

**RAN-2403081203011001**

M. Sc. (Statistics) (Sem. - III) Examination October - 2025
Core-1 - Course 301 : Nonparametric Inference

Time: 3 Hours]**[Total Marks: 70****સૂચના : / Instructions**

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book.
- (2) Attempt all questions.
- (3) Attempt any 2 bit of each question
- (4) Each question carries 14 marks.
- (5) Use of scientific calculator and statistical table are permitted.

Seat No.:

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Student's Signature

- Q. 1.** a. State and explain the basic assumptions of non-parametric tests. How do these assumptions differ from those of parametric tests?
 b. Why are non-parametric tests considered less powerful than parametric tests? Justify with statistical reasoning.
 c. Write the main selection criteria for choosing an appropriate non-parametric test for a given dataset. Support your answer with an applied example.
- Q. 2.** a. A researcher is confused between using the independent sample t-test and the Mann-Whitney U test. As a statistician, how would you guide their choice?
 b. What is the Chi-square test for k independent samples? Explain its purpose.
 c. What is McNemar's test? State one practical application in social or medical sciences.
- Q. 3.** a. What is the Fisher Exact Probability Test? Derive the formula for small-sample cases and explain its advantages over the Chi-square test. Illustrate with an example.
 b. Write a detailed note on the Kendall-Theil-Sen Regression method.
 c. Explain the assumptions of the Binomial test. Why is it considered a nonparametric test?
- Q. 4.** a. Explain Walsh Test in detail.
 b. Derive the test statistic of Cochran's Q Test for binary responses in k related samples. Explain its relationship with the McNemar Test.
 c. Describe the Extension of Median Test and explain how it would be used to compare median of preferences across different groups. What are the advantages of using this test over Kruskal-Wallis Test?
- Q. 5.** a. Explain the Kruskal-Wallis Test for comparing k independent samples. Derive the test statistic and discuss how it extends the Mann-Whitney U test.
 b. Explain Dunn Test in detail.
 c. When Post Hoc Test is useful? Explain Below Terminology
 i) Planned/Priori Contrast
 ii) Protected Test/unprotected Test