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DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

B.Sc. (Statistics Paper)

(SEMESTER SYSTEM)

B.Sc. Statistics paper

COURSE TITLE: B.Sc. (STATISTICS)

DURATION : 6 SEMESTERS

MODE : SEMESTERS

FIRST SEMESTER

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Descriptive Statistics	BSCST/S/101	40	60			100
Probability Theory	BSCST/S/102	40	60			100

SECOND SEMESTER

COURSE TITLE	Paper Code	MARKS				
		THEORY		PRACTICAL		TOTAL
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
Theoretical Distributions	BSCST/S/201	40	60			100
Statistical Methods and Introductory O.R	BSCST/S/202	40	60			100
Practical	BSCST/S/203			40	60	100

Paper-I
Code No.BSCST/S/101

Time: 3 hour
M.M.: 60+40

Descriptive Statistics

Note: There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four unit uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all one from each unit and the compulsory one. The weightage of all the questions will be the same.

Unit-I

Meaning and scope: Origin, development and definition of Statistics, Importance and scope of Statistics, limitation and distrust of Statistics, Role of computers in solving Statistics problems.

Types of data: Concepts of Statistical population and sample from a population; qualitative and quantitative data; discrete and continuous data; frequency and non-frequency data, collection and presentation of data; primary data, secondary data. Diagrammatic and graphical representation of grouped data.

Unit-II

Frequency distributions, cumulative frequency distribution and their graphical representation, histogram, frequency polygon and ogives

Measures of central tendency: requisities for an ideal measure of central tendency, Arithmetic Mean, weighted Mean, Median, Mode, Geometric Mean, Harmonic Mean, Partition values and their graphical location.

Unit-III

Dispersion: characteristics for an ideal measures of dispersion, measures of dispersion; range, quartile deviation, Mean deviation, Standard deviation (σ) and Root mean square deviation(s), relation between σ and s , variance of the combined series, co-efficient of dispersion and variation, Moments: Relation between moments about mean in terms of moments about any point and vice versa, effect of change of origin and scale on moments, Pearson's β and γ co-efficients, skewness, measures of skewness, kurtosis.

Unit-IV

Analysis of categorical data: Consistency of categorical data. Independence and association of attributes. Various measures of association for two way and three way classified data.

Books Recommended:

<u>Sr. No.</u>	<u>Title of Books</u>	<u>Name of Authors</u>	<u>Publishers</u>
01.	Fundamentals of Statistics	Gupta S.C. and Kapoor V.K.	Sultan Chand and Sons
02.	Fundamentals of Statistics Vol.1	Goon A.M., Gupta M.S. Dass Gupta B.	World Press, Calcutta (1991)
03.	Mathematical Statistics	J.N. Kapoor & H.C. Sharma	Sultan Chand and Sons
04.	Mathematical Statistics	O.P. Gupta	Kedar Nath Ram Nath & Co.
05.	Basic Statistics	B.L. Aggarwal	New Age International
06.	Statistics	Richard Johnson	Wiley Publishers

B.Sc.-I (Semester- I)
(w.e.f. 2009-10)

Paper-II
Code No.BSCST/S/102

Time: 3 hour
M.M.: 60+40

Probability Theory

Note: There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four unit uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all one from each unit and the compulsory one. The weightage of all the questions will be the same.

Unit-I

Important concepts in Probability: Basic Terminology, Classical probability, Statistical probability and their limitations, subjective probability, Axiomatic approach to probability. Addition theorem of probability, Extension of addition theorem of probability to n events, Boole's inequality.

Unit-II

Conditional probability, Multiplication theorem of probability, Independent events, Multiplication theorem of probability for independent events, Extension of multiplication theorem of probability to n events. Pairwise independent events: Mutual independent events, probability of occurrence of at least one of the events. Bayes theorem and its applications.

Unit-III

Random variables and Distribution functions: Random variable, Distribution function and its properties, Discrete Random variable; Probability mass function, Discrete distribution function, Continuous random variable; Probability density function. Various measures of central tendency, Dispersion, Skewness and Kurtosis for continuous probability distributions, Continuous distribution function. Two dimensional random variables: Joint probability mass function, Two dimensional distribution function and joint density function, Marginal distribution and density function, Stochastic Independence.

Unit-IV

Mathematical Expectation: Expected value of a random variable, Expected value of function of a random variable, Addition and Multiplication theorems of expectation. Properties of variance. Covariance, variance of a linear combination of random variables. Moments

generating function, limitations and its properties, cumulants and its properties, Characteristic function and probability generating function.

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01.	Fundamentals of Statistics	Gupta S.C. and Kapoor V.K.	Sultan Chand and Sons
02.	Fundamentals of Statistics Vol.1	Goon A.M., Gupta M.S. Dass Gupta B.	World Press, Calcutta (1991)
03.	Mathematical Statistics	J.N. Kapoor & H.C. Sharma	Sultan Chand and Sons
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B.Sc.-I (Semester-II)
(w.e.f. 2009-10)

Paper-I
Code No.BSCST/S/201

Time: 3 hour
M.M.: 60+40

Theoretical Distributions

Note: There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four unit uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all one from each unit and the compulsory one. The weightage of all the questions will be the same.

Unit-I

Discrete uniform distribution, Bernoulli distribution and its moments, Binomial distribution: Moments, recurrence relation for the moments, factorial moments, mean deviation about mean, mode, moment generating function (m.g.f.), additive property, characteristic function (c.f.), cumulants, recurrence relation for cumulants, probability generating function (p.g.f.) and recurrence relation for the probabilities of Binomial distribution. Negative Binomial distribution: m.g.f. cumulants and p.g.f. negative binomial distribution, deduction of moments of negative binomial distribution from those of binomial distribution.

Unit-II

Poisson Distribution: Moments, mode, recurrence relation for moments, m.g.f., c.f., cumulants and p.g.f. of Poisson distribution, additive property of independent Poisson variates. Geometric distribution: Lack of memory, moments and m.g.f. of Geometric distribution. Mean and variance of the Hypergeometric distribution.

Unit-III

Normal distribution: Normal distribution as a limiting form of binomial distribution, chief characteristics of Normal distribution; mode, median, m.g.f., c.g.f. and moments of Normal distribution, A linear combination of independent normal variates, point of inflexion mean deviation about mean, area property of Normal distribution, importance and fitting of normal distribution, Log-normal distribution. Uniform distribution: Moments, m.g.f., characteristic function and mean deviation of uniform distribution.

Unit-IV

Gama Distribution: m.g.f. of Gama distribution, Beta distribution of first and second kind
Exponential distribution, Cauchy distribution.

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01.	Fundamentals of Statistics	Gupta S.C. and Kapoor V.K.	Sultan Chand and Sons
02.	Fundamentals of Statistics Vol.1	Goon A.M., Gupta M.S. Dass Gupta B.	World Press, Calcutta (1991)
03.	Mathematical Statistics	J.N. Kapoor & H.C. Sharma	Sultan Chand and Sons
04.	Mathematical Statistics	O.P. Gupta	Kedar Nath Ram Nath & Co.
05.	Basic Statistics	B.L. Aggarwal	New Age International
06.	Statistics	Richard Johnson	Wiley Publishers

B.Sc.-I (Semester-II)
(w.e.f. 2009-10)

Paper-II
Code No.BSCST/S/202

Time: 3 hour
M.M.: 60+40

Statistical Methods and Introductory O.R.

Note: There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four unit uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all one from each unit and the compulsory one. The weightage of all the questions will be the same.

Unit-I

Correlation: Meaning of correlation, Scatter diagram, Karl Pearson's co-efficient of correlation, Probable error of correlation co-efficient. Spearman's rank correlation co-efficient, tied or repeated ranks. Curve fitting: Straight line and parabola by method of least square. Linear regression: Regression coefficients, properties of regression coefficients, Angle between two lines of regression, Standard error of estimate, Correlation co-efficient between observed and estimated values.

Unit-II

Multiple and partial correlation, Plane of regression, properties of residuals, co-efficient of multiple and partial correlation, multiple correlation in terms of total and partial correlation. Expression for regression co-efficient/partial correlation co-efficient in terms of regression co-efficient/partial correlation co-efficient of lower order.

Unit-III

Objective, Nature and description of Operations Research (O.R.) Characteristics and scope of O.R. Meaning and necessity of O.R. models. Classification and advantages & disadvantages of O.R. models.

Unit-IV

Linear Programming Problems (LPP): Introduction, Description and formulation of LPP: Product mix problem, Diet problem, Transportation problem, Trim-loss problems, Graphical method for solution of LPP, Limitations of graphical method.

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<u>Sr. No.</u>	<u>Title of Books</u>	<u>Name of Authors</u>	<u>Publishers</u>
01.	Fundamentals of Statistics	Gupta S.C. and Kapoor V.K.	Sultan Chand and Sons
02.	Fundamentals of Statistics Vol. II	Goon A.M., Gupta M.S. Dass Gupta B.	World Press, Calcutta (1991)
03.	Mathematical Statistics	J.N. Kapoor & H.C. Sharma	Sultan Chand and Sons
04.	Mathematical Statistics	O.P. Gupta	Kedar Nath Ram Nath & Co.
05.	Basic Statistics	B.L. Aggarwal	New Age International
06.	Statistics	Richard Johnson	Wiley Publishers
07.	Operations Research	B.S. Goel & S.K. Mittal	Pragati Prakasham Meerut
08.	Introduction to Operations Research	S.D. Sharma	Kedar Nath Ram Nath & Co.
09.	Operations Research	N.D. Vohra	

B.Sc.-I (Semester-I & II)
(w.e.f. 2009-10)

Paper-III
Code No.BSCST/S/203

Time: 3 hour
M.M. : 75 + 25

Practical

Note: Five questions will be set. The candidate will be required to attempt any three.

1. Presentation of data by frequency tables, diagrams and graphs.
2. Calculation of measures of central tendency, dispersion, skewness and kurtosis.
3. Exercises on mathematical expectations and finding measures of central tendency, dispersion, skewness and kurtosis of univariate frequency distributions.
4. Fitting of standard univariate discrete and continuous distributions.
5. Karl Pearson's correlation coefficient.
6. Fitting of curves by the least square method.
7. Regression of two variables.
8. Spearman's rank correlation.
9. Multiple regression of three variables.
10. Multiple correlation and partial correlation.

Note:- The course contents from 1 to 4 and 5 to 10 are to be covered in Semester-I & Semester-II respectively.