

## References

1. Agresti, A. (2010): Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.
2. Anderson T.W. and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer
3. Freedman, D., Pisani, R. and Purves, R. (2014), Statistics, 4th Edition, W. W. Norton & Company.
4. Gani S. G., Sankhyshastra and Ganakayantra. Udaya Ravi Publications, Bijapur.
5. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
6. Gupta S P. and V K Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi

## Pedagogy

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.

### *BA Semester 2 Title of the*

#### *Course: Applied Statistics*

Course 3: Statistics for Economics		Course 4: Probability and Distributions	
Number of Theory Credits	Number of lecture hours/semester	Number of Theory Credits	Number of lecture hours/semester
3	42	3	42

Content of Course 3: Statistics for Economics	42 Hrs
<b>Unit – 1 :Supply and Demand</b>	<b>10 Hrs</b>
How Markets Work, Markets and Welfare Markets and competition; determinants of individual demand/supply; demand/supply schedule and demand/supply curve; market versus individual demand/supply; shifts in the demand/supply curve, demand and supply together; how prices allocate resources; elasticity and its application; controls on prices; taxes and the costs of taxation; consumer surplus; producer surplus and the efficiency of the markets.	
<b>Unit – 2:Measuring income inequality: Lorenz curve &amp; Gini Coefficient</b>	<b>10 Hrs</b>
Measuring income inequality: Pareto law of Distribution, Lorenz curve and Gini's Coefficient, Limitations and interpretations of GC.	
<b>Unit – 3:Index numbers</b>	<b>12 Hrs</b>

Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyre's, Paasche's, Bowley's, Marshall- Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests consistency of index numbers, time reversal test, factor reversal test, and Circular test for index numbers, Uses and limitations of index numbers. Consumer price index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate – CPI and GNP Deflator.	
<b>Unit 4: Time Series Analysis</b>	<b>10 Hrs</b>
Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time series: Secular trend, method of moving averages, least squares method – linear, quadratic, exponential trend fittings to the data. Seasonal variation - definition, illustrations, measurements, simple average method, ratio to moving average method, ratio of trend method, link relatives method, Cyclical variation- definition, distinction from seasonal variation, Irregular variation- definition, illustrations.	

## References

1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi.

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<b>Content of Course 4: Probability and Distributions</b>	<b>42 Hrs</b>
<b>Unit – 1 :Introduction to Probability</b>	<b>10 Hrs</b>
Introduction to probability, Basic concepts: Random experiment, Sample space, Mutually exclusive, exhaustive, equally likely events, complimentary events, classical, statistical and axiomatic definition of probability, properties, Addition theorem of Probability and Definition of independent, dependent events, Conditional probability, Multiplication theorem of Probability without proof. Simple numerical problems.	
<b>Unit – 2:Random Variable and Mathematical Expectation</b>	<b>10 Hrs</b>
Definition of a random variable, discrete & continuous random variable, probability mass function, probability density function, distribution function. Definition of mathematical expectation, expected mean and variance of discrete random variable. Properties of Mathematical expectation. Statement of addition and multiplication theorem of expectation. Numerical problems on mathematical expectation.	
<b>Unit – 3:Discrete Distributions</b>	<b>12 Hrs</b>
<b>Binomial Distribution:</b> Definition of Binomial Distribution, mean and Variance of Binomial distribution, numerical problems on binomial distribution. Uses of binomial distribution. Fitting of Binomial distribution and obtaining expected probabilities. Simple problems. <b>Poisson Distribution:</b> Definition of Poisson distribution. Mean, Variance and its properties of Poisson variate. Uses of Poisson distribution. Simple problems on Poisson distribution. Computing probabilities for large n and small p for the given $\lambda$ , finding $\lambda$ for given two successive probabilities. Conditions for Poisson distribution as limiting form of Binomial distribution. Fitting of Poisson distribution.	
<b>Unit – 4 : Normal Distribution</b>	<b>10 Hrs</b>
Definition of normal variate. Application of Normal distribution Definition of standard normal variate, standard normal distribution and properties of normal curve. Conditions under which binomial distribution tend to normal distribution (Statement only). Finding probabilities and expected numbers when mean and variance are given quartile deviation, mean deviation and standard deviation and problems.	

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1. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay
2. Mukhopadhyaya, P. Applied Statistics, New Central Book Agency (P) Ltd., Calcutta
3. Gupta S P. and V K Kapoor Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi.
4. Gani S. G., Sankhyshastra and Ganakayantra. Udaya Ravi Publications, Bijapur.

## Pedagogy

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
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Formative Assessment: 40 marks	
Assessment Occasion/ type	Weightage in marks
1 <sup>st</sup> Internal Assessment Test for 30 marks 1 hr after 8 weeks and 2 <sup>nd</sup> Internal Assessment Test for 30 marks 1 hr after 15 weeks . Average of two tests should be considered.	30
Assignment/Seminar (7 marks)+Attendance(3marks)	10
<b>Total</b>	40

Question Paper Pattern:

# RANI CHANNAMMA UNIVERSITY

## Department of Statistics

*I Semester B.A Statistics*

Sub:

Code:

Maximum Marks: 60

a. Answer any Six Questions from Question 1  
Questions from Question 2,3,4 and 5

b. Answer any Three each

Q.No.1.	Answer any Six Questions ( At least Two question from Each Unit) a. b. c. d, e. f. g. h.	2X6=12
Q.No.2.	(Should cover Entire Unit-I )a. b. c. d.	4X3=12
Q.No.3.	(Should cover Entire Unit-II )a. b. c. d.	4X3=12
Q.No.4.	(Should cover Entire Unit-III )a.	4X3=12
	b. c. d.	
Q.No.5.	(Should cover Entire Unit-IV)a. b. c. d.	4X3=12

## **List of Open Electives**

1. Statistics in Competitive Examinations
2. Statistical Methods
3. Business Statistics
4. Quantitative Aptitude

## *1. Statistics in Competitive Examinations (Open Elective)*

### **Course Objectives**

To train the students to solve the problems of statistics that appear in most of the competitive exams conducted by Banking, State and Central Governments and other agencies.

### *Course Outcomes (CO)*

After the successful completion of the course, the students will be able to develop the data analysis skills required for Competitive Examinations.

### **Pedagogy**

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.

### *Contents*

#### **Unit 1: Collection Classification and Presentation of Statistical Data (6 hours)**

Primary and Secondary data, Methods of data collection; Tabulation of data; Graphs and charts; Frequency distributions; Diagrammatic presentation of frequency distributions.

#### **Unit 2: Measures of Central Tendency and Dispersion (12 hours)**

Meaning of central tendency and essentials of a good measure of central tendency. Types of measures of central tendency, Arithmetic mean, Median, Mode, Geometric mean and Harmonic mean - definition, merits and demerits. Properties of arithmetic mean. Empirical relation between mean median and mode. Problems on both grouped and ungrouped data for all the measures.

Partition values-definition and types of partition values: quartiles, deciles and percentiles. Problems on Quartiles for grouped ungrouped data only.

Meaning and objectives of measures of dispersion. Essentials of a good measure of dispersion, absolute and relative measures of dispersion. Types of measures of

dispersion- Range, Quartile deviation, Mean deviation and standard deviation with relative measures – definition, merits and demerits. Properties of Standard deviation, simple problems on ungrouped and grouped data.

### **Unit 3: Aptitude Ability and Reasoning**

**(14 hours)**

Area, Banker's Discount, Surds and Indices, Ratio and Proportion, Simple Interest, Problems on Trains, Profit and Loss, Compound Interest.

Reasoning: Number series, Analogy, Classifications, Blood relations Coding-decoding, Puzzle test, Logical Venn diagram. Alphabet-test, Alpha-numerical sequence puzzle, Mathematical operations, Numbers, ranking & time sequence test, Logical sequence test, Arithmetical operations.

### **Unit 4: Introduction to Probability**

**(10 hours)**

Introduction to probability, Basic concepts: Random experiment, Sample space, Mutually exclusive, exhaustive, equally likely events, complimentary events, classical, statistical and axiomatic definition of probability, properties, Addition theorem of Probability and Definition of independent, dependent events, Conditional probability, Multiplication theorem of Probability without proof. Simple numerical problems.

### **References**

1. Freedman, D., Pisani, R. and Purves, R. (2014), Statistics, 4th Edition, W. W. Norton & Company.
2. Gupta S. C. Fundamentals of Statistics, Himalaya Publishing House, Bombay.
3. Gani S. G., Sankhyshastra and Ganakayantra. Udaya Ravi Publications, Bijapur.



## *2. Statistical Methods (Open Elective)*

### **Course Objectives**

This is an open elective course for social science and life science students.

The students will learn the elements of descriptive statistics, probability, statistical methods such as tests of hypotheses, correlation and regression.

### *Course Outcomes (CO)*

Students will be able to

CO1. Acquire the knowledge of statistical methods.

CO2. Identify types of data and visualization, analysis and interpretation.

CO3. Know about elementary probability and probability models.

CO4. Employ suitable test procedures for given data set.

### *Pedagogy*

The course is taught using traditional chalk and talk method using problem solving through examples and exercises. Students are encouraged to use resources available on open sources.

### *Contents*

#### **Unit 1: Introduction**

**(10 Hours)**

Definition and scope of Statistics. Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives. Concepts of statistical population and sample. Sampling from finite population - Simple random sampling, Stratified and systematic random sampling procedures (definitions and methods only). Concepts of sampling and non-sampling errors.

#### **Unit 2: Univariate and Bivariate Data Analysis**

**(10 Hours)**

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis. Bivariate data, scatter diagram, Correlation, Karl-Pearson's correlation coefficient, Rank correlation.

Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

### **Unit 3: Probability and Distributions**

**(12 Hours)**

Probability: Random experiment, trial, sample space, events-mutually exclusive and exhaustive events. Classical, statistical and axiomatic definitions of probability, addition and multiplication theorems, Bayes theorem (only statements). Discrete and continuous random variables, probability mass and density functions, distribution functions, expectation of a random variable.

Standard univariate distributions: Binomial, Poisson and Normal distributions (Elementary properties and applications only).

### **Unit 4: Sampling Distributions and Testing of Hypothesis**

**(10 Hours)**

Distribution of sample mean from a normal population, Chi-square, t and F distributions (No derivations) and their applications.

Statistical Hypothesis – null and alternative hypothesis, simple and composite hypothesis. Type I and Type II errors, level of significance, critical region, P-value and its interpretation.

Test for single mean, equality of two means, single variance, and equality of two variances for normal populations.

### **References**

1. Daniel, W. W. (2007) Biostatistics - A Foundation for Analysis in the Health Sciences, Wiley
2. T.W. Anderson and Jeremy D. Finn(1996). The New Statistical Analysis of Data, Springer.
3. MukhyopadyayaP(1999). Applied Statistics, New Central book Agency , Calcutta.
4. Ross,S.M.(2014) Introduction to Probability and Statistics For Engineers and Scientists.
5. Cochran, W G (1984): Sampling Techniques, Wiley Eastern, New Delhi.

### 3. Business Statistics (Open Elective)

#### *Course Objectives*

1. Provide an introduction to basics of statistics within a financial context.
2. To enable students to use statistical techniques for analysis and interpretation of business data.

#### *Course Outcomes (CO)*

Upon the completion of this course students should be able to:

CO1.Frame and formulate management decision problems.

CO2.Understand the basic concepts underlying quantitative analysis.

CO3.Use sound judgment in the applications of quantitative methods to management decisions.

#### **Pedagogy**

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.

#### **Contents**

##### **Unit 1: Statistical Data and Descriptive Statistics**

**(12 hours)**

Nature and Classification of data: univariate, bivariate and multivariate data; time-series and cross- sectional data. Measures of Central Tendency: mathematical averages including arithmetic mean geometric mean and harmonic mean, properties and applications. Positional Averages Mode and Median (and other partition values including quartiles, deciles, and percentiles). Measures of Variation: absolute and relative. Range,

quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis.

## **Unit 2: Simple Correlation and Regression Analysis**

**(10**

**Hours)** Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (Proof not required). Correlation and Probable error; Rank Correlation.

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate and its use in interpreting the results.

## **Unit 3: Index Numbers**

**(10 hours)**

Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyre's, Paasche's, Bowley's, Marshall- Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests consistency of index numbers, time reversal test and factor reversal test for index numbers, Uses and limitations of index numbers. Consumer price index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate – CPI and GNP Deflator.

## **Unit 4: Time Series Analysis**

**(10 hours)**

Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time

series: Secular trend, method of moving averages, least squares method – linear, quadratic, exponential trend fittings to the data. Seasonal variation - definition, illustrations, measurements, simple average method, ratio to moving average method, ratio of trend method, link relatives method, Cyclical variation- definition, distinction from seasonal variation, Irregular variation- definition, illustrations.

### *References*

1. Levin, Richard, David S. Rubin, Sanjay Rastogi, and H M Siddiqui. Statistics for Management. 7th ed., Pearson Education.
2. David M. Levine, Mark L. Berenson, Timothy C. Krehbiel, P. K. Viswanathan, Business Statistics: A First Course, Pearson Education.
3. Siegel Andrew F. Practical Business Statistics. McGraw Hill Education.
4. Gupta, S.P., and Archana Agarwal. Business Statistics, Sultan Chand and Sons, New Delhi.
5. Vohra N. D., Business Statistics, McGraw Hill Education.
6. Murray R Spiegel, Larry J. Stephens, Narinder Kumar. Statistics (Schaum's Outline Series), McGraw Hill Education.
7. Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
8. Anderson, Sweeney, and Williams, Statistics for Students of Economics and Business, Cengage Learning.

#### *4. Quantitative Aptitude (Open Elective)*

### **Course Objective**

To train the students in the aspects of numerical ability, reasoning techniques and mental ability for competitive examinations conducted by various public and private boards.

### *Course Outcomes (CO)*

After the successful completion of the course, the students will be able to develop the general skills required to Competitive Examinations.

### *Pedagogy*

Activity based teaching and learning along with theoretical aspects using classroom teaching, group discussions and seminars.

### *Contents*

Unit 1: Numerical Aptitude I (10 hours)

Number Systems, Computation of Whole Numbers, Decimals and Fractions and relationship between Numbers, Fundamental arithmetical operations.

Unit 2: Numerical Aptitude II (12 hours)

Percentages, Ratios and Proportions, Average, interest, Profit and Loss, Discount use of Tables and Graphs Time and Distance, Ratio and Time, Time and Work.

**Unit 3: Reasoning and Mental Ability I (10 hours)**

Coding-Decoding, Symbol notations, Number Series, Analogy & Classification, Blood relations, Direction Sense, Linear arrangement.

Unit 4: Reasoning and Mental Ability II (10 hours)

Ranking and Comparison, Input & output, Assumptions, Conclusion & Inferences.

### *References:*

1. Aggarwal R.S., Quantitative Aptitude: by, Publication by S, Chand
2. Ningappa A H, Mental Ability: Ashok Publication.