

**Syllabus for 4-Year UG Honours in B.Sc. (Statistics) as Major in consonance with  
Curriculum framework w.e.f. AY 2026-27**

**COURSE STRUCTURE (for Semester III)**

| Year | Semester | Course | Title of the Course                     | No. of Hrs /Week | No. of Credits |
|------|----------|--------|-----------------------------------------|------------------|----------------|
| II   | III      | 5      | Statistical Methods                     | 3                | 3              |
|      |          |        | Statistical Methods Practical Course    | 2                | 1              |
|      |          | 6      | Inferential Statistics                  | 3                | 3              |
|      |          |        | Inferential Statistics Practical Course | 2                | 1              |
|      |          | 7      | Sampling Techniques                     | 3                | 3              |
|      |          |        | Sampling Techniques Practical Course    | 2                | 1              |

  
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## SEMESTER - III

### COURSE 6: INFERENCE STATISTICS

Theory

Credits: 3

3 hrs/week

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#### Course Outcomes

After successful completion of the course students will be able to:

1. To acquaint with estimator, estimates, estimation techniques and its properties.
2. To acquire knowledge of testing the hypothesis of different distributions.
3. To learn about the large sample techniques by using various tools.
4. To learn about the small sample techniques by using various tools.
5. To deal with the situation where there are no parameters to the distributions.

#### Unit – 1: Theory of estimation

Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Rao – Cramer Inequality, properties. Binomial, Poisson & Normal Population parameters estimate by MLE method. Confidence Intervals.

#### Unit – 2: Testing of Hypothesis

Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance, concept of p value and power of a test. One and two tailed tests. Neyman -Pearson's lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

#### Unit – 3: Large sample Tests

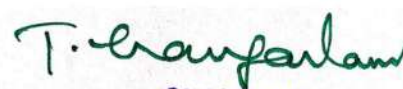
Large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. Standard deviation(s) and correlation coefficient(s).

#### Unit – 4: Small Sample tests

Assumptions and t-test for single mean, difference of means and paired t-test.  $\chi^2$  test for goodness of fit and independence of attributes.  $\chi^2$  test for single variance, F-test for equality of variances.

#### Unit – 5: Non parametric tests

Advantages and disadvantages, comparison with parametric tests. One sample runs test, sign test and Wilcoxon – signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann – Whitney U test, Wald Wolfowitz runs test.

  
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### **Text Books**

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

### **References**

1. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
2. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

### **Suggested Co-curricular Activities:**

1. Training of students by related industrial experts.
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

  
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## SEMESTER - III

### COURSE 6: INFERENCE STATISTICS

Practical

Credits: 1

2 hrs/week

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#### List of Experiments:

1. Large sample test for mean and difference of means.
2. Large sample test for proportion and difference of proportions.
3. Large sample test for standard deviation and difference of standard deviations.
4. Large sample test for correlation coefficient.
5. Small sample test for mean and difference of means.
6. Small sample test for correlation coefficient.
7. Paired t - test (paired samples).
8. Small sample test for single variance ( $\chi^2$  test) and difference of variances (F test).
9.  $\chi^2$  test for goodness of fit and independence of attributes.
10. Non parametric tests for single sample (run test, sign test and Wilcoxon signed rank test).
11. Non parametric tests for related samples (sign test and Wilcoxon signed rank test).
12. Non parametric tests for two independent samples (Median test, Wilcoxon –Mann – Whitney – U test, Wald–Wolfowitz's runs test).

Note: Conclusions of practical problems must be drawn based on p value as well as critical values.

  
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**4- Year UG Honours, Major**  
**Syllabus**  
**(2026-27)**  
**Semester-III**

**Model Question Paper**

**Time : 3hrs**

**Marks:75**

**Part-A**

**Answer any Five Questions. Each Question carries 3 Marks.**

**5x3=15**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Answer the following questions. Each question carries 12 Marks**

**5x12=60**

11. a) Unit-I  
(Or)  
b) Unit-I

12. a) Unit-II  
(Or)  
b) Unit-II

13. a) Unit-III  
(Or)  
b) Unit-III

14. a) Unit-IV  
(Or)  
b) Unit-IV

15. a) Unit-V  
(Or)  
b) Unit-V