STATISTICAL INFERENCE

Credits : 4 **Semester: IV**

Subject Code : BS20040 **No. of Lecture Hours :60**

Objectives:

- To acquaint students with various statistical methods and their applications in different fields.
- To cultivate statistical thinking among students
- To develop skills in handling complex problems in data analysis and research design.

Outcome: Students will be able to
CO1: Develop the distributional results needed for statistical inference.
CO2: Analyze hypotheses tests of means, proportions and variances using both one- and two- sample data sets.
CO3: Explain Chi-Squared test for independence of attributes and goodness of fit.
CO4: Differentiate between the tests statistics to be used for dependent and independent samples.
CO5: Design the test statistic to be used when the nature of the distribution is unknown.

UNIT – I **12hrs**

1. Concepts of Statistical Hypotheses, Null and Alternative Hypothesis, Critical Region, Two types of Errors, Level of Significance and Power of a Test 2
2. One and Two Tailed Tests, Test Function (non-randomized and randomized) 2
3. Neyman-Pearson's Fundamental Lemma for Randomized tests. 2
4. Examples in case of Binomial 2
5. Poisson, Exponential 2
6. Normal Distributions and their Powers of Test Functions 2

UNIT – II **12hr**

1. Use of Central Limit Theorem in Testing
2. Large Sample Tests and Confidence Intervals for Mean(s) 4
3. Proportion(s) 4
4. Standard Deviation (s) 4

UNIT – III **12hrs**

1. Fisher's Z – Transformation for Population Correlation Coefficient(s) and Testing the same in case of One Sample and Two Samples. 4
2. Definition of Order Statistics and Statement of their Distributions 2

3. Tests of Significance based on $\chi 2$ - $\chi 2$ test for Specified Variance
4. Goodness of Fit 4
5. Test for Independence of Attributes (r , s, 2 ,k and 2, 2 contingency tables) 2

UNIT-IV **12hrs**

1. Tests of significance based on student's t – t – test for single sample specified mean 3
2. Difference of means for independent and related samples 3
3. Sample Correlation Coefficient 3
4. F – Test for equality of Population Variances 3

UNIT – V

12hrs

1. Non-Parametric tests-their advantages and disadvantages 1
2. Comparison with parametric tests 2
3. Measurement scale-nominal, ordinal, interval and ratio 1
4. One sample runs test, sign test 1
5. Wilcoxon-signed rank tests (single and paired samples) 3
6. Two independent sample tests: Median test 1
7. Wilcoxon – Mann-Whitney U test 1
8. Wald Wolfowitz's runs test. 2