B.Sc. STATISTICS

CURRICULUM

Ist - Year

PAPERS	Subject	Maximum Marks	Exam Hours
1	Hindi – I	**100**	**3**
2	English – I	**100**	**3**
3	Descriptive Statistics	**100**	**3**
4	Probability & Distributions	**100**	**3**
5	Allied Mathematics	**100**	**3**

IInd - Year

PAPERS	Subject	Maximum Marks	Exam Hours
1	Hindi – II	**100**	**3**
2	English – II	**100**	**3**
3	Sampling Techniques	**100**	**3**
4	Statistical Inference – I	**100**	**3**
5	Business Economics	**100**	**3**

III[rd] - Year

PAPERS	Subject	Maximum Marks	Exam Hours
1	Statistical Inference – II	**100**	**3**
2	Demography	**100**	**3**
3	Applied Statistics	**100**	**3**
4	Numerical Analysis and Fortran	**100**	**3**
5	Operation Research	**100**	**3**

SYLLABUS

I[st] - YEAR

HINDI- I

PAPER - 2

ENGLISH PAPER – I

Detailed Text

PROSE

1. In Prison – Jawaharlal Nehru
2. What is Science? – George Orwell
3. On Marriages – Nirad Chaudari

4. The Luncheon – N. Somerset Maugham
5. The Mourners – V. S. Naipaul
6. The Plane Crash – Juliane Koepcke
7. Better Late – R.K. Narayan

POETRY

1. Polonius' Advice t his Son – William Shakespeare
2. Every Town a Home Town - Kaniyan Purkunran
3. The Village Schoolmaster – Oliver Goldsmith
4. The Solitary Reaper – William Wordsworth
5. On his Blindness – John Milton
6. The Tyger – William Blake

Non-Detailed

Text : THE GIFTS AND OTHER STORIES abridged and simplified by Anthony Toyne – Oxford University Press, 1997.

The following stories

1. The Gifts – O. Henry
2. The Two Friends – Guy de Maupassant
3. The Bear Hunt – Leo Tolstoy
4. The Goblins and the Grave Digger – Charles Dickens
5. The Nightingale and the Rose – Oscar Wilde

GRAMMER

1. Articles and Prepositions
2. Infinitives and Gerunds
3. Five basic sentence patterns (SV SVC, SVO, SVOO, SVOC(A))

4. Arranging the component parts so as to form a sentence
5. Language work at the end of all lessons
6. Language work at the end of all lessons
7. Question Tag, Active and Passive Voice
8. Degrees of Comparison

COMPOSITION

1. Letter Writing (Formal and Informal)
2. Developing the hints
3. Comprehension
4. Writing Telegram
5. Completion of a passage
6. Précis Writing.

Paper – 3
DESCRIPTIVE STATISTICS

UNIT – I

Concepts of statistical population and a sample – Concepts of nominal ,ordinal, ratio and interval scales – Discrete and continuous data – Quantitiative and qualitative data – Primary and Secondary data – Methods of collection, Classification, Tabulation and Presentation of data – Diagrammatic and Graphical representations.

UNIT – II

Measures of central tendency; Arithmetic Mean, Median, Mode, Geometric Mean – Choice of an average – Properties of a good average. Measures of dispersion : Range, Quartile deviation, Mean deviation and Standard deviation – Lorenz curves.

Moments : Raw and central moments. Measures of skewness and kurtosis.

UNIT –III

Correlation : Types of correlation – Scatter diagram – coefficient of correlation – Spearmen's Rank Correlation coefficient – probable error – correlation ratio – correlation coefficient for a grouped data.

UNIT – IV

Curve fitting by the method of least squares : fitting linear, quadratic and non-linear equations reducible to linear equations. Association of attributes : Methods of studying association (Proportion method, Yules coefficient, Coefficient of Colligation).

UNIT – V

Regression analysis – Simple linear regression – Regression equations (raw and grouped data). Multiple linear regression equations – Concepts of partial and multiple correlation coefficient.

Reference:

1. Goon A.M. Gupta M.K and Dasgupta B. : Fundamentals of Statistics Vol.I,II.
2. Snedecor G.W. and Cochran W.G. : Statistical Methods.
3. Gupta C.B. and Vijay Gupta : An Introduction to Statistical Methods.

Paper – 4

PPROBABILITY & DISTRIBUTION

UNIT – I

Concepts of Random experiment – Sample space, Events, Algebra of events – Definition of Probability – Classical, Statistical and Axiomatic approach – Conditional

Probability – Independence of events – Addition and Multiplication Theroems – Baye's Theorem.

UNIT – II

Concept of random Variables – Probability mass and density functions. Distribution function – properties. Mathematical Expection – properties – Tchebycher's inequality and its applications.

UNIT – III

Moment generating functions – Cumulants – Probability generating functions – Characteristic functions and its properties – Discrete distribution – Binomial Poisson, Geometric, Negative Binomial, Hyper Geometric.

UNIT – IV

Continuous distribution : Uniform, Normal, Exponential, Cauchy, Gamma, Beta distributions, concepts of Longnomal, Pareto, Weibull distributions – Simple applications.

UNIT – V

Bivariate distribution : Distribution functions of bivariate random variable and its properties – probability manss and density function. Marginal and conditional distribution. Conditional expectation – concept of regression lines – Covariance, Correlation – Bivariate Normal distribution and its properties.

Books for Study :

1. Hogg R.V. and Craog A.T. (1972) : Introduction to Mathematical Statistics (3/e)

Reference:

1. Spiegal M.R. (1981) : Theory and Problems of Statistics . Schaum's Outline Series McGraw Hill.

Paper – 5

ALLIED MATHEMETICS

UNIT – I

Concept of sample space, events, Definitions of probability, concept of independent events, conditional events, conditional probability, Addition and Multiplication laws of probability, Boole's inequality, Bay's theorem.

UNIT – II

Random variable : Discrete and continuous distribution functions, Excepted value and moments, moment generating functions, characteristic functions, Tchebychev's inequality, statements of uniqueness theorem and inversion theorem on characteristic functions (concept only).

UNIT – III

Standard distribution : Binomial, Poisson, Normal and Uniform distributions, Definitions of Gamma and Beta distributions.

UNIT – IV

Exact sampling distributions : Sampling distributions of statistics t, Chi-Square and F distributions, Relationship between them.

UNIT – V

Bivariate distributions : Concept of bivariate, marginal and conditional distributions, concept of correlation and regression : Correlatiion coefficient, Rank correlation coefficient, simple linear regression, Regression lines, conept of artial and multiple correlation co-efficients. (restricted to 3 variables only).

Reference:

1. mathematical Statistics by V.K. Kapoor and S.C. Gupta.
2. Mathematical Statistics by Kapoor and Sexana.

IInd – YEAR

Paper - 1

HINDI- I

Paper - 2

ENGLISH PAPER – II

Detailed Text

PROSE

8. A Visit to India – Julian Huxley
9. University Days – James Thurber
10. I Have a Dream – Martin Luther King
11. The Story Teller – H.H. Munro (Saki)
12. George Bernard Shaw – Bertrand Russel
13. Only then shall we find Courage – Albert Einstein

POETRY

7. The Day is Done – Henry Wadsworth Longfellow
8. King Arthur's Farewell – Alfred Tennyson

9. O Captain! My Captain! – Walt Whitman
10. My Last Duchess – Robert Browning
11. Ode to a Nightingale – John Keats
12. Lochinvar –Walter Scott

Non-Detailed

A collection of One Act Plays -

1. Remember Ceasar – Gordon Daviot
2. The Proposal – Anotn Chekov
3. The Miracle Merchant – Saki
4. The Stepmother – Arnold Bennet
5. The Mahatma – Rama Sarma

GRAMMER

1. Relative Clauses
2. Conditional Sentences
3. Modal auxiliaries
4. Reported Speech
5. Transformation of Sentences
    a. Affirmative, Negative and Interrogative Sentences
    b. Simple, Compound and Complex Sentences
6. a,b,r clauses
7. Correction of Sentences based on
    a. Subject, Verb and Concord
    b. Tenses
    c. Articles and Prepositions.
    d. Question Tags

COMPOSITION

7. Paraphrasing
8. Dialogue Writing

9. Report Writing
10. Note Making
11. General Essay
12. Expansion of Idea.

Paper – 3

SAMPLING TECHNIQUES

UNIT – I

Concept of sample and population : Need for sampling – Design, Organization and execution of sample survey – Principal steps in Sample surveys – preparation of Questionnaire and Schedules – Pilot survey – Sampling and Non-sampling Errors – Limitations of sampling.

UNIT – II

Sampling from finite population – Simple Random sampling with and without Replacement – Unbiased estimate of mean and variance – finite population correction – Estimation of standard error from a sample – Determination of sample size – Simple Random Sampling for Attributes.

UNIT – III

Stratified Random sampling : Concept of stratifying factor unbiased estimate of the mean and variance of the estimated mean Proportional and Optimum allocation. Relative precision of stratified random sampling and simple random sampling.

UNIT – IV

Ration and regression Estimators (based on simple random sampling only) – concept of Auxiliary variate – Ratio Estimators – Bias of Raio estimates – Variance of the ratio estimates – comparison of Ratio estimator with mean per unit.

Regression Estimators : Linear Regression estimate. Regression estmate with preassigned and Regression estimates computed from sample.

UNIT – V

Systematic sampling : Estimation of the mean and variance of the estimated mean – comparison of simple stratified and systematic sampling – Circular systematic sampling. Circular systematic sampling.

NSSO and its functions – other agencies under taking sample surveys.

Reference:

1. Des Raj (1976) – Sampling designs – Tata McGraw Hill.
2. Kapoor V.K. & Gupta S.C. – Applied Statistics – Sultan chand & Son, New Delhi.

Paper – 4

STATISTICAL INFERENCE – I

UNIT – I

Sampling Distribution – Standard Error – Derived Distributed function of random variables – Sampleing distribution of t. Chi Square and F distributions.

UNIT –II

Order statistics – Distribution function of Maximum and Minimum order statistics – Distribution function of the order statistics – Joint distribution of (r,s) the – order statistics – pdf of Range – asymptotic distribution of Median – Uses of order statistics.

UNIT – III

Test of Significance – large sample and small sample test based on normal, t, Chi-Square, F with respect to mean – variance – coefficient of correlations – Test for association and independence of contingency tables.

UNIT – IV

Point estimation – Concept of Sufficiency – Unbiasedness, Consistency and Efficiency and their interrelationships – Sequential analysis – Need for sequential rules – Wald's Sequential Probability Ratio Test (SPRT) –

UNIT – V

Elementary ideas on distribution free and non-parametric tests – Advantages and limitations of non-parametric test over parametric test – Run, Median and Mann – Whitney tests (one sample and two sample problems).

Reference:

1. Mood, A.M. Graybil, F.A., and Boes, D.C (1974) : Introduction to the theory of statistics – McGraw Hill.
2. Hogg, R.V. and Graig, A.T. (1972) – Introduction to mathematical statistics, III-Edition Amerind.
3. Rohatgi, V.K. (1984) : an Introduction to Probability theory and mathematical statistics, Wiley eastern.
4. Goon, A.M., Gupta, M.K. and Das Gupta, B (1980) An outline of statistical theory Vol-2. 6^{th} revised edition world press.

BUSINESS ECONOMICS

UNIT – I

Definition – Meaning and scope of Economics – Micro and Macro Economics – Economic growth and Economic Development – Role of economics in business decisions – Economic system and resource allocation.

UNIT – II

Utility analysis of Demand – Demand Analysis and Elasticity of Demand – Indifference curve Analysis.

UNIT – III

Production Analysis – Law of returns and production functions, supply and elasticity of supply.

UNIT – IV

Market Analysis – Factor Analysis – Cost Revenue & Break – even Analysis.

UNIT – V

Price policy and pricing methods – Theory of Distribution – National income – Business cycle – Public finance.

Reference:

Business Economics – by S.Sankaran
Principles of Economics – by D.M.Mithani
Managerial Economics – by S.N. Maheswari
Business Economics – by R.Cauvery, U.K.Sudha Nayak, M.Girija, N.Kruporani, R.Meenakshi

IIIrd- YEAR

Paper – 1

STATISTICAL INFERENCE – II

UNIT – I

Neyman pearson theory of testing a statistical hyposthesis – simple and composite hypothesis – Tests with critical Regions – Types of error – Level of significance – Size and power of a test – Power functions – Most powerful test (MP) – Neyman – Parson Lemma.

UNIT – II

Likelihood Ratio (LR) Test – Definition and simple applications – properties and used of LR test – Analysis of variance – ANOVA for one way and two – way classifications.

UNIT – III

Interval estimation – Relationship between interval estimation and testing of hypothesis – confidence intervals and confidence limits.

UNIT – IV

Construction of confidence intervals for parameters of Binomial, Poisson, Normal and Exponential distributions. Average Sample Number (ASN) and Operating Characteristic (OC) functions – simple illustrations.

UNIT – V

Migration – Types of migration – Migration Rates – Hamilton's Rates – Net migration rates – Methods of estimating net migration rates.

Reference:

1. Technical Demography – By R. Ramkumar.
2. A text book of Demography – By O.D. Srivastava.
3. An Introduction to the study of Population – By Bhaskar D. Misra.

Paper – 2
DEMOGRAPHY

Paper – 3
APPLIED STATISTICS

UNIT – I

Concept of time series – Sources of time series data – Component of time series – Additives and multiplication models – Resolving the componenets of time series – Trend – Methods of measuring trend – Methods of fitting polynomial curves and Logistic curves : Semi average method – Method of moving average.

UNIT – II

Seasonal variation – seasonal index – methods of measuring seasonal index – simple Average method – Ratio to trend method – Link relatives method. Cyclical variation – Measurement of cyclical variation – Method of periodogram analysis – Auto regression series – Auto correction and correogram analysis – Randon components Variate difference method.

UNIT – III

Basis of Index Numbers – Definition – Different types of Index Numbers – simple Index numbers. Weighted Index Numbers – Laspeyer's paasche's , Fisher's Marshall Edge worth's and Dorbiosh – bowlay's Index numbers – Errors in Index Numbers – Optimum Tests of Index Numbers – Time reversal Test – Factor Reversal test – Circular reversal Test.

UNIT – IV

Wholesale price Index Numbers – Problems in the constructions of whole Sale Price Index Numbers – Cost of living Index Numbers – Problems in its construction – Methods of construction – Aggregate method – Family budget method – Errors in cost of living Index Numbers – Index Numbers of Industrial Production – Speacing and deflating – Base shifting – Used of Index Numbers.

UNIT – V

Educational statistics – Scores – Types of scores – Scaling Procedures Scaling individual test – Items in terms if difficulty.

Scaling of rating in terms of normal curves – Reliability – Reliability coefficient – Index of reliability – Methods of determining reliability. Parallel – Forms method – Test Retest method – Split – half method – Kuder – Richardsen method – Validity – Types of validity – Intelligence Quotient – Education Quotient.

Reference:

1. Applied Statistics : By M.A. Anjari, O.P.Gupta and S.S. Chaudhari.

Paper – 4

NUMERICAL ANALYSIS AND FORTRAN

UNIT – I

Structure of Fortran – Character set, Fortran – constants, variables, Expression, Library functions, Arithmatic Statements – I/O Statements – Control Statements – GO TO, Computed GO TO, Arithmatic IF, Lofical IF, DO loops, Arrays and subscripted variables.

UNIT – II

Subprograms – function subprograms, Subroutine subprograms, Call statement, Common, Equivalence, Features of Fortran 77 – Simple Program relating to Numerical Methods.

UNIT – III

Floating point Representation – Error – Numerical instability – single non-linear Equation – Iterative methods – Bisection – False Position, Secant, Newton Raphson Methods – Successive Approximation – Interpolation Lagrangian and Newton Interpolation.

UNIT – IV

Solution of simultaneous Equations – Gauss Elimination, Gauss Jordan, Jacobi, Iterative methods, Matrix inverse, Central difference formulae – Stirlings.

UNIT – V

Numerical Integration and Differentiation – Trapezodial Rule – Simpon's one third and three eights and weddle's rules. Solutions ofDifferential Equations, Talylor's Series and Euler Maclawin Formaluae – Stirling Approximation.

Note : Concepts and Numerical problems only.

Reference:

Computer based numerical methods – E.V.Krishnamoorthy & B.S.K. Sen, Affo;ated East – West.

Paper – 5

OPERATION RESEARCH

UNIT – I

Introduction – Origin – Nature of OR – Scope – Structure – Characteristics – OR in Decision making – Models in OR – Phase of OR – Uses and Limitations of OR – LPP – Mathematical formulation of LPP – Graphical method.

UNIT – II

LPP – simples Method – Artificial variable technique – Big-M method – Dual LPP (conversion only).

UNIT – III

Transportation problem – Introduction – Initial basic feasible solution – North West Corner Rule – Row minima – Column minima – Matrix minima (LCM) – Vogel's approximation method – Optimum solution – Modi method – Unbalanced TP – Assignment problem – Unbalanced Hungarian Method.

UNIT – IV

Game Theory – Two person zero sum game : The maxmum – Minimax principle – Game's without saddle points – Graphical solutions of 2 x n and n x 2 Games – Dominance property – Reducing Game problem to an LPP.

UNIT – V

Queuing Theory – Queuing system – Characteristics – Classification of queues – Poisson queues – (M/M/1) : (∞/FIFO)quenching system. Birth – Death process – (M/M/C) : (∞/FIFO) quenching system. (simple problem only).

Reference:

1. Kanto Swarup, P.K. Gupta, Manmohan : Operations Research.
2. Sharma, J.K. : Operations Research and Applications.
3. Dr. B.S. Goel & Dr. S.K. Mital : Oerations Research- Prathi Prakasam Publishers.