Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE　　　　**Department: STATISTICS**

Program: BSc FY　　　　**Subject**: **STATISTICS**　　　　**Course Code**: CCS-I Section(A)

Paper Title: Descriptive Statistics and Computing

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Basic Statistics and Data Condensation**	Meaning of statistics, Importance of Statistics in Industry, Medical Science, Social Sciences, Management Science, Agriculture and Insurance, Information Technology Education and Psychology, Statistical Organization in India and their functions, Central Stational Organization(CSO), Indian Statistical Insttute(ISI) National Sample Survey Organization(NSSO), Indian Institute of Population Studies(IIPS), Bureau of Economics and Statistics. Types of data: Primary and secondary data. Scales of measurements of variables: Nominal, Ordinal, Ratio and Interval. Frequency	To understand graphic &diagrammatic presentation. To see the different types of data.

		distribution(continuous and diccrete), Presentation of data, Graphical presentation of data by histogram, Frequency curve, Frequency polygon,Ogives, Stem and Leaf Chart. Dgrametic Representation of data:Bar chart, multiple bar charts,pie chart.	
II	**Measures of Central Tendency**	Measures of Central Tendency, Arithmetic mean(simple, weighted and trimmed mean), Combined mean, Geometric mean, Harmonic mean Median , Mode, Derivation of median formula for frequency distribution, Quartiles, Box PLOT, Calculating quartiles by analytical and graphical method, Uses of mean , median, mode harmonic mean, geometric mean, Relation between means, Merits and Demerits of measures of central tendency.	To estimate central value of the given data
III	**Measures of Dispersion**	Concepts of measures of dispersion, Types of measures of dispersion, Range, Quartile deviation Mean absolute deviation, about mean, Median Mode, Standard deviation, Variance, Root mean square deviation, Properties of variance Relation between Root mean square deviation and Standard deviation, Coefficient of variation	To find the different measures of dispersion by using data
IV	**Moments**	Raw and Central Moments, Moments about arbitrary point, Relation between raw and central moments(Up to 4th order), effect of change of origin	To estimate moments

		and scale on moments, Sheppard's Correction for central moments, Pearson's coefficients, Measures of Skewness and Kurtosis.	
V	**Statistical Computing Using Excel**	Graphical and diagrammatic presentation of data, Computation of various measures of central tendency, dispersion, skewness and kurtosis, moments using MS-Excel.	Interpretation of different parameters.

Specify Course Outcome: Estimation of parameters.

Specify Program Outcome: To recognize the different statistical aspects.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE   **Department: STATISTICS**

Program: BSc FY   **Subject**: **STATISTICS**   **Course Code**: CCS-II Section(A)

Paper Title: Theory of Variables and Attributes.

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Bivariate Data and Correlation.**	Graphical method to represents bivariate data, scatter diagram, concept of correlation, Karl pearson's product moment correlation and its properties, derivation of Rank correlation formua.	To understand the bivariate distributions
II	**Linear Regression**	Regression coefficient's, coefficient of determination, Lines of regression and their properties, Properties of regression coefficients, Derivation of lines of regression, residuals and their properties, residual plots.	To develop regression lines
III	**Theory of Attributes**	Concepts of attributes, Notations, Classification using dichotomy, Class frequency, Order of classes, Positive and negative class frequencies,,	To recognize attributes in statistics

		Ultimate class frequencies, Relation between class frequencies, Consistency of attributes, (up to three attributes)Independence and association of two attributes, Yules coefficient of association (Q), Coefficient of colligation (Y), Relation between them.	
V	**Computation Using Excel**	Computation of karl pearson's correlation coefficient, Spearman rank correlation coefficient, Fitting of regression line, Curves, Decide the best fit using R^2 with help of MS-Excel.	To use of data in Excel

Specify Course Outcome: To make convenient for different uses of parameter statistics.

Specify Program Outcome: To use of Excel in estimation of different parameters by using data

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE   **Department: STATISTICS**

Program: BSc SY   **Subject**: **STATISTICS**   **Course Code**: CCS-III Section(B)

Paper Title: Applied Statistics-VII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Multiple and Partial Correlation Coefficient:**	Multiple and Partial Correlation (for trivariate data), Yule's notation, Plane of regression, residual's and its properties, Variance of the residual, Coefficient of multiple correlation, Properties of multiple correlation coefficient and Partial correlation coefficient.	To understand multiple and partial correlation
II	**Time Series Analysis**	Meaning of time series, Components of time series, Trend , Seasonal variation, Cyclical variation, Irregular component, Models of time series, Analysis of time series, Applications of time series, Autoregressive model AR(1)	To see the different models in time seres

III	**Measurement of trend and Seasonal variations**	i) Graphical Method, Method of exponential smoothing , Method of moving averages, Method of least squares. ii) Measurement of seasonal fluctuations by method of simple averages, Ratio to trend method, Ratio to moving average method.	To understand the different methods of trend.
IV	**Theory of Index Numbers**	Introduction, Problems involved in construction of index numbers, Calculation of price and quantity index numbers, Simple(un-weighted) Aggregate method, Weighted aggregate method, Average of price relatives, Weighted average relatives, Chain indices, Procedure of construction of chain indices, The criteria of good index numbers, Unit Test, Time reversal test, Factor reversal test, Circular test Uses and limitations of index numbers, Laspeyre's price index, Paasche's price index, Dorbish-Bowley price index numbers, Marshell-Edgeworth price index, Irving Fisher's Ideal index number Quantity Index numbers, Value Index numbers.	To recognize the theory of index numbers

Specify Course Outcome: To develop the trends in time series.

Specify Program Outcome: To clear the models of time series.

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE   **Department: STATISTICS**

Program: BSc SY   **Subject**: **STATISTICS**   **Course Code**: CCS-IV Section(B)

Paper Title: Statistical Inference &Computing Using R-IX

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Theory of Point Estimation &Methods**	i)Basic concept , Prameter, Space, Statistic, Difference between estimate and estimator, Characteristics of estimators, Unbiasedness Consistency, Efficiency , Sufficiency, Factoriztion Theorem, Most efficient estimator, Minimum variance unbiased estimators(MVUE). ii)Methods of estimation: method of moment, Maximum likelihood estimation	To understand the theory estimation

II	**Testing of Hypothesis**	Introduction, Null hypothesis, Simple hypothesis, Composite hypothesis, Two types of errors, Critical region, Level of significance, P-value, Power of the Nyman's pear sons lemma, Most powerful test, Uniformly most powerful test	To use of different testing of hypothesis
III	**Large sample tests**	Test of significance for large samples, Single Proportion, Difference of proportions, Single mean, Difference of means, Problems and Application.	To understand the significance of mean , difference of means etc
IV	**Non Parametric Tests**	Sign test, Wilcox on signed rank test, Run test, Mann- Whitney U test , Merits and Demerits of Non Parametric Tests.	Use of statistics in NP test
V	**Fundamentals of R Software**	Introduction to R, Features of R, Starting and ending R session, Getting help in R, R commands and case sensitivity. Vectors and vector arithmetic.	Use of R software in statistics

Specify Course Outcome: Use of different statistical aspects in estimation theory

Specify Program Outcome: Procedure of testing statistical hypothesis for estimation of parameters .

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE   **Department: STATISTICS**

Program: BSc SY   **Subject**: **STATISTICS**   **Course Code**: CCS-III&IVSEM Section(B)

Paper Title: Practical Paper: CCSP III(Paper-XI)

Unit Number	Unit Name	Topics	Unit-wise Outcome
1.	**Practical**	Measurement of trend by method of exponential smoothing	Formation of trend
2.	**Practical**	Measurement of trend by moving averages	Smoothness of trend
3.	**Practical**	Measurement of linear trend by method of least squares	Formation of linear trend
4.	**Practical**	Fitting of AR(1) model	Model formation
5.	**Practical**	Measurement of seasonal variation by method of simple averages	Measurement of seasonal variation
6.	**Practical**	Measurement of seasonal variation by ratio to trend method	Ratio to trend formation

7.	**Practical**	Measurement of seasonal variation by ratio to moving average method	ratio to moving average formation
8.	**Practical**	Unweighted index number	Unweighted index formation
9.	**Practical**	Weighted index number by Laspeyr's and Paasche's index number.	weighted index formation
10.	**Practical**	Weighted index number by fisher's ideal index formula	By fisher index formula
11.	**Practical**	Cost of living index number	Cost of living for different commodities
12.	**Practical**	Multiple correlation coefficient by fitting of regression plane	Concept of correlation &regression
13.	**Practical**	Partial correlation coefficient	Concept of partial correlation
14.	**Practical**	Wilcox ion signed rank test	Concept of rank test
15.	**Practical**	Sign test for single sample &two sample	Concept of sign test
16.	**Practical**	Run test	Concept of run test
17.	**Practical**	Median test	Concept of median test
18.	**Practical**	Mann-Whitney U Test	Concept of U test
19.	**Practical**	Applications of Fisher's Z-Transformation	Concept of Z transformation

Specify Course Outcome: Different trends have cleared with different methods implemented.

Specify Program Outcome: Trends, seasonal variation, model formation autoregressive models

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L.BABLE   **Department: STATISTICS**

Program: BSc SY   **Subject**: **STATISTICS**   **Course Code**: SECS-II (B)

Paper Title: Statistical Study of Meteorology

Unit Number	Unit Name	Topics	Unit-wise Outcome
1.	**Basic Concepts**	Basic Concepts of meteorological statistics, Physical climatology, Climatic classification, Indian climatology Winter, Pre-monsoon, South-West monsoon season, Post Monsoon Season, Synoptic Climatology.	Climatic Aspects
2.	**Introduction to Statistics**	The purpose of statistics, Population and sample, Censuses and surveys, Descriptive statistics and inductive statistics, Fields of applications, Statistical variables-Qualitative and quantitative, Discrete and continuous variables.	Types of surveys

3.	**Definition of Time Series**	Different component of time series, stationary time series, - covariance and auto-correlation, Method of trend removing, Moving average method. Differencing, ITMS Software.	Formation and stationa -rity in time series

Specify Course Outcome: Three aspects climate, different survey methods, trend formation in time series are concluded.

Specify Program Outcome: Different types of trends in time series has cleared in the given program.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L. BABLE   **Department: STATISTICS**

Program: BSc TY   **Subject**: STATISTICS   **Course Code**: Section(A)

Paper Title: Survey Sampling (Compulsory)-XII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Sample Survey**	Concepts of population and sample, Sampling unit, Sampling frame, Parameters and Statistics, Sampling Distribution, Principle Steps in sample survey, Principles of sample survey, Sampling and non-sampling errors, Advantages of sampling over complete over complete census, Limitations of Sampling.	To develop Simple Random Sampling technique
II	**Types of Sampling**	Random and non-random sampling, Methods of achieving non-randomness, Sample size, Determination of sample size, Purposive sampling, Probability sampling, Snow ball sampling ,Quota Sampling, Mixed Sampling.	Various methods of sampling

III	**Simple Random Sampling**	Simple Random Sampling with and without replacement, Probability of selecting any specified unit in the sample, Selection of simple random sample, Notation and terminology, Estimation of population mean and its standard error, Simple random sampling of attributes, Merits and demerits of simple random sampling	Simple random sampling with and without replacement
IV	**Stratified Random Sampling**	Concept of Stratification, Sampling from heterogeneous population, Notation and terminology, Allocation of sample size, Proportional allocation, Neyman's allocation. Estimation of population mean and its variance with under each allocation and their comparison, Proportional allocation Vs Simple random sampling, Gain in precision due to Stratification	To develop stratified Sampling
V	**Systematic Sampling**	Sampling interval, Notation and terminology, Variance of estimated means, Relation between systematic sampling and simple random sampling, Merits and demerits of systematic sampling, Condition for systematic sampling to be better than simple random sampling.	To develop systematic Sampling

Specify Course Outcome: Various sampling techniques

Specify Program Outcome: To learn this program is to develop scientific view to conduct survey in proper way to collect the data about specific perspective.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L. BABLE **Department: STATISTICS**

Program: BSc TY **Subject**: STATISTICS **Course Code**: Section(A)

Paper Title: Design of Experiments (Compulsory)-XIV

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Analysis of Variance**	Introduction, one way, two way classification with One observation per cell, Mathematical model, ANOVA table, Degree of freedom, Hypothesis to be tested.	To know the statistical model
II	**Design of Experiments**	Introduction, Notation and Terminology, Principles of an experimental design, Replication, Randomization, Local control, Size of plot, Analysis of completely randomized design (CRD).	To know the design technology
III	**Randomized Block Design(RBD)**	Randomized Block Design(RBD), Statistical analysis of RBD for one observation per experimental unit, Comparison of CRD with	To verify the various types of design

		RBD in terms of efficiency, Missing value in RBD.	
IV	**Latin Square Design**	Latin Square Design(LSD), Analysis of Latin Square Design, Advantages and disadvantages of Latin Square Design, Efficiency of LSD compared with CRD and RBD, Missing value in LSD.	To verify the various types of design
V	**Factorial Experiments**	Factorial experiments, purpose, Need, Advantages of factorial experiments, Analysis of 2^2 and 2^3 factorial experiments, Yates correction method of computing factorial effect total, ANOVA table.	To study the clustring of design

Specify Course Outcome: Design of Experiments

Specify Program Outcome: Students should able to have skills of designing various kinds of techniques at different.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L. BABLE   **Department:STATISTICS**

Program: BSc TY   **Subject**: STATISTICS   **Course Code**: Section(A)

Paper Title: Practical IV(Compulsory)(Based on theory papers-XII&XIV).

Unit Number	Unit Name	Topics	Unit-wise Outcome
1.	**Practical**	Drawing Simple Random Sample	**To know the SRS**
2.	**Practical**	Estimation of Population Mean using SRS	**To know the SRS**
3.	**Practical**	Estimation of Population Variance using SRS	**To know the SRS**
4.	**Practical**	Estimation of Population Mean and Variance using different allocations in Stratified Random Sampling	**To know the SRS**
5.	**Practical**	Estimation of gain in precision due to Stratification	**To know the Stratification**
6.	**Practical**	Determination of sample size in Stratified Sampling	**To know the Stratification**

7.	**Practical**	Estimation of Population mean and Variance in Systematic Sampling	**To know the Systematic Sampling**
8.	**Practical**	ANOVA one way classification	**To know the ANOVA**
9.	**Practical**	ANOVA two way classification with one entry per cell	**To know the ANOVA**
10.	**Practical**	Analysis of Completely Randomized Design	**To know the CRD**
11.	**Practical**	Analysis of Randomized Block Design	**To know the RBD**
12.	**Practical**	Analysis of Latin Square Design	**To know the LSD**
13.	**Practical**	Missing Plot Technique of RBD	**To know the RBD**
14.	**Practical**	Missing Plot Technique of LSD	**To know the LSD**
15.	**Practical**	Efficiency of LSD over RBD	**To know the LSD**
16.	**Practical**	2^2 Factorial Experiment	**To know the Factorization method**
17.	**Practical**	2^3 Factorial Experiment	**To know the Factorization method**

Specify Course Outcome: To understand SRS, CRD, RBD, LSD and ANOVA etc.

Specify Program Outcome: To have knowledge about analysis of various kinds of data.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Prof. Dr. B.L. BABLE **Department: STATISTICS**

Program: B.Sc. T.Y. Sem V **Subject**: STATISTICS **Course Code**: SECS-III(A)

Paper Title: DATA MANAGEMENT AND ANALYSIS WITH ADVANCED EXCEL

Unit Number	Unit Name	Topics	Unit-wise Outcome
1.	**Introduction**	A Using excel lists, Creating a list, Sorting, To perform simple sort by MULTIPLE columns, Data forms: Adding data using the data form, AutoFilter, Advanced AutoFilters, Special features for Filtered lists, Totals and Subtotals, Total Row, Subtotals, Managing Windows, Multiple Windows Splitting Windows, Windows, Freezing Panes, Linking Data, Analysis ool pack, Analysis by goal seek, Analysis by pivot tables.	**To understand the different program**
2.	**Object oriented programming**	Working across application, File system objects controls, Class modules, Good programming techniques, Customizing menus and toolbars debugging, Handling	**To know the different program**

		errors, Recording macros, Running macros, Customizing menus and toolbars, Writing macros, Selecting cells and ranges, Talking to your user variables, Subroutines, Arrangements and functions, Loops and logic, Debugging, Handling errors, Event handling, The visual basic rabbit-hole, Looping over collections, Creating forms, Using forms, Advanced form controls, Programming menus and toolbars, Working across applications, Crib sheet.	

Specify Course Outcome: To have computer oriented knowledge.

Specify Program Outcome: Tabulation and interpretation of elementary MS-Excel.

Signature of Teacher

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. FY Semester-II   **Subject**: Statistics   **Course Code**: CCS –II Section (A)

Paper Title: Discrete Probability Distributions; Paper-III

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Uniform Distribution**	Uniform Discrete Distribution: - Definition, Mean, Variance and Moment Generating Function, Examples on real life situation	Learn the Discrete Distribution
II	**Binomial Distribution**	Bernoulli Distribution: Definition, Mean, Variance and Moment Generating function, Examples on real life situation, Binomial Distribution: Definition, Moments, Moment Generating Function, Cumulants, Additive property of Binomial Distribution, Recurrence Relation for the Probabilities of Binomial Distribution, Mode, Problems, Examples on real life situation	Know the distribution function and its characteristics
III	**Poisson distribution**	Poisson distribution as a limiting case of Binomial Distribution, moments of Poisson distribution, mode of Poisson Distribution, recurrence relation for moment of Poisson distribution, moment Generating and cumulant generating function, additive property of Poisson Distribution, recurrence formula for the probabilities of Poisson distribution	Know the idea of binomial and poisson distribution
IV	**Negative Binomial & Geometric Distribution**	(i)Definition, Moment Generating Function, cumulants, Moments, Relation between negative binomial and binomial distribution (ii) Geometric Distribution definition, lack of memory, Moments of geometric distribution moment generating function, mean, variance, Applications of geometric distribution in the real life situation and relation with the binomial distribution,	Learn the Expected value of Negative Binomial & Geometric Distribution
V	**Hyper geometric Distribution & Multinomial Distribution**	(I)Hyper geometric Distribution: Definition, Mean and variance, relation with Binomial distribution, Recurrence relation for the probabilities of Hyper Geometric Distribution, Examples on real life.(II) Multinomial Distribution:- Introduction, moments of Multinomial Distribution,Examples.	Gathering basic knowledge of Probability distribution function

Specify Course Outcome: Acquire basic knowledge about probability distribution function like binomial and poisson.

Specify Program Outcome: Understand probability distribution function like binomial and poisson with mathematical expectations and generating function.

Signature of Teachers   **Shri. D. N. Shinde**

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. FY Semester-I &II   **Subject**: Statistics   **Course Code**: CCSP –I Section (A & B)

Paper Title: Practical; Paper-V

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1. Construction of Frequency distributions 2. Bar Chart, Frequency polygon, Frequency Cruve, Ogives Histogram. (Also using MS-EXCEL/Spread Sheet) 3 Measures of central tendencies Mean, Median and Mode. (Also using MS-EXCEL/Spread Sheet) 4 Compute Quartiles by analytical and graphical method 5 Compute measures of dispersions Range, Quartile deviation, Mean deviation Standard deviation (Also using MSEXCEL/ Spread Sheet 6 Coefficient of variation 7 Moments 8 Correlation coefficient (Results to be verified by using computer) 9 Regression (Results to be verified by using computer 10 Spearman's rank correlation coefficient (For repeated and unrepeated ranks) 11 Fitting of Binomial distribution 12 Fitting of Poisson distribution 13 Fitting of Curves (i) $Y=a+bx$ (ii) $Y=ab^x$ (iii) Second degree curve 14 Attributes 15 Computation of probabilities of bivariate distribution 16 Most Plausible values of system of liner equations	Experience the study of representation of statistical data by graph

Specify Course Outcome: Analyze the statistical data by different measures.

Specify Program Outcome: Understand the statistical representation of data by graph and tabular form.

Signature of Teachers   **Shri. D. N. Shinde**

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. SY Semester-IV   **Subject**: Statistics   **Course Code**: CCS –IV Section (A)

Paper Title: Exact Sampling Distributions; Paper-VIII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Chi-square Distribution**	Chi-Square variate, Derivation of Chi-Square Distribution (Using method of moment generating function), Nature of Chi-Square probability curve, moment generating function, Cumulant Generating Function, limiting form of Chi-Square Distribution for large Degrees of Freedom Moments, Mode and Skewness of ChiSquare Distribution, Additive property of Chi-Square Distribution	Learn the Chi-Square Distribution
II	**Applications of Chi-square distribution**	Chi-square Distribution for Testing of Hypotheses (i) Population variance (ii) goodness of fit (iii)Test of independence of attributes, contingency table, Yates correction for 2x2 contingency table (iv) Homogeneity of three or more correlation Coefficients, Problems	Know the Applications of Chi-square distribution
III	**t- Distribution**	Students't' statistic, Derivation of student's t distribution, Fisher's t, Distribution of Fisher's t, moments of t- distribution, limiting form of t-distribution, graph of tdistribution. Applications of t – distribution for testing of hypothesis.(1)t-test for single mean, (2) t-test for difference of means (paired & unpaired), (3) t-test correlation coefficient ,problem	Know the idea of t-distribution
IV	**F- Distribution**	F- Statistic, Probability density function, moments of F-distribution, mode of Fdistribution, F- test for equality of two variances, Relation between F & tdistribution, F and Chi-Square Distribution, problem	Learn the F- Statistic
V	**Fisher's Z – Distribution**	Probability density function of Fisher's Z Distribution, Moment generating function of Z-distribution, Fisher's Z Transformation, problems	Gathering basic knowledge of Exact Sampling Distributions

Specify Course Outcome: Acquire basic knowledge about Exact Sampling Distributions function like t, F and Z distribution.

Specify Program Outcome: Understand the Exact Sampling Distributions function like t, F and Z distribution.

 Signature of Teachers   **Shri. D. N. Shinde**

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. FY Semester-I   **Subject**: Statistics   **Course Code**: CCS –I Section (A)

Paper Title: Elementary Probability Theory; Paper-I

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Probability**	Random experiment, trial ,out come and event, Exhaustive events, favourable events, Independent events, sample space, classical definition of probability, Empirical definition of probability, Axiomatic approach to probability, Addition Theorem of probability, Extension of Addition theorem of probability (up to 3events), Conditional probability. Conditional probability and Independent events, mutually and pair wise independent events, multiplication theorem of probability for Independent finite events, Bayes theorem, Baye's Theorem for further events	Learn the probability theory
II	**Random Variable (Univariate)**	Random Variable, Distribution function, discrete random variable, Probability Mass Function, Distribution function of discrete random variable, Continuous random variable, Probability Density Function, Distribution function of Continuous random variable, Properties of distributions (Continuous and Discrete)	Know the distribution function and random variables
III	**Random Variable (Bivariate)**	Definition, Two Dimensional Probability Mass Function, Marginal Probability Function, Conditional Probability Function, Two Dimensional Distribution Function, Marginal Distribution Function Joint Density Function, Marginal Density Function, Stochastic Independence and related theorems	Know the two dimensional random variables with probability function
IV	**Mathematical Expectations**	Definition, Expected value of random Variable, Expected value of Function of random variable properties of Expectations, Various measures of Central Tendency, Dispersion, skewness and Kurtosis for Discrete and continuous probability distribution, Basic concepts, Variance, Properties of variance, covariance, Variance of a Linear combination of Random variable, conditional expectations	Learn the Expected value of random Variable

V	**Probability Generating function**	Probability Generating function, Moment Generating Function- Definition, Properties of moment generating function, Cumulants, cumulant generating function properties of cumulants problems	Gathering basic knowledge of Probability Generating function

Specify Course Outcome: Acquire basic knowledge about probability theory, random variable with mathematical expectations and generating function.

Specify Program Outcome: Understand probability theory, random variable with mathematical expectations and generating function.

Signature of Teachers   **Shri. D. N. Shinde**

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. SY Semester-III   **Subject**: Statistics   **Course Code**: CCS –III Section (A)

Paper Title: Continuous Probability Distributions; Paper-VI

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Uniform and Exponential Distribution**	i) Rectangular or Uniform distribution: Definition, Moments, Moment generating function, Mean, Variance, Mean deviation about mean, examples, problems and application, Relation with other distributions, Properties of Rectangular distribution. Distributions of distribution function of continuous random variable. ii) Exponential Distribution: - Probability density function, Moment Generating function, Mean and Variance, lack of memory property, problems,	Learn the Continuous Probability Distributions
II	**Normal Distribution**	Probability density function, Normal Distribution as a limiting form of Binomial Distribution Important characteristics of Normal Distribution and Normal Probability curve, Mode, Median, Quartiles, Moment Generating Function and Cumulant Generating Function, Moments, Additive property for Linear combination of two independent normal variables, Mean deviation about mean, Area property (Normal probability integral),Importance of normal distribution, fitting of normal distribution, Use of Normal Probability	Know the normal distribution function and its characteristics
III	**Gamma Distributions**	Gamma Distribution with single and two parameters, Moment Generating Function, Cumulant Generating Function, limiting form of Gamma Distribution properties of Gamma Distribution, Beta Distribution of first and second kind, Moments of Beta Distributions, Relation between Exponential and Gamma Distribution as a sum of i.i.d. exponential random variables, Problems, examples, Applications, Transformation of one & Two Dimensional random variables.	Know the idea of Gamma Distribution
IV	**Weibull and Cauchy Distribution**	(i)Weibull Distribution:-Probability Density Function of Weibull Distribution with given shape and scale, parameter, Moments of standard Weibull Distribution,	Learn the Expected value of Probability Density Function of Weibull Distribution

		Characteristics of Weibull distribution (ii) Cauchy Distribution:- Probability density function of Cauchy Distribution, Characteristics of standard Cauchy Distribution, Comment on non existence, moments	
V	**Logistic Distribution**	Central Limit theorem, Application of central limit theorm, Probability density function of Logistic distrib ution, moment generating function of Logistic distribution, problems, De-Moivre, Lapalce Theorem.	Gathering basic applications of continuous distribution function

Specify Course Outcome: Acquire basic knowledge about continuous distribution function like normal and gamma.

Specify Program Outcome: Understand continuous distribution function like uniform and normal with their properties.

Signature of Teachers   **Shri. D. N. Shinde**

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. SY Semester-III   **Subject**: Statistics **Course Code**: SECS –I (B)

Paper Title: Data Collection and Interpretation; SECS-I (B)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		The objective of the course is that, The Student to collection & presentation of data. It also discusses how data can be summarized and analyzed for drawing statistical inference. The students will be introduced to important data sources that are available & will also be trained in the use of free statistical software to analyze data. Course Outline: 1. Sources of data, Population census versus sample surveys, Random Sampling. 2. Univariate frequency distribution, Measures of central tendency: mean, median & mode, Arithmetic Mean ,Geometric Mean & Harmonic Mean, Measures Of Dispersion, Skewness & Kurtosis. 3. Bivariate Frequency distribution, Correlation & Regression, Rank Correlation. 4. Introduction to Probability theory, Notation of random experiment, sample space, event, probability of event ,Conditional Probability, Independence of events, Random variables & probability distribution, Binomial & Normal Distributions. 5. Estimation of population parameters from sample data. Unbiased estimators for population mean and variance. 6. Basics of index numbers : price and quantity index numbers.	Experience the study of collection & presentation of data

Specify Course Outcome: Experience the study of summarized and analyzed for drawing statistical inference.

Specify Program Outcome: Understand the summarized and analyzed for drawing statistical inference.

Signature of Teachers   **Shri. D. N. Shinde**

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. TY Semester-V   **Subject**: Statistics   **Course Code**: DSES –I Section (B)

Paper Title: Linear Programming - Paper-XIII (B1) (Elective)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		Basics of operations Research: Introduction, scope, definition of operations research, Objectives of operations research, Phases of operations research, scope of operations research, Limitations of operations research.	Learn the basic idea of operational research
II		Linear Programming Problem: Introduction, General Linear Programming problems, Mathematical Formulation of L.P.P., Basic solution , Non degenerate and Degenerate Basic solution, Important Thermos Important Definitions, Convex set and Thermos on it.	Formulation of real problem into mathematical form
III		Solution of L.P.P. by Graphical Method, Slack and surplus variables, some definitions and Notations. Fundamental Theorems of L.P.P (Only statement). Basic Feasible Solution from feasible solution, Simplex Method of L.P.P, artificial variables, Big-M method, Numerical problems	Formulation of real problem into graphical form
IV		Assignment problem: Introduction, Assignment problem, Mathematical Formulation of an Assignment problem, Unbalanced Assignment Problem, method for solving a minimal Assignment problem (Hungarian Method)	Learn the Assignment method
V		Transportation problem: Introduction, Difference between Transportation problem and Assignment problem, Important definitions, solution of Transportation problem, Initial feasible solution ,North -West corner rule method, Lowest-cost entry method, Vogel's approximation method, Optimality test, computational procedure of Optimality test(Modified Distribution method), Resolving Degeneracy in Transportation problem, unbalanced Transportation problem	Learn the Transportation method

Specify Course Outcome: Acquire basic knowledge operation research and linear programming.

Specify Program Outcome: Understand the linear programming techniques for various problems.

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. SY Semester-III &IV   **Subject**: Statistics **Course Code**: CCSP –II Section (A)

Paper Title: Practical; Paper-X

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1. Fitting of Normal distribution 2. Problems based on area property of Normal distribution 3. Chi-square test for population variance 4. Chi-square test for goodness of fit 5. Chi-square test for 2x2 contingency table also using Yates correction 6. Chi-square test for Independence of attributes 7. Chi-square test of Homogeneity of Correlation coefficients 8. t - Test for single mean 9. t - Test for difference of means 10. Paired t – test 11. t - Test for testing the significance of sample correlation coefficient 12. F-Test for equality of two population variances 13. Estimation by method of moments 14. Estimation by method maximum likelihood estimation 15. Construction of confidence interval for mean and proportion 16. Large sample test for single mean 17. Large sample test for difference of means 18. Large sample test for single proportions 19. Large sample test for difference of proportions (Note: Results should be verified by Using R-	Experience the study of continuous probability distribution and exact sampling distribution

Specify Course Outcome: Analyze the continuous probability distribution and exact sampling distribution measures.

Specify Program Outcome: Understand the continuous probability distribution and exact sampling distribution measures.

Signature of Teachers   Shri. D. N. Shinde

Dnyanopasak Shikshan Mandal's
College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. TY Semester-VI   **Subject**: Statistics   **Course Code**: DSESP –V Section (B)

Paper Title: Based on theory papers-Paper XVII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1 Formulation of Linear Programming Problem 2 Solution of L.P.P. by Graphical method 3 Basic feasible solution of L.P.P. 4 Solution of L.P.P. by Simplex method 5 Solution of L.P.P. by Big-M method 6 Assignment problem 7 North-West Corner Rule method 8 Matrix Minima method 9 Vogel's Approximation Method 10 Optimality test 11 Unbalanced Transportation problem 12 Game with and without Saddle point 13 Graphical method to solve 2 x n and m x2 game 14 Dominance Property 15 Sequencing 16 Queuing 17 Simulation 18 Traveling salesman problem 19 PERT 20 CPM	Expertise various techniques of linear programming

Specify Course Outcome: Acquire basic knowledge operation research and its different techniques to solve the problems.

Specify Program Outcome: Understand the operation research and its different techniques to solve the problems for finding the optimum solutions.

Signature of Teachers   **Shri. D. N. Shinde**

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Shri. D. N. Shinde   **Department:** Statistics

Program: B. Sc. TY Semester-VI   **Subject**: Statistics   **Course Code**: SECS –IV (B)

Paper Title: Skill Enhancement Course SECS-IV (B)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		Introduction to clinical trials: need and ethics of clinical trials, bias and random error in clinical studies, conduct of clinical trials, overview of Phase I-IV trials, multicenter trials. Data management: data definitions, case report forms, database design, data collection systems for good clinical practice. Bioavailability. Design of clinical trials: parallel vs. cross-over designs, cross-sectional vs. longitudinal designs, objectives and endpoints of clinical trials, design of Phase I trials, design of single-stage and multi-stage Phase II trials. Design and monitoring of Phase III trials with sequential stopping; design of bio-equivalence trials. Inference for 2x2 crossover design: Classical methods of interval hypothesis testing for bioequivalence, Bayesian methods, nonparametric methods. Determining sample size, multiplicative (or log-transformed) model, ML method of estimation, assessment of inter and intra subject variabilities, detection of outlying subjects. Optimal crossover designs: Balaam's design, Two-sequence dual design. Optimal four period designs. Assessment of bioequivalence for more than two drugs	Experience the study of Data management and Design and monitoring of clinical trials with sequential stopping

Specify Course Outcome: Experience the study of summarized and analyzed for drawing statistical clinical trials.

Specify Program Outcome: Understand the summarized and analyzed for drawing statistical clinical trials.

Signature of Teachers   **Shri. D. N. Shinde**