DEPARTMENT OF MATHEMATICS AND STATISTICS

JAI NARAIN VYAS UNIVERSITY:JODHPUR

B.Sc./B.A. Statistics Three Years Program: Semester wise Course Type, Course Code, Workload, Credits and Maximum Marks

FOR THE ACADEMIC SESSIONS: 2023-24, 2024-25 & 2025-26

Level	Sem.	Course Type	Course Code	Course Title	L	P	H/W	Total Hours	Credits	Total Credits	Sessional Marks	EoSE Marks	M.M.
5	I	DCC	STA5001T	Statistical Methods	4	0	4	60	4		30	70	100
			STA5001P	Statistical Methods PRACTICAL	0	2	4	60	2	6	30	70	100
				Other Department -1						6	30	70	100
				Other Department-2						6	30	70	100
		AEC		Either Hindi or English	2	0	2	30	2	2	30	70	100
				Total credits						**20**			
	II	DCC	STA5002T	Elements of probability	4	0	4	60	4	6	30	70	100
			STA5002P	Elements of probability PRACTICAL	0	2	4	60	2		30	70	100

	Sem	Cat	Code	Course									
				Other Department -1						6	30	70	100
				Other Department-2						6	30	70	100
		AEC		Environmental Science	2	0	2	30	2	2	30	70	100
				Total credits						**20**			
				Exit With B.Sc./B.A. Certificate and Entry with B.Sc. Certificate for B.Sc. Diploma									
6	III	DCC	STA6001T	Probability Distribution	4	0	4	60	4	6	30	70	100
			STA6001P	Probability Distribution PRACTICAL	0	2	4	60	2		30	70	100
				Other Department -1						6	30	70	100
				Other Department-2						6	30	70	100
		SEC		Choose any one SEC from the list provided for Semester III						2	30	70	100
				Total credits						**20**			
	IV	DCC	STA6002T	Correlation and Numerical Methods	4	0	4	60	4	6	30	70	100
			STA6002P	Correlation and Numerical Methods PRACTICAL	0	2	4	60	2		30	70	100
				Other Department -1						6	30	70	100
				Other Department-2						6	30	70	100
		SEC		Choose any one SEC from the list provided for Semester IV						2	30	70	100

				Total credits						20				
				Exit with B.Sc./B.A. Diploma and Entry with B.Sc. Diploma for B.Sc. Degree										
				Discipline Specific Elective (DSE) – Choose any number of the following from Mathematics Discipline										
7	V	DSE	STA7101T	Applied Statistics	4	0	4	60	4	6		30	70	100
			STA7101P	Applied Statistics PRACTICAL	0	2	4	60	2			30	70	100
			STA7102T	Sampling Techniques	4	0	4	60	4	6		30	70	100
			STA7102P	Sampling Techniques PRACTICAL	0	2	4	60	2			30	70	100
				Other Department -1						6		30	70	100
				May be from another Departments-2						6		30	70	100
		SEC		Choose any one SEC from the list provided for Semester V						2		30	70	100
				Total credits						20				
				Discipline Specific Elective (DSE) – Choose any number of the following from Mathematics Discipline										
	VI	DSE	STA7103T	Theory of Estimation and Testing of Hypothesis	4	0	4	60	4	6		30	70	100
			STA7103P	Theory of Estimation and Testing of Hypothesis PRACTICAL	0	2	4	60	2			30	70	100
			STA7104T	Statistical Quality Control and Design of Experiments	4	0	4	60	4	6		30	70	100
			STA7104P	Statistical Quality Control and	0	2	4	60	2			30	70	100

				Design of Experiments PRACTICAL									
				Other Department -1						6	30	70	100
				May be from another Departments-2						6	30	70	100
	SEC			Choose any one SEC from the list provided for Semester VI						2	30	70	100
				Total credits						**20**			
		Exit with B.Sc. Degree											

Note: One AEC with Semester I and II each. One SEC with Semester III, IV, V and VI each.

AEC denotes: Ability Enhancement Course

SEC denotes: Skill Enhancement Course

B.Sc. / B.A. Statistics Semester : I, 2023-24
Discipline Centric Core Course (DCC)
STA5001T: STATISTICAL METHODS
(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		

Unit-I: Definition, Importance, Scope, Limitations, distrust and functions of statistics, Planning of a statistical enquiry, sources of data, classification and tabulation of statistical data.

Unit-II: Diagrammatic and graphical representation of statistical data, graphs of frequencydistribution, histogram, frequency polygon and ogives.

Unit-III: Measures of central tendency: Mean, Median and Mode, requisites of an ideal average,their merits and demerits, dispersion and its various measures.

Unit -IV: Moments, raw moments, central moments and interrelationship between them,skewness and its various measures. Kurtosis and its measures.

Unit -V: Theory of attributes, class frequency and their order, consistency of data, incompletedata, association and independence of attributes, coefficient of association.

SUGGESTED BOOKS

- Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons,Delhi.
- Gupta, S.P.: Statistical Methods, Sultan Chand & Sons, Delhi.
- Nagar, K.N.: सांख्यिकी के मूल तत्व, मीनाक्षी प्रकाशन ।

Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester : I, 2023-24

Discipline Centric Core Course (DCC)

STA5001P: STATISTICAL METHODS PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Presentation of raw data.
2. Graphical representation by (i) Histogram (ii) Frequency Polygon (iii) Frequency curve and (iv) Ogives.
3. Diagrammatic representation by (i) Bars (ii) Pie-diagram.
4. Measures of central tendency: Mean, Median and Mode.
5. Measures of dispersion: (i) Range (ii) Inter-quartile range (iii) Mean deviation (iv) Variance and Standard deviation (v) Coefficient of variation.
6. Moments and various measures of skewness and kurtosis.
7. Exercises on determination of class frequencies, consistency of data and association of attributes.

B.Sc. / B.A. Statistics Semester: II, 2023-24
Discipline Centric Core Course (DCC)
STA5002T: ELEMENTS OF PROBABILITY
(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		

SYLLABUS

Unit-I: Random experiment. Sample space, events. Union and interaction of events, mutually exclusive, exhaustive, independent and equally likely events. Classical and Statistical definitions of probability and simple problems. Axiomatic approach to probability. Addition law of probability for two or more events.

Unit-II: Conditional probability. Multiplication law of probability, Statistical independence of events. Bayes theorem and its simple applications.

Unit-III: Random Variable: Discrete and continuous random variables. Probability mass and density functions, joint, marginal and conditional probability function. Distribution functions.

Unit -IV: Mathematical Expectation: Definition of expectation, Addition and Multiplication laws of expectation. Moments and product moments in terms of expectation, variance and covariance for the linear combination of random variables Elementary idea of conditional expectation. Schwartz's inequality.

Unit -V: Moments generating and Cumulant generating functions with properties. Joint Moment generating function. Characteristic function with properties (without proof).

SUGGESTED BOOKS

- Gupta, S.C. and Kapoor, V.K. Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Delhi.
- Kapoor, J.N. and Saxena, H.C.: Mathematical Statistics, S.Chand & Co., Delhi
- Goon, A.M., Gupta M.K., Dass Gupta.: Fundamentals of Statistics, Vol. 1, World Press, Calcutta, 1991.
- Gokharoo, D.C. and Saini, S.R.: Mathematical Statistics (Hindi ed.), Navkar Prakashan, Ajmer. Bhargava, S.L. and Agarwal, S.M., Mathematical Statistics (Hindi Ed.), Jaipur Publishing House, Jaipur.
- David, R.: Elementary Probability, Oxford Press
- Bhat, B.R., Srivenkatramana, T. and Rao, Madhava K.S. (1977): A Beginner's Text, Vol, II, New Age International (P) Ltd., 1996.
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  Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester : II, 2023-24
Discipline Centric Core Course (DCC)
STA5002T: ELEMENTS OF PROBABILITY PRACTICAL
(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Definition of probability.
2. Addition and multiplication theorem of probability.
3 Conditional probability and Baye's theorem.

4. Probability mass function. Joint, marginal and conditional probability function.

5. Mathematical expectation, moment generating function, cumulant generating function.

B.Sc. / B.A. Statistics Semester: III, 2024-25
Discipline Centric Core Course (DCC)
STA6001T: PROBABILITY DISTRIBUTIONS
(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		

Unit-I: Discrete probability distributions and their properties: Bernoulli, Binomial, Poisson, negative binomial, geometric, hypergeometric, multinomial and discrete uniform distributions.

Unit-II: Continuous probability distributions and their properties: Uniform, Normal, Exponential, Beta type I and type II, Gamma and Cauchy distributions.

Unit-III: Distributions of functions of random variables, cumulative distribution, function techniques, distribution of sum, difference, product and quotient of two random variables, the moment generating functions and transformation techniques (Chapter V of Mood, Graybill and Boes Book).

Unit -IV: Concepts of conditional expectations, the conditional variance, the joint moment generating function and moments, the bi-variate normal distribution and its properties.

Unit -V: Concepts of sampling distribution and standard error, derivation of X^2 (chi-square), t and F distribution, their simple properties.

SUGGESTED BOOKS

- Mood, A.M. , Graybill, F.A. and Boes, D.C. Introduction to the Theory of Statistics (Third edition), Mc- Graw-Hill.
- Hogg, R.V. and Graig, A.T.: Mathematical Statistics, Amerind
- Gupta, S.C. and Kapoor; V.K. ; Fundamentals of Mathematical Statistics, Sultan Chand and Sons, Delhi.

Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester: III, 2024-25

Discipline Centric Core Course (DCC)

STA6001P: PROBABILITY DISTRIBUTIONS PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Fitting of distributions: (i) Binomial (ii) Poisson (iii) Normal distributions

   (iv) Negative binomial (v) geometric (vi) Exponential.

2. Properties of normal, X^2, t and F tests.

B.Sc. / B.A. Statistics Semester: IV, 2024-25

Discipline Centric Core Course (DCC)

STA6002T: CORRELATION AND NUMERICAL METHODS

(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

SYLLABUS

Unit-I: Method of least squares, its application in fitting of straightline, Second degree parabola, logarithmic and exponential curves. The bi-variate data marginal and conditional frequency distribution, covariance, variance of a linear function of variates.

Unit-II: Correlation and regression, the rank correlation, intraclass correlation, the correlation ratio, probable error.

Unit-III: Multivariate data, concept of multiple correlation and regression, partial correlations, multiple regression equation (for three variables).

Unit -IV: Time series and its components, method of moving average and curve fitting for determining trend, determination of seasonal indices. Link relative method.

Unit -V: Statistical applications of numerical methods: Methods of intra and extra polations due to Newton, Lagrange and Gauss. Divided differences and Newton's formula. Numerical Integrations: Trapezodial and Simpson's formulae.

SUGGESTED BOOKS

- Gupta, S.C. and Kapoor, V.K. Fundamentals of Mathematical Statistics, Sultan Chand and Sons, Delhi.
- Kapoor, J.N. and Saxena H.C.: Mathematical Statistics, S. Chand and Co., Delhi. Scarborough, J.B.: Numerical Mathematical Analysis, Oxford and IBH.

Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester: IV, 2024-25
Discipline Centric Core Course (DCC)
STA6002P: CORRELATION AND NUMERICAL METHODS PRACTICAL
(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Computation of co-efficient of (i) Simple correlation (ii) Rank correlation.
2. Preparation of correlation table from ungrouped data.

3. Determination of regression lines from (i) Ungrouped data (ii) Correlation table.

4. Fitting of linear regression in case of three variables, computation of partial and multiple correlations coefficient for three variables.

5. Fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curve by least square method.

6. Moving average method for determining trend, seasonal indices.
7. Practical on Numerical methods

B.Sc. / B.A. Statistics Semester: V, 2025-26

Discipline Specific Elective (DSE)

STA7101T: APPLIED STATISTICS

(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		

Unit-I: Statistical Organizations in India: C.S.O., N.S.S.O., their functions and publications,agricultural Statistics, area and yield statistics, trade statistics.

Unit-II: Index Number: Various types of index numbers, construction of index number of prices, fixed base and chain base methods, uses and limitations of these methods.

Unit-III: Essential requisites of an ideal index number, cost of living index number and itsconstruction, the notions of splicing, base shifting and deflating.

Unit -IV: Population Statistics, its nature, vital statistics, measures of mortality and fertility.

Unit -V: The growth of population and its measurements, life table, its construction and uses.Indian census, its organization and features.

SUGGESTED BOOKS

- Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics

- Goon, A.M. and others: Fundamentals of Statistics, Vol. II, World Press, Calcutta.

- Gupta, B.N.: Statistics: Theory and Practice, Sahitya Bhawan, Agra (The Chapter onIndian Statistics)

- Agarwal, B.L. Basic Statistics, Wiley Eastern Ltd.,

Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester: V, 2025-26

Discipline Specific Elective (DSE)

STA7101P: APPLIED STATISTICS PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Computations of death rates, birth rates, reproduction rates and construction of lifetables.
2. Exercises on various types of index numbers.

B.Sc. / B.A. Statistics Semester: V, 2025-26

Discipline Specific Elective (DSE)

STA7102T: SAMPLING TECHNIQUES

(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		
Unit-I: Sampling surveys vs. complete enumeration, random and purposive sampling. Methods of drawing random sample, the principal steps in sample surveys, sampling and non sampling errors.		
Unit-II: Simple random sampling with and without replacement, stratified random sampling, comparison of stratified sampling with SRSWOR.		
Unit-III: Ratio and regression methods of estimation, estimation of population mean and total in large sample size. Comparison with simple estimator.		
Unit -IV: Systematic Sampling: unbiased estimator, variance of the estimator (including in terms of intra class correlation coefficient), Comparison with SRS, elementary idea of estimation of variance". Cluster Sampling with equal cluster size: Unbiased estimator, variance of the estimator / (including in terms of intra class correlation coefficient), estimation of variance.		
Unit -V: Two stages sampling in case of equal cluster size at both the stages. Two phase sampling: ratio and regression estimation.		
SUGGESTED BOOKS		
• Sukhatme, P.V. and others: Sample Surveys and its application, ISAS, Delhi – 12. • Cochran, W.G.: Sampling Technique, John Wiley Publication, New York. **Note: Latest edition of textbooks and reference books may be used.**		

B.Sc. / B.A. Statistics Semester: V, 2025-26

Discipline Specific Elective (DSE)

STA7102P: : SAMPLING TECHNIQUES PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Practical on sampling techniques :
     (i) SRSWOR (ii) SRSWR
     (iii) Stratified sampling (iv) Systematic sampling
     (vi) Cluster sampling

B.Sc. / B.A. Statistics Semester: VI, 2025-26

Discipline Specific Elective (DSE)

STA7103T: THEORY OF ESTIMATION AND TESTING OF HYPOTHESIS

(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

SYLLABUS
Unit-I: Stochastic convergence: Chebyshev's inequality and its generalized form, weak and strong law of large numbers, simple form of central limit theorem.
Unit-II: Concepts of point estimation, properties of point estimators such as consistency, unbiasedness, minimum variance. Unbiased estimators, efficiency and simple notion of sufficiency, factorization theorem (without proof).
Unit-III: Different methods of finding estimators such as method of moments, method of minimum variance, method of least square and maximum likelihood (without detailed discussion of their properties).
Unit -IV: Testing of hypothesis, simple and composite hypotheses, two types of errors, idea of best critical region, power of a test, power curves in simple cases. Nayman-Pearson lemma.
Unit -V: General theory of test of significance, Large sample tests for mean and proportions. Applications of X^2 (chi-square) t and F in testing of hypotheses. The interval estimation of Normal population mean, variance, difference of means, ratio of variances.

SUGGESTED BOOKS
• Gupta, S.C. and Kapoor, V.K.: Fundamental of Mathematical Statistics, Sultan Chand andSons, Delhi.
• Surendran, P.U. and Saxena, H.C. : Statistical Inference, S.Chand & Co. Delhi.
Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester: VI, 2025-26

Discipline Specific Elective (DSE)

STA7103P: THEORY OF ESTIMATION AND TESTING OF HYPOTHESIS PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1. Test of significance based on normal, X^2 (chi-square), t and F tests, power curve.

B.Sc. / B.A. Statistics Semester: VI, 2025-26

Discipline Specific Elective (DSE)

STA7104T: STATISTICAL QUALITY CONTROL AND DESIGNS OF EXPERIMENTS

(30 CA + 70 End Sem. = Max. Marks: 100)

Course Credits	No. of Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
SYLLABUS		

Unit-I: Concept of Statistical quality control, Control charts : $(x, \overline{R}), (x, \overline{\sigma})$, p, np, c-charts, their constructions and uses .

Unit-II: Sequential Analysis: Sequential probability ratio test, O.C. and A.S.N. functions and their applications.

Unit-III: Sampling Inspection by attributes: Producer's risk, consumer's risk, AOQL, ASN, OC,Single, Double and Sequential Sampling plans and their comparison.

Unit -IV: Analysis of variance, one way and two way classification, including multiple but equalnumber of observations per cell. The completely randomized design, Randomized block design.

Unit -V: comparison of RBD with CRD, Lay-out of RBD. The Latin square design, its layout and analysis. Factorial experiments, the main effects and interactions layout and its analysis (in 2^2 and 2^3 carried out in a RBD only).

SUGGESTED BOOKS
• Gupta, B.N.: Statistics (Theory and Practical), Sahitya Bhawan, Agra.
• Goon, Gupta, Dasgupta: Fundamentals of Statistics, Vol. II.
• Grant, E.L.: Statistical Quality Control, Mc-Graw Hill, New York.
• Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, Sultan Chand & Sons, Delhi.
• Rahatgi, V.: Statistical Inference, Wiley.
Note: Latest edition of textbooks and reference books may be used.

B.Sc. / B.A. Statistics Semester: VI, 2025-26

Discipline Specific Elective (DSE)

STA7104P: STATISTICAL QUALITY CONTROL AND DESIGNS OF EXPERIMENTS PRACTICAL

(30 CA + 70 End Sem. = Max. Marks: 100)

The following topics are prescribed for practical works:

1.   Analysis of variance: One-way and two-way classifications.

2. Analysis of (i) completely randomized (ii) randomized block and Latin square designs,factorial experiments.

3.   Practical on SQC