K. T. S. P. Mandal's
Hutatma Rajguru Mahavidyalaya , Rajgurunagar
Department Of Statistics
Teaching Plan
Academic Year 2014-15

Sr.No	Class	Paper	Name of Teacher
1	F.Y.B.Sc	Descriptive Statistics	Shah N.S.
2	F.Y.B.C.S.	Statistical Methods-I	Shah N.S.

Paper : Descriptive Statistics **Class: F.Y.B.Sc**

Month	Topic	Subtopic
July 2014	1**. Introduction to Statistics** **2. Population and Sample**	1.1 Meaning of Statistics as a Science. 1.2 Importance of Statistics. 1.3 Scope of Statistics: 1.4 Statistical organizations in India and their functions: 2.1 Types of characteristics: 2.2 Types of data: 2.3 Notion of a statistical population 2.4 Methods of sampling
August 2014	**3. Summary Statistics**	3.1 Classification 3.2 Measures of Central Tendency Arithmetic Mean (A.M.), median, mode Partition Values: Quartiles, Deciles and Percentiles Geometric Mean, Harmonic Mean, Weighted Mean 3.3 Measures of Dispersion Range, Semi-interquartile range, Mean deviation, Variance and standard deviation, Mean squared deviation coefficient of variation

Sept/Oct 2014	**4. Moments, Skewness and Kurtosis**	4.1 Raw moments (m'r) for ungrouped and grouped data 4.2 Central moments (mr) for ungrouped and grouped data 4.3 Relations between central moments and raw moments, upto 4-th order 4.4 Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution. 4.5 Bowley's coefficient of skewness 4.6 Karl Pearson's coefficient of skewness. 4.7 Measures of skewness based on moments ($\beta 1, \gamma 1$). 4.8 Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions. 4.9 Measures of kurtosis based on moments ($\beta 2, \gamma 2$).
Nov/ Dec 2014	**5. Theory of Attributes**	5.1 Attributes: 5.2 Consistency of data upto 2 attributes. 5.3 Concepts of independence and association of two attributes. 5.4 Yule's coefficient of association (Q), $-1 \leq Q \leq 1$, interpretation.
January 2015	**6. Correlation**	6.1 Bivariate data, Scatter diagram and interpretation. 6.2 Concept of correlation between two variables 6.3 Covariance between two variables (m11) : 6.4 Karl Pearson's coefficient of correlation (r) 6.5 Spearman's rank correlation coefficient: compute Karl Pearson's correlation coefficient between ranks.
February 2015	**7. Linear Regression Model**	7.1 Meaning of regression 7.2 Simple linear regression model: $Y = a + b X + \varepsilon$ 7.3 Concept of residual, plot of residual, coefficient of determination
Feb/Mar 2015	**8. Fitting of curves to the bivariate data Fitting of curves to the bivariate data**	8.1 Fitting of line ($Y = a + b X$), 8.2 Fitting of second degree curve 8.3 Fitting of exponential uncorrelatedness of two variables. 8.6 Variance of linear combination of variables Var(aX + bY).Correlation coefficient

	9 Index Numbers	9.1 Introduction. 9.2 Definition and Meaning. 9.3 Problems/considerations in the construction of index numbers. 9.4 Simple and weighted price index 9.5 Simple and weighted price index 9.6 Laspeyre's, Paasche's and Fisher's Index numbers. 9.7 Consumer price index number (i) family budget method (ii) aggregate expenditure method. 9.8 Shifting of base, splicing, deflating, purchasing power. 9.9 Description of the BSE sensitivity and similar index numbers.

Paper: Statistical Methods-I **Class: F.Y.B.C.S**

Month	Topic	Subtopic
July 2014	**1.Data Condensation and graphical methods**	1.1 Raw data, attributes and variables, discrete and continuous variables. 1.2 Presentation of data using frequency distribution and cumulative frequency distribution 1.3 Graphical presentation of frequency distribution-histogram, stem and leaf chart, less than and more than ogive curves. 1.4 Numerical problems related to real life situations.
	2. Review/ Revision of Descriptive Statistics	2.1 Measures of central tendency: Mean, Mode, Median Examples where each of these is most appropriate 2.2 Partition values: Quariles, Deciles, Percentiles, Box plot 2.3 Measures of Dispersion: Variance, Standard deviation, Coefficient of variation
August 2014	**3.Moments**	3.1 Raw and central moments 3.2 Relation between raw and central values upto fourth order 3.3 Numerical problems related moments

	4. Measures of Skewness and Kurtosis Discrete Sample Space)	3.1 Concept and definition of a discrete random variable. 4.1 Concept of symmetric frequency distribution, skewness, positive and negative skewness 4.2 Measures of skewness- Pearson's measure, Bowley's measure (β_1, γ_1) 4.3 kurtosis of a frequency distribution, Measures of kurosis (β_2, γ_2) based upon moments, types of kurtosis: (β_1, γ_1)tokurtic , platykurtic, mesokurtic 4.5 Numerical problems
Septmber 2014	**5. Discrete Random Variable**	5.1 Definition of random variable and discrete random variable 5.2 Definition of probability mass function, distribution function and its properties 5.3 Definition of expectation and variance, theorem on expectation 5.4 Determination of median and mode using p.m.f. 5.5 Numerical problems
Sept/Oct 2014	**6. Standard Discrete Distributions**	6.1 Discrete Uniform Distribution: definition, mean, variance 6.2 Bernoulli Distribution 6.3 Binomial Distribution 6.4 Geometric Distribution: 6.5 Poisson Distribution: 6.6 Illustration of real life situations 6.7 Numerical problems
Nov/ Dec 2014	**7. Correlation (for bivariate raw data)**	7.1 Bivariate data, scatter diagram 7.2 correlation 7.3 Karl Pearson's coefficient of correlation, limit of r 7.4 interpretation of r, coefficient of determination, Auto correlation 7.5 Numerical problems
Dec 2014	**8.Regression**	8.1 Regression 8.2 linear Regression 8.3 Fitting of straight line using least square method 8.4 Properties of Regression coefficients 8.5 Non linear Regression: second degree curve, growth curve 8.6 Residual plot, mean residual sum of squares

		8.7 Numerical problems
Jan/Feb 2015	**9. Multiple and partial correlation and Regression (for trivariate data)**	9.1 Yule's notation and concept of multiple regression 9.2 Fitting of multiple Regression plane 9.3 Partial Regression coefficient 9.4 Multiple correlation coefficient 9.5 Partial correlation coefficient 9.6 Numerical problems
Feb 2015	**10. Time Series**	10.1 Meaning and utility 10.2 Component of Time series 10.3 Additive and Multiplicative models 10.4 Methods of estimating trend : moving average method, least square method and exponential smoothing method 10.5 Elimination of trend using additive and multiplicative models 10.6 Simple time series models 10.7 Numerical problems

Shah N.S.

Sr.No	Class	Paper	Name of Teacher
1	F.Y.B.Sc	Discrete Probability and Probability Distributions	Kale B.S.
2	F.Y.B.C.S.	Statistical Methods-II	Kale B.S.
3	F.Y.B.C.A	Computer Applications in Statistics	Kale B.S.

Paper : Discrete Probability and Probability Distributions.

Class: F.Y.B.Sc

Month	Topic	Subtopic
July 2014	**1. Review of probability, conditional probability, independence**	1.1 Experiments/Models, Ideas of deterministic and non-deterministic models. Random Experiment, concept of statistical regularity. 1.2 Definitions of - (i) Sample space, (ii) Discrete sample space: finite and countable infinite, (iii) Event, (iv) Elementary event, (v) Complement of an event. (vi) Certain event (vii) Impossible event 1.3 Concept of occurrence of an event. 1.4 Algebra of events and its representation in set theory notation. Occurrence of following events. (i) at least one of the given events, (ii) none of the given events, (iii) all of the given events, (iv) mutually exclusive events, (v) mutually exhaustive events, (vi) exactly one event out of the given events. 1.5 Classical definition of probability and its limitations. 1.6 Probability model, probability of an event, equiprobable and non-equiprobable sample space, 1.7 Axiomatic definition of probability. 1.8 Definition of conditional probability of an event. 1.9 Definition of independence of two events

		$P(A \cap B) = P(A) \cdot P(B)$ 1.10 Pairwise independence and mutual independence for three events 1.11 Multiplication theorem $P(A \cap B) = P(A) \cdot P(B\|A)$. Generalization to $P(A \cap B \cap C)$.
August 2014	**2. Bayes' Theorem** **3. Univariate Probability Distributions (Defined on Discrete Sample Space)**	2.1 Partition of the sample space 2.2 Proof of Bayes' theorem. Applications of Bayes' theorem in real life 3.1 Concept and definition of a discrete random variable. 3.2 Probability mass function (p.m.f.) and cumulative distribution function (c.d.f.), $F(\cdot)$ of discrete random variable, properties of c.d.f.. 3.3 Mode and median of a univariate discrete probability distribution
Septmber 2014	**4. Mathematical Expectation (Univariate Random Variable)**	4.1 Definition of expectation (Mean) of a random variable, expectation of a function of a random variable, m.g.f. and c.g.f. Properties of m.g.f and c.g.f. 4.2 Definitions of variance, standard deviation (s.d.) and Coefficient of variation (c.v.) of univariate probability distribution, effect of change of origin and scale on mean, variance and s.d. 4.3 Definition of raw, central and factorial raw moments of univariate probability Distributions and their interrelations **(**without proof). 4.4 Coefficients of skewness and kurtosis based on moments.
October 2014	**5. Some Standard Discrete Probability Distributions - I**	5.1 Degenerate distribution, mean and variance 5.2 Uniform discrete distribution, p.m.f., c.d.f., mean, variance, real life situations, comments on mode and median 5.3 Bernoulli Distribution: p.m.f., mean, variance 5.4 Binomial Distribution: p.m.f., mean, variance 5.5 Hypergeometric Distribution : p.m.f., Computation

		of probability, situations where this distribution is applicable, binomial approximation to hypergeometric probabilities, mean and variance of the distribution
Nov/ Dec 2014	**6. Some Standard Discrete Probability Distributions - II**	6.1 Poisson distribution: m.g.f. and c.g.f. Moments, mean, variance, skewness and kurtosis 6.2 Geometric distribution: Mean, variance, m.g.f. and c.g.f.
January 2015	**7. Bivariate Discrete Probability Distribution**	7.1 Definition of two-dimensional discrete random variable, its joint p.m.f. and its distribution function and their properties 7.2 Computation of probabilities of events in bivariate probability distribution. 7.3 Concepts of marginal and conditional probability distributions. 7.4 Independence of two discrete random variables based on joint and marginal p.m.f.s
Feb/Mar 2015	**8. Mathematical Expectation (Bivariate Random Variable)**	8.1 Definition of raw and central moments, m.g.f, c.g.f. 8.2 Theorems on expectations .8.3 Conditional expectation. 8.4 Definitions of conditional mean and conditional variance. 8.5 Definition of covariance, coefficient of correlation, independence and uncorrelatedness of two variables. 8.6 Variance of linear combination of variables Var(aX + bY).Correlation coefficient

Paper : **Statistical Methods-II** **Class: F.Y.B.C.S**

Month	Topic	Subtopic
July 2014	**1. Detailed Review / Revision of Theory of Probability**	1.1 Counting Principles, Permutation, and Combination. 1.2 Deterministic and non-determination models. 1.3 Random Experiment, Sample Spaces (finite and countably infinite) 1.4 Events: types of events, Operations on events. 1.5 Probability - classical definition, probability models, axioms of probability, probability of an event. 1.6 Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 1.7 Numerical problems related to real life situations
August 2014	**2. Advanced Theory of Probability**	2.1Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B)=P(A).P(B\|A)$ 2.2 Bayes' theorem (without proof) 2.3 Concept of Posterior probability, problems on posterior probability. 2.4 Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative. 2.5 Concept and definition of independence of two events. 2.6 Numerical problems related to real life situations.
Sept /Oct 2014	**3. Continuous Random Variable**	3.1 Definition of continuous random variable (r. v.), 3.2 Probability density function (p.d.f.), 3.3 Cumulative distribution function (c.d.f.), its properties. 3.4 Calculation of mean, mode, median, variance, standard deviation for continuous r. v. 3.5 Numerical problems related to real life situations
Dec 2014	**4.Standard Continuous Probability Distributions**	1.Uniform Distribution: p.d.f., mean, variance, nature of probability curve. 2. Exponential Distribution: p.d.f., mean, variance, nature of probability curve, lack of memory property.

		3. Normal Distribution: Statement of p.d.f , nature of density curve, standard normal distribution, symmetry, computations of probabilities using normal probability table, normal approximation to binomial and poisson distribution, Central limit theorem, normal probability plot. 4. Pareto Distribution: p.d.f., mean, variance, applications
	5.Concepts and Definitions Related to testing of Hypothesis	5. Numerical problems related to real life situations. 1.Definitions: population, statistics, RSWR,SRSWOR, Random sample, parameter, statistic, standard error of estimator. 2. Concepts: null hypothesis, alternative hypothesis, critical region, level of significance, type I error, type II error, one and two sided tests, p-value.
Jan 2015	**6. Large Sample Tests**	1. Test for population mean 2. Test for equality of two population mean 3. Test for population proportion 4. Test for equality of population proportion 5. Numerical problems related to real life situations.
	7.Test based on t-distribution	1. One sample test concerning mean 2.Testing for equality of means of two populations 3. Paired t-test 4. Test for significance of correlation coefficient for bivariate raw data 5. Test for significance of regression coefficient for bivariate raw data 5. Numerical problems related to real life situations.

Feb 2015	**8. Test based on Chi-square distribution**	1. chi-square test for goodness of fit 2. Test for independence of attributes. 3. Test for significance of variation for a population. 4. Numerical problems related to real life situations.
	9.Non parametric tests	1.Run test 2. Sign test 3.Kolmogrov-Smirnov test 4. Mann-whitney test 5. Numerical problems related to real life situations.
	10. Simulation	1.Introduction, merits and demerits and pitfall 2. Psedo-random number generator 3. Model Sampling from uniform and exponential distribution

Paper : Computer Applications in Statistics Class: F.Y.B.C.A

Month	Topic	Subtopic
December 2014	**1. Methods of counting and Fundamental Principals of Counting**	1. Principals of counting 2. Permutations and combinations 3. Examples and problems
	2. Elements of Probability Theory	1. Random experiments, sample space, events, algebra of events. 2. Classical definition of probability, addition theorem of probability, Independence of events, Simple numerical problems.

Jan / Feb 2015	**3.Standard Discrete Distributions**	1.Disctrete Uniform : Probability Distribution, c.d.f. mean ,variance(without proof) 2.Bernoulli : probability distribution , mean, variance 3. Binomial : probability distribution, c.d.f., mean, variance, 4. Examples and problems.
March 2015	**4.Simulation Techniques**	1. Random Number Generator 2. Model sampling from discrete uniform and binomial distributions 3. Monte Carlo Simulation examples and problems.

Kale B.S.