

RAYALASEEMA UNIVERSITY: KURNOOL

**B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21**  
**Semester – II (CBCS With Maths Combination Common to BA/BSc)**

Course - II: **Probability Theory and Distributions**

**UNIT-I**

**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.

**UNIT-II**

**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. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

**UNIT- III**

**Mathematical expectation :** Mathematical expectation of a random variable and function of a random variable. 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.

**UNIT-IV**

**Discrete Distributions:** Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Poisson approximation to Binomial distribution. Hyper-geometric distribution: Definition, mean and variance.

**UNIT - V**

**Continuous Distributions:** Rectangular, Exponential, Gamma, Beta Distributions: mean, variance, M.G.F, C.G.F, C.F. Normal Distribution: Definition, Importance, Properties, M.G.F, CF, additive property.

**Text Books:**

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, SultanChand & Sons, New Delhi.
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. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

**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., Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Course-I.
5. Sanjay Arora and Bansil Lal: New Mathematical Statistics: Satya Prakashan , NewDelhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7<sup>th</sup> edition. Pearson.

Credits 2

**Practicals Course - II**

1. Fitting of Binomial distribution – Direct method.
2. Fitting of binomial distribution – Recurrence relation Method.
3. Fitting of Poisson distribution – Direct method.
4. Fitting of Poisson distribution - Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution – Areas method.
8. Fitting of Normal distribution – Ordinates method.
9. Fitting of Exponential distribution.

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.

### **Course Learning Outcomes**

Students will acquire

- 1) ability to distinguish between random and non-random experiments,
- 2) knowledge to conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,
- 3) knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments,
- 4) knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,
- (e) acumen to apply standard discrete and continuous probability distributions to different situations.

Course Wise Objectives COURSE-II:

### **COURSE-II: Probability Theory and Distributions**

- This Course 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.
- This Course gives an idea of using various standard theoretical distributions, their chief characteristics and applications in analyzing any data

RAYALASEEMA UNIVERSITY

THREE YEAR B.A./B.Sc DEGREE EXAMINATION

STATISTICS(WM)

(W.E.F 2022-23 ADMITTED BATCH) SEMESTER – II

COURSE 2: PROBABILITY THEORY AND DISTRIBUTIONS

Time: 3 Hours

Max. Marks : 75

SECTION – A

I. Answer the following Multiple Choice questions (10 x 1= 10 marks)

1. The probability of a null event is.....  
A)1                      B)0.5                      C) 0                      D)-1
2. Axiomatic definition of probability is due to .....  
A) Fisher B)Kolomogorov      C)Pearson      D)Vonmises
3. Which of the following is a continuous random variable...  
A)Height B)Persons C)Vehicles D) none
4. The Probability function of Discrete random variable is..  
A)pmf B)pdf C)Distribution function D)Marginalfunction
5. If X, Y are independent  $E(XY)=.....$   
A)0                      B)1                      C)  $E(X)E(Y)$                       D)  $E(X)+E(Y)$
6. MGF of a random variable used to Generate.....  
A)Probabilities                      B)Cumulants                      C)Moments      D)variables
7. The mean of the Binomial Distribution is.....  
A)0                      B)1                      C)np                      D)npq
8. The distribution of rare events is.....  
A) Binomial      B)Poisson      C)Geometric      D)Normal
9. The Variance of a Standard Normal distribution is....  
A)0                      B)1                      C)-1                      D)  $\alpha$
10. The Gamma distribution ranges between.....  
A) (0,1)                      B)(0,  $\alpha$ )                      C)(- $\alpha$ , + $\alpha$ )                      D)(- $\alpha$ , 0)

II. Answer the following fill in the blanks (5 x 1 = 5 marks)

11. The Probability of a Sure event is.....
12. The limits of a Distribution function is.....
13. If c is a constant then  $E(cX)=.....$
14. The Variance of a Poission distribution is .....
15. The MGF of a Normal Distribution is.....

III. Answer the following Questions :-

5 X 2 = 10 M

16. Define (a) Random experiment (b) Events
17. Define Probability Mass Function
18. Define Mathematical Expectation
19. Define Geometric distribution.
20. Additive property of Normal distribution

### SECTION - B

Answer one question from each unit. Each question carries 10 marks

5 X 10 = 50M

#### UNIT I

21. Explain various definitions of Probability  
OR
22. State and prove Multiplication theorem of Probability for n events

#### UNIT II

23. Explain Distribution Function and its properties.  
OR
24. Define the Concepts (a) Joint pdf (b) Marginal pdf (c) Conditional pdf  
(d) Independence of Random variables

#### UNIT III

25. State and Prove Chebychev's Inequality.  
OR
26. State and Prove Multiplication theorem on Mathematical Expectation.

#### UNIT IV

27. Define Binomial distribution and derive its mean and variance.  
OR
28. Derive Poisson distribution as a limiting case of Binomial distribution.

#### UNIT V

29. Define Normal distribution. Mention the Properties and Importance of Normal distribution.  
OR
30. Define Gama distribution, find MGF of Gama distribution.