

GUJARAT UNIVERSITY, AHMEDABAD
S.Y.B.A / S. Y. B. Sc.
STATISTICS : Theory and Practical (New Course)
 (To be effective from : June 2004)

There will be three Theory papers and three practical papers.

The following table presents the title, workload and marking scheme for these papers :

Sr. No.	Paper	Title	Workload in hrs. per week	Maximum Marks
1	Theory papaer III	Mathematical Statistics-I	3L + 1T	70
2	Theory paper IV	Applied Statistics	3L + 1T	70
3	Theory paper V	Mathematical Statistics - II	3L + 1T	70
6	Practical paper I		Duration 3 hrs.	35
7	Practical paper II		3 hrs.	35
8	Practical paper III		3 hrs.	35

Head of Passing :

A Candidate Should possess atleast 76 Marks out of 210 marks aggregate in 3 Theory papers and 38 marks out of 105 marks aggregate in 3 Practical Papers to be eligible for passing.

GUJARAT UNIVERSITY, AHMEDABAD
S.Y.B.A / S. Y. B. Sc.
STATISTICS : (New Course)
Modified Syllabus to be Effective from June-2004
(Academic Year : 2004-2005)
Paper III : (Mathematical Statistics-I)

1. Probability : (20%)

Random experiment trial, sample point & sample space, events, operations of events, concepts of mutually exclusive and exhaustive events. Definition of probability : classification and relative approach, axiomatic approach, Geometric probability and uniform probability space. Comparison and drawbacks the definitions of probability conditional probability, Addition and Multiplication rules of probability, Independence of two or more events, Bayes Theorem.

Expressions for probability of occurrence of exactly **K** events out of three events A, B, C for $K = 1, 2, 3$.

Proof of following inequalities for two events A and B

- (i) $P(A \cup B) \geq \max \{P(A), P(B)\}$
- (ii) $P(A \cup B) \geq \max \{0, P(A) + P(B) - 1\}$
- (iii) $P(A \cap B) \leq \min \{P(A), P(B)\}$

2 Mathematical Expectation : (30%)

Discrete and continuous random variable, distribution function of continuous and discrete random variables and their properties. Mathematical expectation, – Raw, central, factorial moments and cumulants with their inter-relationship up to fourth order, mode, quartiles, coefficient of variation and measures of skewness and kurtosis; Moment generating function, characteristics functions and probability generating function and their properties.

3 Unitariate distributions and their properties : (50 %)

Binomial, poisson, Hypergeometric, Uniform, Normal, gamma, Beta distribution, Bernoulli Distribution, rectangular Distribution, Exponential Distribution, Weibull Distribution.

GUJARAT UNIVERSITY, AHMEDABAD
Second B.A./B. Sc.—Paper IV
(Applied Statistics)

- 1. PERT - CPM :** **(20 %)**
Meaning of PERT, activity, dummy activity, Network, expected time, characteristics and uses and limitations of PERT, Meaning of C.P.M. Meaning of Earliest Starting Time (EST) and Latest Starting Time (LST), Latest Finsih Time (LFT), Examples based on PERT-CPM; difference between PERT-CPM.

- 2. Demographic Methods :** **(20%)**
 - 2.1 Importance of population census, detailed study of last population census.
 - 2.2 Vital statistics : Rates of vital events,
Measurements of mortality : Crude Death Rates, Specific death Rate,
Standardized Death Rate.
Measurements of fertility : Crude birth rate, general fertility rate, total fertility rate, gross and net reproduction rates, concepts of life table and its uses, measurement of population growth and population projections.

- 3. Economic Statistics :**
 - 3.1 Index number : Construction and use of Index numbers weighted index number, Passche, Laspeyre, Fisher, Marshall - Edgeworth formula of index numbers, errors in index numbers tests of index numbers, chain index numbers, construction of cost of living index and wholesale price index numbers. **(20%)**
 - 3.2 Time Series :
Components of Time - Series, Measurement of trend by method of moving average and mathematical curves (upto second degree) calculation of seasonal variation and indices by Ratio to trend and moveing Avg. Method. **(20%)**
 - 3.3 Mathematical Economics :
Formulation of Demand & Supply functions, Market Equillibrium, Determination of demand and Supply curves from time series data, Utility function and its uses in derivation of demand curves. Elasticity of demand and Supply and cost function, Optimization of revenue for a given demand law, use of elasticity in calssification of goods into necessities and luxuries. Problem of monopoly. **(20%)**

GUJARAT UNIVERSITY, AHMEDABAD
SECOND B.A./B. Sc.—Paper V
(Mathematical Statistics-II)

1. **Correlation and Regression** : (40%)
General Concepts of bivariate and trivariate distributions, marginal and conditional distribution, productmoment correction coefficient, Spear's Rank correlation coefficient, independence and uncorrelatedness of random variables.
Concept of regression, error in regression, fitting of linear and quadratic curves and curves, which are reductible to linear forms by methods of least squares. Regression and correlation in three variables, partial and multiple regression, partial and mulitple correlation coefficient and their interrelationships.
2. **Large Sample Tests and Small Sample Tests** : (20%)
Idea of Statistical hypothesis and alternative hypothesis, level of significance, degree of freedom.
Contingency tables and association of attributes, Chi-square tests in testing independence of attributes, in contingency tables, and goodness of fit. Tests for proportion(s), Fiosher's Z - transformation and its uses in testing significance of total and partial correlation coefficietns x^2 , t, F test and their uses in the test of significance concerning total, partial and multiple correlation coefficients.
3. **Sampling distributions and Standard Errors** : (10%)
Concept of smapling distribution, sampling disgribution of sample total from binomial, poisson and normal distribution, sampling distribution of the difference of two sample means from independent normal populations concept of standard error of sample moments.
4. **Non Parameric Tests** : (10%)
Parametric versus non-parametric tests, sing, median, Wald-Wlofowitz runs and Mann-whiteny tests.
5. **Sample Surveys and Sampling Techniques** : (20%)
Sampling versus complete enumeration, different steps in large scale sample survey, Biases in Survey, type of population and type of Sampling.
Sample Random Sampling, derivation of variance of sample mean, Random Sampling for proportion, estimation of sample size and population total.

GUJARAT UNIVERSITY, AHMEDABAD

Second B.A./B.Sc.

Practical—Paper I (3 Hours duration)

(Revised Syllabus Effective from June, 2004)

1. Construction of frequency tables with one and two variables, classification, graphical representation, Histogram, frequency curve & polygon, ogives.
2. Measures of central tendency for discrete and continuous data.
3. Measures of dispersion for discrete and continuous data.
Calculation of quartiles, deciles, percentiles for discrete and continuous data.
4. Test of goodness of fit of Binomial, Poisson and Normal Distribution.
5. Drawing of Random Samples from Uniform, Normal, Exponential, Binomial and Poisson Distribution.

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Second B.A./B.Sc.

Practical—Paper II (3 Hours duration)

1. Computation of death rates, standard death rates, Computation of gross fertility rates, age specific fertility rates, gross and net reproduction rates, problems on life table.
2. Measurement of linear trend in time series by method of moving average & method of least squares, calculation of seasonal index fitting of demand curve from time series data and calculation of price elasticity of demand.
3. Construction of price index number and quantity index numbers, by average of price relatives, conversion of chain base index numbers to fixed base index numbers and viceversa. Construction of cost of living index numbers by (i) Aggregate expenditure method.
(ii) Family budget method.
4. Examples related to PERT and CPM.

GUJARAT UNIVERSITY, AHMEDABAD
Second B.A./B.Sc.
Practical—Paper III (3 Hours duration)

1. Computation of Coefficient of correlation and rank Correlation, computation of Coefficient of regression from Bivariate frequency distribution, fitting of Regression lines, fitting of quadratic and exponential curves to given bivariate data, examining the consistency of data.
2. Computation of partial and multiple correlation and regression including three variables only. Fitting of a linear regression plane to statistical data and prediction problem.
3. Problems on sign, Run, Median and Mann - Whitney U-test.
4. Drawing of random samples from finite population, estimation of population mean, population total, population proportion along with their standard errors using simple random sampling without replacement Estimation of Sample Size.
5. Problems based on Large Sample and Small Sample tests.

Note : Exposure to computers and statistical softwares/packages are - M. S. Excel, Systat, Statistica, is recommended.

GUJARAT UNIVERSITY, AHMEDABAD
Second B.A./B.Sc. Practical—Paper III

Recommended Books :

1. Chung, K. L. (1979), Elementary Probability Theory with Stochastic Process - Springer International Student Edition.
2. David Stirzaker (1994) :- Elementary Probability, Cambridge University press.
3. Kathreen Subrahmaniam :- A primer in Probability - Marcel - Dekkar
4. Feeler, W. : An introduction to probability Theory and its application, 1968, Wiley.
5. Hogg, R. V. & Craig A. T. (1971) :- Introduction to Mathematical Statistics (3rd Ed.) – Mac Millan.
6. Hoel, P. G. Port, S. C. and Stone, C. T. (1991), Introduction to Probability Theory – Universal Book Stall.
7. Mukhopadhyay, P. (1996), Mathematical Statistics, New Central Book Agency, Calcutta.

Additional Reference :

1. DeGroot, M. H. (1975) : Probability and Statistics, Addison Wesley
2. Parzen, E. (1960) : Modern Probability Theory and its applications, Wiley Eastern.
3. Pitman, Jim (1993) : Probability Narosa Publishing House
4. Ross, S. M. (1997) : Introduction to probability models - Academic Press.
5. Blake, I : An introduction to applied Probability (1979), John Wiley & Sons.

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Second B.A./B.Sc.

Practical—Paper IV

Recommended Books

1. Pathak, K. B. And Ram, F. : Techniques of Demographic Analysis - Himalaya Publishing House (1992).
2. Mukhopadhyay, P. (1999) : Applied Statistics
- New Central Book Agency Ptv. Ltd. Calcutta.
3. Srivastava, O. S. (1983) : A textbook of demography
- Vikas Publishing House, New Delhi.
4. Goon, A. M. Gupta, M. K. & Dasgupta, B. (1986) :- Fundamental of Statistics - Vol - II, World Press Calcutta.
5. Agarwal, B. S. (1996) : Basic Statistics (3rd Edition) :- New age International Publishers.
6. Elhance, D. N. :- Fundamental of Statistics (3rd Edition) : Kitab Mahal, Allahbad.
7. H. A. Taha : Operations Research, Macmillan Publishing Co. Inc. (Edition 6, 1999).
8. F. S. Hiller and G. J. Libermann : Introduction to Operations Research, McGraw Hill, Inc (Edition 6, 1995).
9. Allen, R. G. D. : Mathematical Analysis for Economist.

Books For Reference :

1. Jaiswal M. C. : “अर्थविषयक आंकडाशास्त्र”, गुज. युनि., ग्रंथनिर्माणा बोर्ड.
2. Vohra, N. D. : Quantitative Techniques In Management. (Tata - MacGraw Hill Publishing Company Ltd. Delhi)

GUJARAT UNIVERSITY, AHMEDABAD
Second B.A./B.Sc.
Practical—Paper V

Recommended Books :

1. Croxton, F. E. : Cowden; D. J. and Kleen, S. : (1973) - Applied General Statistics, Prentice Hall of India.
 2. Snedecor, G. W. and Cochran, W. G. (1967) : Statistical Methods (Iowa State University Press).
 3. Chatterjee, Samprit & Bertram Price (1991) : Regression Analysis by Example. (John Wiley and Sons Inc.)
 4. Medhi, J. : Statistical Methods : An Introductory Approach (Wiley Eastern).
 5. Agarwal, B. S. : (1996) - Basic Statistics New Age International Publishers.
 6. Hines William, W. and Montgomery Douglas; C. (1990) - Probability and Statistics in Engineering and Management Science (3rd Edi.) John Wiley & Sons.
 7. Mukhopadhyay, P. : Mathematical Statistics (1999) : New Central Book Agency Pvt. Ltd., Calcutta.
 8. kendall, M. G. & Stuart, A. : Advance Theory of Statistics Vol. - I (Charles Griffin).
 9. Cramer, H. Mathematical Methods of Statistics.
 10. Siegel; S. : Nonparametric Tests for Behavioral Science (Mac. Craw Hill, 1956).
 11. Kenny & Keeping : Mathematics of Statistics Vol.-I & II (Van Nostrand).
 12. Cochran, W. G. (1984) : Sampling Techniques - 3rd Edition, Wiley Eastern.
 13. Sampat, S. (2000) : Sampling Theory :- Narosa.
 14. M. N. Murthy : Sampling Theory and Methods.
 15. Levin and Rubin : Statistics for Management (2nd Ed.) Prentice Hall - India.
 16. C. R. Kothari : Research Methodology - methods and techniques - 2nd Ed. (Wiley - Eastern).
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