

Course Structure (Statistics General) for Semester System (W.E.F.JULY 2015)

Semester	Paper	Module	Marks	Topic	Total in Semester
Sem 1	IA(TH)	101	25	Descriptive Statistics I	TH+PR
	IA(TH)	102	25	Probability I	
	IB(PR)	103	25	Practical (101 and 102)	50+25
Sem 2	IIA(TH)	201	25	Descriptive Statistics II	
	IIA(TH)	202	25	Probability II	
	IIB(PR)	203	25	Practical (201 and 202)	50+25
Sem 3	IIIA(TH)	301	25	Sampling Distributions and Point Estimation	
	IIIA(TH)	302	25	Economic Statistics, Time Series Analysis	
	IIIB(PR)	303	25	Practical (301 and 302)	50+25
Sem 4	IVA(TH)	401	25	Statistical Inference	
	IVA(TH)	402	25	Population Statistics and Statistical Quality Control	
	IVB(PR)	403	25	Practical (401 and 402)	50+25
				Grand Total	200+100

Sem 1 : PAPER IA (Module 101 & 102) :50 marks (Theoretical)
PAPER IB (Module 103) :25 marks (Practical)

Sem II : PAPER IIA (Module 201 & 202) :50 marks (Theoretical)
PAPER IIB (Module 203) :25 marks (Practical)

SemIII : PAPER IIIA (Module 301 & 302) :50 marks (Theoretical)
PAPER IIIB (Module 303) :25 marks (Practical)

Sem IV : PAPER IVA (Module 401 & 402) :50 marks (Theoretical)
PAPER IVB (Module 403) :25 marks (Practical)

**QUESTION PATTERN FOR B.Sc. GENERAL EXAMINATION IN STATISTICS
SEMESTER SYSTEM
W.E.F. 2015**

A question paper having a total marks - 50

GROUP-I (10 marks):

- * Short questions of 2 marks each (Topics under Group II & Group III):
Number of questions to be given = 10
Number of questions to be answered = 5
Total marks = $2 \times 5 = 10$

GROUP-II (20 marks):

- * Broad questions of 10 marks each :
Number of questions to be given = 4
Number of questions to be answered = 2
Total marks = $10 \times 2 = 20$

GROUP-III (20 marks):

- * Broad questions of 10 marks each :
Number of questions to be given = 4
Number of questions to be answered = 2
Total marks = $10 \times 2 = 20$

Modules of New Syllabus (2015) Statistics General (Semester System):
[L denotes lecture hours]

Semester I

PAPER IA(Theoretical) (50 marks)

101 Descriptive Statistics I (25 marks)

Types of statistical data, Compilation, Classification, Tabulation and Diagrammatic representation of data, Frequency Distribution, Cumulative Distribution and their graphical representation, Histogram, Frequency Polygon, Frequency Curve and Ogive.

(11L)

Analysis of Univariate Quantitative Data – concepts of central tendency, dispersion, relative dispersion, skewness and kurtosis and their measures based on quantiles and moments.

(14L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(2001) : Fundamentals of Statistics (Vol. 1), World Press
2. Yule G.U. & Kendall M.G.(1950) : Introduction to the Theory of Statistics, Charles Griffin
3. Nagar A.L. & Das R.K. (1976): Basic Statistics
4. Bhattacharyya G. K. & Johnson R. A. (1977) : Concepts & Methods of Statistics, J.Wiley

102 Probability I (25 marks)

Random Experiments and Random Events, Statistical regularity and meaning of Probability, Classical and Axiomatic definitions of Probability (discrete sample space only), Conditional Probability, Independence of Events, Principal Theorems including union and intersection of events and Bayes Theorem.

(13L)

Random Variable and its Probability Distribution, Cumulative Distribution Function, Probability Mass Function and Probability Density Function, Mathematical Expectation, Variance and Moments.

(12L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(1997): An Outline of Statistics(Vol 1), World Press
2. Feller W.(1968) : An Introduction to Probability Theory & its Applications, John Wiley
3. Cacoullos T. (1973): Exercises in Probability, Narosa
4. Bhattacharyya G. K. & Johnson R. A. (1977) : Concepts & Methods of Statistics, J.Wiley
5. Freund J.E. (2001): Mathematical Statistics, Prentice Hall
6. Pitman J. (1993): Probability, Narosa
7. Stirzaker D. (1994): Elementary Probability, Cambridge University Press
8. Rathie and Mathai: Probability and Statistics

PAPER IB(Practical) (25 marks) :Based on topics of Paper IA

Semester 2

PAPER IIA(Theoretical) (50 marks)

201 Descriptive Statistics II (25 marks)

Fitting of Binomial, Poisson and Normal distributions (2L)

Analysis of Bivariate Quantitative Data – Scatter Diagram, Product Moment Correlation Coefficient and its properties, Regression Analysis, Fitting of Linear and Polynomial equations by the principle of Least Squares, Correlation Index, Spearman's Rank Correlation Coefficient. (15L)

Analysis of Multivariate Quantitative Data – Multiple Regression, Multiple Correlation and Partial Correlation in *three* variables, their measures and related results. (8L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(2001) : Fundamentals of Statistics (Vol. 1), World Press
2. Yule G.U. & Kendall M.G.(1950) : Introduction to the Theory of Statistics, Charles Griffin
3. Nagar A.L. & Das R.K. (1976): Basic Statistics
4. Bhattacharyya G. K. & Johnson R. A. (1977) : Concepts & Methods of Statistics, J.Wiley

202 Probability II (25 marks)

Standard Univariate Discrete Distributions and their properties – Discrete Uniform, Binomial, Poisson, Hypergeometric, Geometric and Negative Binomial distributions (10L)

Standard Univariate Continuous Distributions – Uniform, Normal, Exponential, Gamma, Beta and Lognormal distributions, Joint Distribution of two random variables, Marginal and Conditional distributions, Covariance and Correlation, Simple Theorems including theorems on expectation and variance of a sum of random variables and expectation of product of random variables., Bivariate Normal distribution and statement of its general properties (10L)

Chebychev's Inequality, Weak Law of Large Numbers, Statement of Central Limit Theorem (i.i.d. case) and its uses. (5L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(1997): An Outline of Statistics(Vol 1), World Press
 2. Feller W.(1968) : An Introduction to Probability Theory & its Applications, John Wiley
 3. Cacoullos T. (1973): Exercises in Probability, Narosa
 4. Bhattacharyya G. K. & Johnson R. A.(1977) : Concepts & Methods of Statistics, J.Wiley
 5. Freund J.E. (2001): Mathematical Statistics, Prentice Hall
 6. Pitman J. (1993): Probability, Narosa
 7. Stirzaker D. (1994): Elementary Probability, Cambridge University Press
- Rathie and Mathai: Probability and Statistics

PAPER IIB(Practical) (25 marks) : Based on topics of Paper IIA

Semester 3

PAPER IIIA(Theoretical) (50 marks)

301 Sampling Distributions and Point Estimation (25 marks)

Concepts of Population and sample, Random Sampling and Sampling Distributions of Statistics, sampling distribution of sum of independent Binomial and Poisson variables, χ^2 , t and F distributions (derivations excluded), sampling distribution of mean and variance of independent Normal variables.

(13L)

Point Estimation of a population parameter – concepts of Bias and Standard Error of an estimator, concepts of Unbiasedness, Minimum Variance, Consistency and Efficiency of an estimator, Method of Moments, Maximum Likelihood Method of estimation, Method of Least Squares, Point estimators of the parameters of Binomial, Poisson, and univariate Normal distributions.

(12L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(1997) : An Outline of Statistics (Vol 1), World Press
2. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 1), World Press
3. Mood A.M., Graybill F. & Boes D.C.(1974) : An Introduction to the theory of Statistics (3rd ed.), McGraw Hill
4. Rohatgi V.K. (1984): An Introduction to Probability Theory and Mathematical Statistics, John Wiley
5. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 1), World Press

302 Economic Statistics, Time Series Analysis (25 marks)

Economic Statistics: Index Number –construction and use of price index numbers and tests in connection with them, Consumer and Wholesale price index numbers, their uses and major steps in their construction. Chain index

(12L)

Time Series Analysis: Different components of a times series, determination of Trend by method of simple moving-averages and by fitting mathematical curves by least squares principle, determination of seasonal indices by methods of trend ratios and ratios to moving averages.

(13L)

References:

1. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 2), World Press
2. Yule G.U.& Kendall M.G.(1950) : Introduction to the Theory of Statistics, Charles Griffin
3. Nagar A.L. & Das R.K. (1976): Basic Statistics
4. Mukhopadhyay P. (1999): Applied Statistics
5. Croxton F. E., Cowden D. J. & Klein (1969) : Applied General Statistics, Prentice Hall

PAPER IIIB(Practical) (25 marks) :Based on topics of Paper IIIA

Semester 4

PAPER IVA(Theoretical) (50 marks)

401 Statistical Inference (25 marks)

Statistical tests of Hypotheses – Null and Alternative hypotheses, Types of Errors, Critical Region, Level of Significance, Power and p-values, Exact tests of hypotheses under Normal set-up for a single mean, the equality of two means, a single variance and the equality of two variances, Test of Significance of sample correlation coefficient (null case) and tests of hypotheses for the equality of means and equality of variances of a bivariate Normal distribution. (13L)

Interval Estimation – Confidence Interval and Confidence Coefficient, Exact confidence interval under Normal set-up for a single mean, single variance, the difference of two means and the ratio of two variances. (5L)

Large Sample Tests and related Interval Estimates of a single mean and a single proportion and difference of two means & two proportions, Pearsonian χ^2 tests for goodness of fit & for homogeneity and independence in a contingency table. (7L)

References:

1. Goon A.M., Gupta M. & Dasgupta B.(1997) : An Outline of Statistics (Vol 1), World Press
2. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 1), World Press
3. Mood A.M., Graybill F. & Boes D.C.(1974) : An Introduction to the theory of Statistics (3rd ed.), McGraw Hill
4. Rohatgi V.K. (1984): An Introduction to Probability Theory and Mathematical Statistics, John Wiley
5. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 1), World Press

402 Population Statistics and Statistical Quality Control (25 marks)

Population Statistics:

Vital events, Rates and Ratios, Measurement of Mortality – Crude, Specific and Standardized death rates, Complete Life Table, Measurement of Fertility and Reproduction – Crude Birth Rate, General, Specific and Total fertility rates, Gross and Net reproduction rates. (14L)

Statistical Quality Control:

Advantages of statistical quality control, Construction of control charts by attributes (p, c, np) and variables (\bar{x} , R). (7L)

Sampling Inspection Plan by attributes, OC, ASN (and ATI), LTPD and AOQL for single sampling plan (4L)

References:

1. Goon A.M.,Gupta M.& Dasgupta B.(2001): Fundamentals of Statistics (Vol 2), World Press
2. Yule G.U.& Kendall M.G.(1950) : Introduction to the Theory of Statistics, Charles Griffin
3. Nagar A.L. & Das R.K. (1976): Basic Statistics
4. Mukhopadhyay P. (1999): Applied Statistics
5. Croxton F. E., Cowden D. J. & Klein (1969) : Applied General Statistics, Prentice Hall

PAPER IVB(Practical) (25 marks) : Based on topics of Paper IVA