PROBABILITY AND STATISTICS

Course Code: 22BM1104

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Course Outcomes: At the end of the Course, the student shall be able to
CO1: determine the mean and variance of discrete and continuous random variables **(L3)**
CO2: calculate probabilities using normal distribution and construct sampling distribution of means **(L3)**
CO3: measure the confidence interval for the mean of a population and test a hypothesis concerning means **(L5)**
CO4: test a hypothesis concerning variances and proportions **(L5)**
CO5: calculate correlation coefficient and determine linear regression for bivariate data **(L3)**

UNIT-I **(10 Lectures)**

Random Variables:

Random variables, types of random variables, binomial distribution, probability distribution function, probability density function, the mean and variance of a probability distribution, poisson distribution, Normal distribution: calculating normal probabilities, normal approximation to the binomial distribution. (Sections 4.1, 4.2, 4.4, 4.6, 5.1-5.3 of textbook)

Learning Outcomes:
At the end of the unit, the student will be able to

1. determine the mean and variance of a random variable (L3)
2. calculate the probabilities using density and distribution function. (L3)
3. interpret the properties of the normal distribution and its applications (L2)

UNIT-II **(10 Lectures)**

Sampling Distribution: population and sample, sampling distribution of the mean (σ known), sampling distribution of the mean (σ unknown), sampling distribution of the variance: Chi-square and Fdistributions. (Sections 6.1-6.4 of textbook)

Learning Outcomes:
At the end of the unit, the student will be able to

1. determine the mean and variance of a sampling distribution of means (L3)
2. discuss the sampling distribution of the means and variances (L2)
3. interpret the properties of Chi-square and F distributions (L2)

UNIT-III **(10 Lectures)**

Estimation and Test of Hypothesis of Means:

Point estimation, interval estimation, test of hypothesis, hypothesis concerning one mean, hypothesis concerning two means, matched pair comparisons. (Sections 7.1, 7.2, 7.4-7.6, 8.2- 8.4 of textbook)
Learning Outcomes:
At the end of the unit, the student will be able to

1. calculate the confidence interval for the mean of a population (L3)

2. discuss the test of a hypothesis concerning population mean (L2)
3. test a hypothesis concerning two means (L5)

UNIT-IV **(10 Lectures)**

Estimation and Test of Hypothesis of Variances and Proportions:

Estimation of variance, hypothesis concerning one variance, hypothesis concerning two variances, estimation of proportion, hypothesis concerning one proportion, hypothesis concerning several proportions. (Sections 9.1- 9.3, 10.1 – 10.3 of textbook)

Learning Outcomes:

At the end of the unit, the student will be able to

1. calculate the confidence interval for the variance and the proportion of a population (L3)
2. discuss the test of a hypothesis concerning population variance (L2)
3. test a hypothesis concerning proportions (L5)

UNIT-V **(10 Lectures)**

Correlation and Regression :

The method of least squares, curvilinear regression, multiple regression, correlation (excluding causation). (Sections 11.1, 11.3, 11.4, 11.6 of textbook)

Learning Outcomes:

At the end of the unit, the student will be able to

1. demonstrate the least squares method (L3)
2. illustrate several types of curves for a tabulated data (L4)
3. determine the correlation coefficient for a tabulated data (L3)

Text Book:

1. Richard A.Johnson, *Miller & Freund's Probability and Statistics for Engineers*, 8th edition, PHI Learning India Private Limited, 2011.

Reference Books:

1. S. Ross, *A First Course in Probability*, Pearson Education India, 2002.
2. W. Feller, *An Introduction to Probability Theory and its Applications*, 1st edition, Wiley, 1968.

Web References:

1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ma08/