**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**I B.Sc. – Statistics / Semester- II (2018-19)**

**Paper II**

**Course: MATHEMATICAL EXPECTATIONS & PROBABILITY DISTRIBUTIONS**

**Total Hrs. of Teaching: 52 @ 4 h / Week Total Credits: 03**

-------------------------------------------------------------------------------------------------------------------------------**Objective:** Distinguish between discrete and continuous random variables, explain the difference between population, parameter, sample, and statistic, determine if a given value represents a population parameter or sample statistic, find probabilities associated with a discrete probability distribution. Compute the mean and variance of a discrete probability distribution. Find probabilities associated with a binomial distribution. find probabilities associated with a normal probability distribution using the standard normal table.

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**Module -1 (12h)**

**Mathematical Expectation:**

Mathematical expectation of a function of a random variable- Raw and central moments variance and covariance using mathematical expectation with examples.-Addition and multiplication theorems of expectation-Chebyshev’s and Cauchy-Schwartz’s inequalities and their applications.

**Module-2 (15h)**

**Generating Functions:**

Definition of (M.G.F),(C.G.F),(P.G.F),(C.F) And Properties-Statement and applications of weak law of large numbers and central limit theorem for identically and independently distributed (i.i.d) random variables with finite variance.

**Module-3 (13h)**

**Discrete distributions:**

Uniform, Bernoulli, Binomial, Poisson, Negative binomial, Geometric and Hyper-Geometric(mean and variance only) distributions- Properties of these distributions and moments up to fourth order and their real life applications-Reproductive property wherever exists-Binomial approximation to Hyper-Geometric, Poisson approximation to Binomial and Negative binomial distributions.

**Module-4 (15h)**

**Continuous distributions**:

Rectangular and Normal distributions-Normal distribution as a limiting case of Binomial and Poisson distributions-Exponential, Gamma, Beta of two kinds (mean and variance only)

Cauchy (definition and c.f. only) distributions-Properties of these distributions and moments up to fourth ordertheir real life applications and reproductive productive property wherever exists.

**List of Text Books:**

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan .

 Chand&Sons, New Delhi

 **List of Reference Books:**

1. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press

 Pvt.Ltd., Kolakota.

 2. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.

**SEMESTER-II- Paper –II:**

 **MATHEMATICAL EXPECTATIONS & PROBABILITY DISTRIBUTIONS PROBABILITY DISTRIBUTIONS**

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

**Max. marks: 60 Time : 2 ½ Hrs.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unit / Chapter name** |  | **Short Answer Questions** | **Essay Questions** | **Marks allotted to the Unit/Chapter** |
| **Unit – 1** |
| **Mathematical Expectation** |  | **1** | **2** | **25** |
| **Unit – 2** |
| **Generating Functions** |  | **2** | **2** | **30** |
| **Unit – 3** |
| **Discrete Distributions** |  | **2** | **2**  | **30** |
| **Unit – 4** |
| **Continuous Distributions** |  | **1** | **2** | **25** |
| **Any of the above Units (i.e., 1-4)** |
| - |  |  |  |  |
| **Total No. of Questions including choice (14)** |  | **6** | **8** | **-** |
| **Total marks allotted to all questions including choice =** | **110** |

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

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

**Statistics Paper–II: MATHEMATICAL EXPECTATIONS PROBABILITY DISTRIBUTIONS**

**Model Paper**

**Time: 2 ½ Hrs. Max. Marks: 60**

 **Section – A**

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

1. Define Mathematical Expectation of a random variable. State its properties?
2. State and prove Chebyshev’s inequality.
3. Explain the central limit theorem.
4. Define Poisson Distribution. Obtain its mean and variance?
5. Find m.g.f. of Binomial distribution.
6. Explain the memory less property of geometric distribution.

**Section – B**

 **Answer any two questions 2x10 = 20 M**

 7. State and prove Cauchy Schwartz inequality.

 8. State and prove Addition theorem of expectation for n variables

 9. Define probability generating function and derive the properties.

 10. State Weak law of large numbers and explain its applications

**Section – C**

 **Answer any two questions 2x10 = 20 M**

 11. Define Hyper Geometric distribution, find its mean and variance.

 12. Derive the recurrence relation for the moments of Binomial distribution.

 13. Define Normal Distribution and find MGF & hence reduce it’s mean and variance.

 14. Define Gamma distribution, state and prove additive property of gamma distribution.

B.Sc. I Year: Descriptive Statistics &Probability Distributions Practical - Paper-I & II (Semester I and II)

**(With Mathematics Combination)**

1.Basics of Excel- data entry, editing and saving, establishing and copying a formulae, built

 in functions in excel, copy and paste and exporting to MS word document.

2.Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS Excel

3.Diagrammatic presentation of data (Bar and Pie) using MS Excel

4.computation of non-central and central moments – Sheppard’s corrections for grouped data.

5.Computation of coefficients of Skewness and Kurtosis – Karl Pearson’s and Bowley’sβ1 and β2.

6.Computation of measures of central tendency, dispersion and coefficients of Skew -ness,

Kurtosis using MS Excel.

 7.Fitting of Binomial distribution – Direct method.

Fitting of Binomial distribution – Direct method using MS Excel.

8.Fitting of binomial distribution – Recurrence relation Method.

9.Fitting of Poisson distribution – Direct method.

Fitting of Poisson Distribution – Direct method using MS Excel.

10.Fitting of Poisson distribution - Recurrence relation Method.

11.Fitting of Negative Binomial distribution.

12.Fitting of Geometric distribution.

13.Fitting of Normal distribution – Areas method.

14.Fitting of Normal distribution – Ordinates method.

15.Fitting of Exponential distribution.

16.Fitting of Exponential distribution 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.

Question paper pattern: odd sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

 **Record: 10M**

 **Viva: 4M**

**TOTAL: 50M**

Question paper pattern: even sem

**Theory:** Five Questions will be given.

 The Student has to answer three questions**. 3x12=36 M**

 **Record: 10M**

 **Viva: 4M**

**TOTAL: 50M**