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| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester****I B.Sc Major/Minor****(II Sem)** **(2023-24)** |
| Course Code | **TITLE OF THE COURSE****Descriptive Statistics** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: |  **Basic Knowledge in Probability, Distributions and methods in statistics** | 3 | - | 1 | 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 which are essential in all research areas.

# Course Outcomes:

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

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

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

**Unit–1:Statistical Description of Data**

Origin, history and definitions of Statistics. Importance, Scope and limitations Statistics. Function of Statistics – Collection, Presentation, Analysis and Interpretation. Collection of data - primary and secondary data and its methods. Classification of data – Quantitative, Qualitative, Temporal, Spatial. Presentation of data – Textual, Tabular – essential parts.

**Unit– 2:**

Measurement Scales– Nominal, Ordinal, Ratio and Interval. Frequency distribution and types of frequency distributions, forming a frequency distribution .Diagrammatic representation of data–Historiagram ,Bar, Multiple bar and Pie with simple problems .Graphical representation of data: Histogram ,frequency polygon and Ogives with simple problems.

**Unit–3:Measures of Central Tendency(MCT)**

Arithmetic Mean – properties, methods .Median, Mode, Geometric Mean (GM), Harmonic Mean (HM).Calculation of mean, median, mode, GM and HM for grouped and ungrouped data .Median and Mode through graph. Empirical relation between mean , median and mode. Features of good average.

**Unit–4:Measures of Dispersion**

Concept and problems – Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non – Central moments and their interrelationship. Sheppard's correction for moments .Skewness and its methods ,kurtosis.

**Unit–5:Elementary Probability**

Basic Concepts of Probability, random experiments, trial , outcome, sample space, event , mutually exclusive and exhaustive events ,equally likely and favorable 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 and simple problems .Boole's inequality ,Baye’s theorem and its applications in real life problems.

# Textbooks:

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. JaganmohanRao, Dr.N.SrinivasaRao, Dr P.TirupathiRao, 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. **S.C. Gupta&V.K. Kapoor:FundamentalsofMathematicalStatistics,SultanCHAND &Sons,NewDelhi.**
2. **O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.**
3. **P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.**
4. **K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.**

# WebLinks:

 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)**

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

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| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program & Semester****I B.Sc Major/Minor****(II Sem)** **(2023-24)** |
| **CourseCode** | **TITLE OF THE COURSE****Descriptive Statistics Practical Course** |
| **Practical** | **Hours Allocated: 30 hrs** | **L** | **T** | **P** | **C** |
| **Pre-requisites:** |  **Basic knowledge in Sampling concept** | **-** | **-** | **2** | **1** |

1. Writing a Questionnaire in different situations.
2. Forming a grouped and ungrouped frequency distribution table.
3. Diagrammatic presentation of data–Bar ,multiple Bar and Pie.
4. Graphical presentation of data–Histogram, frequency polygon ,Ogives.
5. Computation of measures of central tendency–Mean ,Median and Mode.
6. Computation of measures of dispersion–Q.D .,M.D and S.D.
7. Computation of non-central, centralmoments,*1*and*𝛽2*forungroupeddata.
8. Computation of non- central, central moments , *𝛽1* and *𝛽2* and Sheppard‘s corrections for grouped data.
9. Computation of Karl Pearson‘s and Bowley‘s Coefficients of Skewness.

**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-II: DESCRIPTIVE STATISTICS (MAJOR 01)**

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

**Max. Marks: 50 Time: 2 Hrs.**

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

**Pithapur Rajah’s Government College (Autonomous), Kakinada**

**I year B.Sc., Degree Examinations - II Semester (w.e.f 2023-24)**

**For 2023-24 batch**

**Statistics Course II: DESCRIPTIVE STATISTICS (MAJOR 01)**

**Model Paper**

**Time: 2 Hrs. Max. Marks: 50**

**Answer any THREE of the following. Choosing at least one from each part. 3x10=30M**

 **SECTION - A**

**PART- I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | Explain about scope of Statistics. | BT1 | PO2 | C01 |
| 2 | Illustrate about graphical representation of data. | BT1 | PO1 | CO2 |
| **3** | Describe briefly about measures of central tendency. | BT2 | PO2 | CO3 |

**PART- II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | Explain in detailed about measures of dispersion  | BT1 | PO2 | CO3 |
| 5 | Explain about Baye’s theorem. | BT2 | PO1 | C04 |
| **6** | State and prove additional theorem for n events. | BT2 | PO2 | C04 |

 **SECTION – B**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7. | Explain about limitation of statistics. | BT1 | PO1 | CO2 |
| 8 | Write about classification of data. | BT3 | PO5 | CO2 |
| 9 | Analyze about nominal and ordinal measurement of scale. | BT2 | PO3 | CO3 |
| 10 | Explain about properties of A.M | BT1 | PO2 | CO3 |
| 11 | Show that Karl pearson coefficient of skewness lies between $\pm 3.$ | BT3 | PO2 | CO5 |
| 12 | State and prove multiplication theorem for 2events. | BT3 | PO1 | CO5 |
| 13 | Define (a)sample space (b) exhaustive events (c) exclusive events (d) favorable outcomes. | BT3 | PO2 | CO5 |

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| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A), KAKINADA** | **Program &Semester****I B.Sc Major****(II Sem)** **(2023-24)** |
| Course Code | **TITLE OF THE COURSE****RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS** |
| Teaching | Hours Allocated: 60 (**Theory**) | L | T | P | C |
| Pre-requisites: | **Basic Knowledge in random varibles ,expectations and about generating functions** | 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 which are essential in all research areas.

# Course Outcomes:

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

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

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

**Unit– 1:Univariate Random Variables**

Definition of random variable (r.v.), discrete and continuous random variables, functions of random variable. Probability mass function, Probability density function, Distribution function and its properties .Calculation of moments, coefficient of skewness and kurtosis for a given pmf and pdf.

# Unit – 2:Bivariate Random Variables

Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

# Unit–3:Mathematical Expectation

Mathematical expectation of function a random variable. Moments and covariance using mathematical expectation with examples.

Addition and Multiplication theorems on expectation Properties of expectations ,variance ,covariance. Chebyshev and Cauchy-Schwartz inequalities and their applications

# Unit–4:Generating functions

Definitions of Moment Generating Function, Cumulant Generating Function, Characteristic Function and Probability Generating Function and their properties. Weak Law of Large Numbers (WLLN),Strong Law of Large Numbers (SLLN).

# Unit–5:LimitTheorems

Concept – Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Convergence in probability and convergence in distribution, concept of Central limit theorem. Lindberg – Levy CLT and its applications ,Statement of Lyapunov‘s CLT,relationship between CLT and WLLN

# Textbooks:

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. JaganmohanRao, Dr.N.SrinivasaRao, Dr P.TirupathiRao, Smt. D.Vijayalakshmi.**
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4. **K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.**

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

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

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| C:\Users\dell\Desktop\P.R LOGO.png | **P.R.GOVERNMENT COLLEGE(A),****KAKINADA** | **Program & Semester****I B.Sc Major** **(II Sem)** **(2023-24)** |
| **CourseCode** | **TITLE OF THE COURSE****RANDOMVARIABLESANDMATHEMATICALEXPECTATIONS** |
| **Practical** | **Hours Allocated: 30 hrs** | **L** | **T** | **P** | **C** |
| **Pre-requisites:** | **Basic Knowledge in random varibles ,expectations and about generating functions** | **-** | **-** | **2** | **1** |

1. **Calculation of moments of uni variate random variable tothe given pmf.**
2. **Calculation of coefficient of skewness and kurtosis of uni variate random variable to the given pmf.**
3. **Calculation of moments of uni variate random variable to the given pdf.**
4. **Calculation of coefficient of skewness and kurtosis of uni variate random variable to the given pdf.**
5. **Problem related to jpmf, mpmf and conditional pmf and its independence.**
6. **Problem related to jpdf, mpdf andconditional pdf and its independence.**
7. **Chebyshev‘s inequality application oriented problems.**

# 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-II: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS (MAJOR 2)**

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

**Max. Marks: 50 Time: 2 Hrs.**

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

**Pithapur Rajah’s Government College (Autonomous), Kakinada**

**I year B.Sc., Degree Examinations - II Semester (w.e.f 2023-24)**

**For 2023-24 batch**

**Statistics Course II: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS (MAJOR 2)**

**Model Paper**

**Time: 2 Hrs. Max. Marks: 50**

**Answer any THREE of the following. Choosing at least one from each part. 3x10=30M**

 **SECTION - A**

**PART- I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | Define distribution function in univariate random variable and explain properties | BT2 | PO3 | CO3 |
| 2 | Describe about distribution function of bi variate random variables  | BT2 | P02 | C02 |
| **3** | State and prove additional theorem of expectation for n events | BT3 | PO4 | CO3 |

**PART- II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | State and prove chebyshev in equality | BT3 | PO4 | CO3 |
| 5 | Explain about moments generating function and its properties  | BT2 | PO5 | CO4 |
| **6** | Explain the following 1. Population (ii) Sample (iii) Parameter

(iv) statistic (v) sampling distribution (vi) standard error  | BT1 | PO3 | CO5 |

 **SECTION – B**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7. | Demonstrate P.M.F and P.D.F. | BT2 | P02 | C02 |
| 8 | Explain about bi variate discrete random variable. | BT1 | PO1 | CO2 |
| 9 | Explain about random variables and its types . | BT1 | PO2 | C01 |
| 10 | State and prove multiplication theorem in expectation for two events | BT3 | PO5 | CO2 |
| 11 | State and prove Cauchy-schwartz in equalities. | BT3 | PO3 | CO3 |
| 12 | Describe about strong-law of large numbers | BT3 | PO1 | CO5 |
| 13 | Write about statement of central limit theorem  | BT3 | PO2 | CO5 |