GUJARAT UNIVERSITY

B. COM. (HONS)

SEMESTER – III

CONTINUOUS PROBABILITY DISTRIBUTIONS

COURSE CODE – DSC C STA 232

CREDIT MARK DISTRIBUTION – 04

AS PER NEP 2020 (To be effective from June 2024)

Lecture 04 Hours

Tutorial – 00

Practical – 00

COURSE OBJECTIVES

The course aims to provide students with a comprehensive understanding of various continuous probability distributions commonly used in statistical analysis. It focuses on theoretical foundations, practical applications, and computational methods associated with Normal, Student's t, Chi-square, and F distributions.

PRE – REQUISITE

- To delve into Continuous Probability Distributions, a solid foundation in probability theory is indispensable. This encompasses a thorough grasp of basic probability concepts like sample spaces, events, and probability laws (including Bayes' theorem). Mastery of discrete probability distributions such as the binomial, Poisson, and geometric distributions is essential, as they provide the groundwork for understanding continuous distributions. Proficiency in calculus, particularly differential and integral calculus, is crucial for comprehending the principles of continuous distributions, including the probability density function (PDF), cumulative distribution function (CDF), and moments (mean, variance, skewness, kurtosis). Familiarity with the properties and applications of key continuous distributions such as the normal distribution (including standardization and transformations), Student's t-distribution (inference for small samples and robustness), chi-square distribution (goodness of fit tests and confidence intervals for variance), and F-distribution (analysis of variance and regression) is essential for applying statistical methods effectively in various fields, including economics, engineering, and social sciences.

CO – REQUISITE

- The learner should have basic understanding of random variables, Distribution and mathematics.

COURSE OUTCOMES

- Understand the theoretical basis and characteristics of continuous probability distributions.
- Apply the properties and principles of Normal distribution to solve statistical problems.

- Analyze data using Student's t-distribution for small sample sizes and understand its assumptions.
- Utilize Chi-square distribution for testing hypotheses about categorical data.
- Apply F-distribution for comparing variances and conducting ANOVA tests.
- Perform calculations involving Z-scores, t-scores, Chi-square scores, and F-scores accurately.

UNIT	CONTENT	WEIGHTAGE
1	**Introduction to Continuous Distributions and Normal Distribution** ➢ Overview of Continuous probability distributions and its characteristics ➢ Normal distribution and its Properties ➢ Standard normal distribution, its properties and applications ➢ Calculation of Z-score for single mean and two means	**25%**
2	**Student's t-Distribution** ➢ Definition of Student's t- distribution ➢ Probability Density Function (PDF) of t distribution ➢ Assumptions of t- distribution ➢ Properties of t- distribution ➢ Applications of t- distribution ➢ Calculation of t-score for single mean and two means	**25%**
3	**Chi-square distribution** ➢ Definition of Chi-square distribution ➢ Probability Density Function (PDF) of Chi-square distribution ➢ Assumptions of Chi-square distribution ➢ Properties of Chi-square distribution ➢ Applications of Chi-square distribution ➢ Calculation of Chi-square score for quantitative and qualitative data	**25%**
4	**F - distribution** ➢ Definition of F distribution ➢ Probability Density Function (PDF) of F distribution ➢ Assumptions of F distribution ➢ Properties of F distribution ➢ Applications of F distribution ➢ Calculation of F-score for two variances	**25%**

Pedagogical Tools:

- Classroom Lectures and discussion
- Problem Solving
- Tutorial
- Group Discussion
- Seminar
- Assignments
-

MODE OF EVALUATION:

Evaluation will be divided in two parts.

- **External:** Semester end Examination will be conducted by the Gujarat University of 50 Marks
- **Internal:** Internal Evaluation of 50 marks will be decided by the colleges / Institutes/ University departments as per the instruction given by the University time to time.

FBLD (Flip Blended Learning Design Template)

- Any One Unit from the above syllabus can be discussed by the faculty through online mode.
- Online mode can be SWAYAM MOOC Course or any other suggested by the UGC or Gujarat University.

REFERENCE BOOKS:

1. Gupta, S. C. & Kapoor, V.K. (2013). Fundamentals of Mathematical Statistics (11th ed.). Sultan Chand $ Sons.
2. Elhance, D. N., Elhance, V. & Aggarwal, B. M.(2005). Fundamentals of Statistics . Kitab Mahal.
3. Devore, J. L. (2011). Probability and Statistics for Engineering and the Sciences (8th ed.). Brooks/Cole.
4. Wackerly, D. D., Mendenhall, W., & Scheaffer, R. L. (2014). Mathematical Statistics with Applications (7th ed.). Cengage Learning.
5. Johnson, N. L., Kotz, S., & Balakrishnan, N. (1995). Continuous Univariate Distributions, Vol. 1. Wiley-Interscience.
6. Mood, A. M., Graybill, F. A., & Boes, D. C. (1974). Introduction to the Theory of Statistics (3rd ed.). McGraw-Hill.