,moments and minimum Chi-square and their properties.(statements only).

UNIT 3:

Interval estimation-Confidence Interval for population mean,proportions and variance based on Normal,t and Chi-square,F.Test of significance-Standard error-large sample tests.Exact test based in t,Chi-square and F distributions with respect to population mean,proportion,variance and correlation coefficient.Test of independence of attributes based on contingency tables-Goodness of fit tests based on Chi-square.

UNIT 4:

Test of significance-Standard Error-Large sample tests.Exact test based on t,Chi-square and F distribution with respect to population mean,proportion,variance and correlation coefficient.Theory of attributes-Test of independence of attributes based on contingency table--Goodness of fit tests based on Chi-square.

UNIT 5:

Test of hypothesis:Type I and Type II errors-power of test-Neymann Pearson Lemma-Likelihood ratio test-Concepts of most powerful test-(statement and result only).simple problems.

BOOKS FOR STUDY AND REFERENCE:

Hogg,R.V. & Craig,A.T.:Introduction to Mathematical Statistics,Macmillan.
Mood A.M. & Graybill F.A. & Boes,D.G.:Introduction to theory of Statistics,McGraw Hill.
Snedecor, G.W. & Cochran W.G.:Statistical Methods,Oxford and IBH.
Hoel P.G.(1971):Introduction to Mathematical Statistics,Wiley.
Wilks,S.S.:Elementary Statistical Analysis,Oxford and IBH.

PRACTICALS for ALLIED MATHEMATICAL STATISTICS I & II (Max. 50 Marks)

NOTE:

Use of scientific calculators may be permitted for Mathematical Statistics for practical examination.Statistical and Mathematical tables are to be provided to the students at the examination hall.

Record of practical:-10 marks

Duration-3 Hrs.

1. Construction of univariate and bivariate distributions with samples of size not exceeding 200.
2. Diagrammatic and graphical representation of data and frequency distribution.
3. Cumulative frequency distribution-Ogives-Lorenz curve.
4. Measure of location and dispersion.(absolute and relative)
5. Numerical problems involving derivations of marginal and conditional distributions and related measures of moments.
6. Fitting of Binomial, Poisson and Normal distributions and tests of goodness of fit.
7. Curve fitting by the method of least squares.
(i) $y = ax + b$; (ii) $y = ax^2 + bx + c$; (iii) $y = ae^{bx}$; (iv) $y = ax^b$
8. Computation of correlation coefficients and regression lines for raw and group data. Rank correlation coefficient.
9. Asymptotic and exact tests of significance with regard to population mean, proportion, variance and coefficient of correlation.
10. Confidence Interval based on Normal, t and Chi-square statistics.

For B.Sc.Br.V Botony Br.XII Computer Science & B.Sc. Geology
ALLIED:PAPER I-STATISTICAL METHODS AND THEIR APPLICATIONS-I

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in physical, natural and earth sciences.

UNIT 1:

Nature and scope of statistical methods and their limitations-Classification, tabulation and diagrammatic representation of various types of statistical data-Frequency curve and Ogives-graphical determination of percentiles, quantiles and their uses, Lorenz curve.

UNIT 2 :

Measures of location-arithmetic mean, median, mode, geometric mean, harmonic mean and their properties-merits and demerits.

UNIT 3:

Measures of dispersion-Range, mean deviation, quartile deviation, standard deviation, coefficient of variation, skewness and kurtosis-and their properties.

UNIT 4:

Probability of an event-finitely additive probability addition and multiplication theorems-Independence of events-conditional probability-Bayes' theorem.

UNIT 5:

Concept of random variables-mathematical expectation-moments of random variables(raw and central moments)-Moment generating function-Chebycheff's inequality-simple problems.

BOOKS FOR STUDY AND REFERENCE:

Moore, E.B.: Elements of Statistics-Prentice Hall.

Wilks, S.S.: elementary Statistical Analysis-Oxford and IBH.

Snedecor, G.W. & Cochran, W.G.: Statistical Methods, Oxford and IBH.

Simpson and Kafka: Basic Statistics.

Burr, I.W.: Applied Statistical methods, Academic press

Croxton, F.E. and Cowden, D.J.: Applied General Statistics, Prentice Hall
Ostleo, B.: Statistics in Research, Oxford & IBH.

ALLIED : PAPER II-STATISTICAL METHODS AND THEIR APPLICATIONS

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in physical, natural and earth sciences.

UNIT 1:

Bivariate frequency table and its uses-scatter diagram-Regression lines-linear prediction-Rank correlation coefficients-curve fitting by the method of least squares.

UNIT 2:

Standard distributions-Binomial, Poisson & Normal distributions-fitting of distributions.

UNIT 3:

Concept of sampling distributions-S.E.-test of significance based on t, Chi-square and F-distributions with respect to mean, variance and correlation coefficient. Theory of attributes and test of independence in contingency table.

UNIT 4:

Sampling from finite population-Simple random sampling, stratified and systematic random sampling procedures-Estimation mean and total and their S.E. Concept of sampling and non sampling errors.

UNIT 5:

Principle of scientific experiments-Randomization, replication and local control. Analysis of variance-one way and two way classification of CRD & RBD, LSD designs. Concept of factorial experiments (without confounding).

BOOKS FOR STUDY AND REFERENCE:

Mode, E.B.: Elements of Statistics-Prentice Hall.
Wilks, S.S.: elementary Statistical Analysis-Oxford and IBH.
Snedecor, G.W. & Cochran, W.G.: Statistical Methods, Oxford and IBH.
Simpson and Kafka: Basic Statistics.
Burr, I.W.: Applied Statistical methods, Academic press
Croxtton, F.E. and Cowden, D.J.: Applied General Statistics, Prentice Hall
Ostleo, B.: Statistics in Research, Oxford & IBH.

PRACTICALS for ALLIED STATISTICAL METHODS AND THEIR APPLICATIONS I & II (Max. 50 marks)

Note:

Use of scientific calculators may be permitted for Mathematical Statistics for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

Record of practical-10 Marks

Duration: 3 hrs

Practical Exam. 40 Marks

1. Construction of univariate and bivariate frequency distributions with samples of size not exceeding 200.
2. Diagrammatic and graphical representation of data and frequency distribution.

3. Cumulative frequency distribution - Ogives – Lorenz curve.
4. Measure of location and dispersion (absolute and relative).
5. Numerical problem involving derivation of marginal and conditional distributions and related measures of moments.
6. Fitting of Binomial, Poisson and Normal distribution and Test of goodness of fit.
7. Curve fitting by the method of least squares.
 - (i) $y = ax + b$ (ii) $y = ax^2 + bx + c$ (iii) $y = ae^{bx}$ (iv) $y = ax^b$
8. Computation of correlation coefficients and regression lines for raw and grouped data. Rank correlation coefficient.
9. Asymptotic and exact tests of significance with regard to population mean, proportion, variance and coefficient of correlation.
10. Test for independence of attributes based on contingency table.
11. Confidence Interval based on Normal, t and Chi – square statistics.

For B.Sc Br. V Botany Br. XII Computer Science & B.Sc Geology
ALLIED:PAPER I – STATISTICAL METHODS AND THEIR APPLICATIONS -I

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in physical, natural and earth sciences.

UNIT 1:

Nature and scope of statistical methods and their limitations – Classification, tabulation and diagrammatic representation of various types of statistical data – Frequency curves and Ogives – Graphical determination of percentiles, quartiles and their uses, Lorenz curves.

UNIT 2:

Measures of location – Arithmetic mean, median, mode, Geometric mean, Harmonic mean and their properties – merits and demerits.

UNIT 3:

Measures of dispersion – Range, mean deviation, quartile deviation, standard deviation, coefficient of variation, skewness and kurtosis – and their properties.

UNIT 4:

Probability of an event – Finitely additive probability space addition and multiplication theorems – Independence of events – conditional probability – Bayes’ theorem.

UNIT 5:

Concepts of random variable – Mathematical expectations – Moments of random variable (raw and central moments) – Moment generating function – Chebycheff’s inequality – simple problems.

Books for Study and References:

- Mode, E.B.: Elements of Statistics – Prentice Hall
 Wilks, S.S.: Elementary Statistical Analysis – Oxford and IBH

Snedecor, G.W., & Cochran, W.G.: Statistical Methods, Oxford and IBH

Simpson and Kafka: Basic Statistics

Burr, I.W.: Applied Statistical Methods, Academic Press.

Croxton, F.E. and Cowden, D.J.: Applied General Statistics, Prentice Hall

Ostleo, B.: Statistics in Research, Oxford & IBH

ALLIED: PAPER II – STATISTICAL METHODS AND THEIR APPLICATIONS II

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in physical, natural and earth sciences.

UNIT 1:

Bivariate frequency table and its uses – scatter diagram – Regression lines-linear prediction- Rank correlation coefficient-curve fitting by the method of least squares.

UNIT 2:

Standard distribution - Binomial, Poisson and Normal distributions - Fitting of distributions.

UNIT 3:

Concept of sampling distributions - standard error - Tests of significance based on t Chi-square and F distributions with respect to mean, variance and correlation coefficient. Theory of attributes and tests of independence in contingency table

UNIT 4:

Sampling from finite population - Simple random sampling, Stratified and systematic random sampling procedures – Estimation mean and total and their standard errors. Concepts of sampling and non – sampling errors.

UNIT 5:

Principle of scientific experiments – Randomization, replication and local control Analysis of variance – One way classification Analysis of CRD and RBD – Latin square designs. Concepts of factorial experiments (without confounding).

Books for Study and References:

Mode, E.B.: Elements of Statistics – Prentice Hall

Wilks, S.S.: Elementary Statistical Analysis – Oxford and IBH

Snedecor, G.W., & Cochran, W.G.: Statistical Methods, Oxford and IBH

Simpson and Kafka: Basic Statistics

Burr, I.W.: Applied Statistical Methods, Academic Press.

Croxton, F.E. and Cowden, D.J.: Applied General Statistics, Prentice Hall

Ostleo, B.: Statistics in Research, Oxford & IBH

PRACTICALS for ALLIED

STATISTICAL METHODS AND THEIR APPLICATIONS I & II

(Max: 50 Marks)

NOTE:

Use of scientific calculator may be permitted for Mathematical Statistics for practical examination. Statistical and Mathematical table are to be provided to the students at the examination hall.

Record of practical – 10 Marks

Practical Exam: 40 Marks

Duration : 3 Hours.

1. Construction of univariate and bivariate frequency distribution with samples of size not proceeding 200.
2. Digrammatic and graphical representation of various statistical data and frequency distributions.
3. Cumulative frequency curve and Lorenz curves.
4. Computation of various measures of location, dispersion, moments, skewness and kurtosis.
5. Curve fitting by the method of least squares.
(i) $y = ax + b$; (ii) $y = ax^2 + bx + c$; (iii) $y = ae^{bx}$; (iv) $y = ax^b$
6. Computation of correlation coefficients – regression lines (raw data and grouped data) – correlation coefficients.
7. Fitting of Binomial, Poisson and Normal distributions and testing goodness of fit.
8. Large sample test – test for proportions.
9. Exact test based on t, Chi – square and F distributions with regard to mean, variance and correlation coefficients.
10. Estimation of mean and r total and their standard errors in simple, stratified and systematic random sampling procedure.
11. Analysis of variance – one-way and two-way classifications.
12. Analysis of CRD, RBD and Latin square designs.

For B.Sc. Br. VIII Geography and Br. Geology
ALLIED : PAPER I – APPLIED STATISTICS – I

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in physical, natural and earth sciences.

UNIT 1:

Nature and scope of statistical methods and their limitations and their applications in Geography – spatial data and statistical methods classification, tabulation and diagrammatic representation of various type of statistical data – frequency curves and Ogives – Graphical determination of percentiles, quartiles and their uses, Lorenz curve.

UNIT 2:

Measures of location – Arithmetic mean, median, mode, Geometric mean, Harmonic mean and their properties – merits and demerits.

UNIT 3:

Measures of dispersion – Range, mean deviation, quartile deviation, standard deviation, coefficient of variation, skewness and kurtosis – and their properties.

UNIT 4:

Probability of an event – Finitely additive probability space addition and multiplication theorems – Independence of events – conditional probability – Bayes' theorem.

UNIT 5:

Concepts of random variable – Distribution function – Mathematical Expectation – Moments of random variable –

Moment generating function – simple problem.

Books for Study:

Wonnacott, R.J. & Wonnacott, T.H. (1985): Introductory Statistics. Fourth edition John Wiley and Sons.

David Ebdon (1977): Statistics in Geography – A practical approach Basil Blackwell, Oxford.

Gregory. S. (1964): Statistical Methods and Geographer, Longman, London.

Books for Reference:

Snedecor, G.W., and Cochran, W.G.: Statistical Methods, Oxford and IBH.

Burr, I. W.: Applied Statistical Methods, Academic Press.

Aslam Mohamood and Moonis Raza, (1977): Statistical methods in Geographical studies.

Rajesh publications, New Delhi.

Hammond.R. and Mc. Cullagh.p. (1974): Quantitative Techniques in Geotaphy; An Introduction, Clarendon Press, Oxford.

Science in Geography Series: (I-IV) Oxford University Press, London:

(I) Development of Geographical methods (II) Data Collection

(III) Data Description & Presentation (IV) Data use and interpretation.

ALLIED: PAPER II – APPLIED STATISTICS – II

Note: The emphasis is solely upon the applicational understanding and practice of statistical methods, with specific reference to problems in earth sciences.

UNIT 1:

Bivariate frequency table and its uses – scatter diagram – Regression lines – linear prediction – Rank correlation coefficient – curve fitting by the method of least squares.

UNIT 2:

Standard deviation – Binomial, Poisson and Normal distributions –Fitting of the distributions.

UNIT 3:

Concept of sampling distributions – standard error – Tests of significance based on t, Chi – square and F distributions with respect to mean, variance and correlation coefficient, Theory of attributes and tests of independence in contingency tables.

UNIT 4:

Sampling from finite population – Simple random sampling. Stratified and systematic random sampling procedures – Estimation mean and total and their standard errors. Concept of sampling and non-sampling errors.

UNIT 5:

Principles of scientific experiments – Randomization, replication and local control – Analysis of variance – One way and Two way classifications – Analysis of CRD and RBD – Latin square design.

Books for Study:

Wonnacott, R.J. & Wonnacott, T.H. (1985): Introductory Statistics. Fourth edition John Wiley and Sons.
David Ebdon (1977): Statistics in Geography – A practical approach Basil Blackwell, Oxford.
Gregory. S. (1964): Statistical Methods and Geographer, Longman, London.

Books for Reference:

Snedecor, G.W., and Cochran, W.G.: Statistical Methods, Oxford and IBH.
Burr, I. W.: Applied Statistical Methods, Academic Press.
Aslam Mohamood and Moonis Raza, (1977): Statistical methods in Geographical studies.
Rajesh publications, New Delhi.
Hammond.R. and Mc. Cullagh.p. (1974): Quantitative Techniques in Geogtaphy; An Introduction, Clarendon Press, Oxford.
Science in Geography Series: (I-Iv) Oxford University Press, London:
(I) Development of Geographical methods (II) Data Collection
(III) Data Description & Presentation (IV) Data use and interpretation.

PRACTICALS for ALLIED SUBJECT APPLIED STATISTICS I & II

NOTE:

Use of scientific calculator may be permitted for Mathematical Statistics for practical examintion. Statistical and Mathematical tables are to be provided to the students at the examination hall.

Record of practical – 10 Marks

Practical Exam. 40 Marks

Duration : 3 Hrs.

1. Construction of Univariate distribution with sample size not exceeding 200 Diagrammatic & Statistical representation of data.
2. Numerical computation of measures of central tendency – Measures of Dispersion (relative and absolute) – Measures of Skewness.
3. Fitting of Binomial and Poisson distributions and testing of goodness of fit.
4. Computation of correlation coefficients – regression lines – rank correlation coefficients
5. Curve fitting by the method of Least – Squares.
(i) $y = ax + b$; (ii) $y = ax^2 + bx + c$; (iii) $y = ae^{bx}$; (iv) $y = ax^b$
6. Asymptotic and exact tests based on Normal, t and F distributions.
7. Chi – square test for independence of attributes and its applications to Biological studies.
8. Analysis of variance – one-way and Two-way classifications.
9. Analysis of CRD,RBD and LSD.
10. Non-parametric tests.

For B.Sc. Br. VI Zoology/Bio-Chemistry

ALLIED: PAPER I – BIO-STATISTICS – I

UNIT 1:

Nature and scope of statistical methods and their limitations – compilation, classification and tabulation of statistical data – uses of frequency table – Ogives and Frequency curves.

UNIT 2:

Measures of location – Aithmetic mean, median, mode, Geometric mean, Harmonic Mean and their popteries – merits and demerits.

UNIT 3:

Measures of dispersion – Range, mean deviation, quartile deviation, quartile deviation, coefficient of variation, skewness and kurtosis – and their properties.

UNIT 4:

Events and sets – sample space – concept of probability – addition and multiplication theorem on probability – conditional probability and independence of events.

UNIT 5:

Bivariate frequency table and its uses – Covariance and coefficient of correlation – Scatter diagram – regression lines – linear prediction – curve fitting by the method of least squares.

Books for study and reference:

Sunder Rao-Bio-Statistics

Snedecor, G.W. and Cochran, W.G.-Statistical Methods, Oxford press, & IBH.

Zar, J. –Bio-statistical Analysis, Prentice Hall of India.

Lewis, A.E.(1971)-Bio-statistics

Scholer, W.C.(1969)-Statistics for Biological Sciences, Addison Wesley.

Bancrof, H.:Introduction to Bio-statistics

Sokal and Rohlf-Biometry, 2nd ed.,(1982)

Daniel, W. Bio-statistics, Wiley publishing company.

ALLIED: PAPER II – BIO-STATISTICS-II**UNIT 1**

Concepts of random variables and distributions – Standard distributions – Binomial, Poisson and Normal distributions and their applications.

UNIT 2

Concepts of sampling distributions – standard error – asymptotic and exact tests based on Normal, t, Chi-square and F distributions.

UNIT 3

Principles of Scientific experimentation – randomization, replication and local control – Analysis of Variance – One way and Two way classifications CRD,RBD,LSD.

UNIT 4

Non-parametric tests: Run,Median,Sign,Mann-Whitney, and Wilcoxon-signed rank test.

UNIT 5

Introduction to Vital Statistics: Simple Mortality and Fertility rate – Birth rate and Life tables.

Books for study and reference:

Sunder Rao-Bio-Statistics

Snedecor, G.W. and Cochran, W.G.-Statistical Methods, Oxford press, & IBH.

Zar, J. –Bio-statistical Analysis, Prentice Hall of India.

Lewis, A.E.(1971)-Bio-statistics

Scholer, W.C.(1969)-Statistics for Biological Sciences, Addison Wesley.

Bancrof, H.:Introduction to Bio-statistics

Sokal and Rohlf-Biometry, 2nd ed.,(1982)

Daniel, W. Bio-statistics, Wiley publishing company.

PRACTICALS FOR ALLIED

ALLIED: BIO-STATISTICS I & II

NOTE:

Use of scientific calculator may be permitted for Mathematical Statistics for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

1. Construction of univariate distribution with sample size not exceeding 200.
Diagrammatic & statistical representation of data.
2. Numerical computation of measures of central tendency. Measures of Dispersion (relative and absolute)-Measures of Skewness.
3. Fitting of Binomial and Poisson distributions and testing of goodness of fit.
4. Computations of correlation coefficients – regression lines – rank correlation coefficients.
5. Curve fitting by the method of Least –squares
(i) $y = ax + b$; (ii) $y = ax^2 + bx + c$; (iii) $y = ae^{bx}$; (iv) $y = a x^b$
6. Asymptotic and exact test based on Normal , t and F distributions.
7. Chi-square test for independence of attributes and its applications to biological studies.
8. Analysis of variance – One way and two – way classifications.
9. Analysis of CRD, RBD and LSD.
10. Non-parametric test.