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|  | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  I B.Sc. (I Sem)  (2022-23) | | | |
| Course Code  1211 | **TITLE OF THE COURSE**  **Descriptive Statistics & Probability** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: | Basic Knowledge in Mathematics & Statistics | 4 | - | - | 4 |

# Course Objectives:

* This course gives the students to review good practice in presentation and format that most applicable to their own data.
* The measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
* The measures of dispersion throw light on reliability of average and control of variability
* This paper deals with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable and mathematical expectation which are essential in all research areas.

# Course Outcomes:

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| On Completion of the course, the students will be able to- | |
| **CO1** | **learn about basic concepts of Statistics** |
| **CO2** | **learn about various measures of Central tendency and also various dispersion** |
| **CO3** | **learn about Skewness and kurtosis** |
| **CO4** | **know about Probability Concept and Random variables** |
| **CO5** | **know about Expectations** |

**Course with focus on employability / entrepreneurship / Skill Development modules**

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| Skill Development |  |  | Employability |  |  | Entrepreneurship |  |

#### Module-I (10 Hrs)

Introduction to Statistics: Importance and scope of Statistics.Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

#### Module*-*II *(10 Hrs)*

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their inter-relations. Sheppard's correction for moments. Skewness and kurtosis.

Module-III (12 Hrs)

Introduction to Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorem and its applications in real life problems.

Module-IV (8 Hrs)

Random variable: Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. Simple Problems.

Additional Inputs: Bi-variate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

Module-V (10 Hrs)

Mathematical Expectation : Mathematical expectation of a random variable and its Properties. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

# Text books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan.**
2. **BA/BSc I year Statistics-descriptive statistics, probability distribution-Telugu Academy-Dr M. Jaganmohan Rao, Dr. N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt. D.Vijayalakshmi.**
3. **B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar**

# Reference books:

**1. Willam Feller: Introduction to Probability theory and its applications. Volume –I,**

**Wiley**

**2. Goon AM, Gupta MK, Das Gupta B: Fundamentals of Statistics, Vol-I, the**

**World Press Pvt.Ltd. Kolkata.**

# Web Links:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

# CO-PO Mapping:

**(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High], '-':No Correlation)**

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|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 3 | 2 | 1 | 2 | 2 |
| CO2 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO5 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |

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|  | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester**  I B.Sc. (I Sem) | | | |
| Course Code | **TITLE OF THE COURSE**  **Descriptive Statistics & Probability** |
| **Practical** | Hours Allocated: 30 | L | T | P | C |
| Pre-requisites: | **Application of Statistical tools and techniques** | - | - | 2 | 1 |

**Conduct any SIX (MS-Excel mandatory):**

1. Graphical presentation of data (Histogram, frequency polygon).
2. Construction of Ogive curves
3. Computation of measures of central tendency(Mean, Median andMode)
4. Computation of measures of dispersion(Q.D, M.D and S.D)
5. Computation of non-central, central moments, 1 and 2 for ungrouped data.
6. Computation of non-central, central moments, 1 and 2 and Sheppard’s corrections for grouped data.
7. Computation of Karl Pearson’s coefficient of Skewness and Bowley’s coefficient of Skewness.
8. Practicals 1, 2, 3, 4, 6, 7 using MS-Excel.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall be exported to MS word for writing inference.

# Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>

2. <https://en.wikipedia.org/wiki/Descriptive_statistics>

3. <https://www.scribbr.com/statistics/descriptive-statistics/>

4. <https://byjus.com/maths/probability-and-statistics/>

5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

**SEMESTER-I: DISCRIPTIVE STATISTICS& PROBABILITY**

**Model blue print for the Question Paper setter**

**Max. Marks: 50 Time: 2 ½ Hrs.**

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| **Module** | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **I** | **2** | **1** | **20** |
| **II** | **1** | **2** | **25** |
| **III** | **1** | **1** | **15** |
| **IV** | **1** | **1** | **15** |
| **V** | **2** | **1** | **20** |
| **Total including choice** | **7** | **6** | **95** |

**Statistics Course–I: DISCRIPTIVE STATISTICS& PROBABILITY**

**Question Bank**

**Short answer Questions:**

1. Explain the construction of Ogives.
2. Write the merits and demerits of mode.
3. Show that the sum of absolute deviation from median is minimum.
4. State and Prove properties of arithmetic mean
5. Explain an ideal measure of dispersion
6. Write about Sheppard’s corrections.
7. Define Kurtosis and explain.
8. State and prove addition theorem of probability for two events.
9. State and prove multiplication theorem for two events.
10. Define Probability density function.
11. Define Probability mass function.
12. Define distribution function and sate its properties.
13. Define Marginal and conditional distributions.
14. What is the chance that leap year selected at random will contain 53 Sundays.
15. A problem in statistics is given to the three students A,B and C whose chances of

solving it are 1/2, 3/4 and 1/4 respectively. What is the probability that the problem will be solved it all of them solve independently.

1. For a continuous random variable X with p.d.f. f(x)=3x2 ,0≤ x ≤ 1. Find a and b such

that i) p(X ≤ a) = p(X>a) and ii)p(X>b)=0.05

1. Define Mathematical Expectation of a random variable. State its properties?
2. State and prove addition theorem of expectation for 2 variables.
3. Define Characteristic function and state its properties.
4. Explain Cumulative generating function

**ESSAY QUESTIONS:**

1. Explain the various methods to collect primary data and the sources of secondary data.
2. Explain measures of central tendency.
3. Explain measures of dispersion.
4. Define central and non central moments and establish the relation between them.
5. Explain Karl Pearson’s and Bowley’s coefficient of Skewness.
6. State and prove addition theorem for n events.
7. State and prove multiplication theorem for n events.
8. State and prove Bayes’s theorem.
9. State and prove Boole’s inequality.
10. The first four moments about a point 4 are respectively 1, 4, 10 and 45. Fnd mean, variance, µ3 and µ4.
11. A random variable X lies the following probability distributions

X: 0 1 2 3 4 5 6 7 8

P(X): a 3a 5a 7a 9a 11a 13a 15a 17a

Find the values of a)a b) p(X<3) c)p(X≥3) d)p(0<X<5) e)p(X≤7)

1. Suppose that the random variables X takes the values 3,4 and 5 with probabilities 1/2 , 1/6 and

1/3 respectively. Obtain distribution function of the random variable X.

1. State and prove Cauchy’s Schwartz inequality.
2. State and prove Chebyshev’s inequality.
3. Define Moment generating function and derive its properties.
4. Define Probability generating function and derive its properties.

**P.R. Government College (Autonomous), Kakinada**

**I year B.Sc., Degree Examinations – Semester-I**

**Statistics Course–I: DISCRIPTIVE STATISTICS& PROBABILITY**

**Model Paper**

**Time: 2 ½ Hrs. Max. Marks: 50**

**Section – A**

**Answer any FOUR of the following questions. 4x5 = 20 M**

1. Explain the construction of Ogives.
2. Show that the sum of absolute deviation from median is minimum
3. Write the merits and demerits of mode.
4. State and Prove properties of arithmetic mean
5. Explain an ideal measure of dispersion
6. A problem in statistics is given to the three students A,B and C whose chances of

solving it are 1/2, 3/4 and 1/4 respectively. What is the probability that the problem will be solved it all of them solve independently.

1. For a continuous random variable X with p.d.f. f(x)=3x2 ,0≤ x ≤ 1. Find a and b such

that i) p(X ≤ a) = p(X>a) and ii)p(X>b)=0.05

**Section – B**

**Answer any THREE questions 3x10 = 30 M**

1. Explain the various methods of collecting primary data.
2. Explain measures of central tendency with their relative merits and demerits?
3. Define raw and central moments and establish relationship between them

11. State and prove Baye’s theorem probability.

12.A random variable X lies the following probability distributions

X: 0 1 2 3 4 5 6 7 8

P(X): a 3a 5a 7a 9a 11a 13a 15a 17a

Find the values of a)a b) p(X<3) c)p(X≥3) d)p(0<X<5) e)p(X≤7)

13.Define M.G.F state and prove its properties.