UNIVERSITY OF THE PUNJAB

Fifth Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. ....

Roll No. in Words. ....

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PAPER: Parametric and Nonparametric Tests (Theory) **MAX. TIME: 15 Min.**

Course Code: STAT-301 Part–I (Compulsory) **MAX. MARKS: 10**

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Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)

1. Which of the following value is impossible for a Chi-square statistic?
   (a) Greater than zero (b) Less than zero (c) Equal to zero (d) Not equal to zero

2. The value of Chi-square statistic is always zero if:
   (a) $\sum f_o = \sum f_e$ (b) $f_o = f_e$ (c) $f_o > f_e$ (d) $f_o < f_e$

3. The non-parametric equivalent of an unpaired samples t-test is
   a) Sign test b) Wilcoxon signed rank test c) Mann-whitney U test d) Kruskal Wallis test

4. The Mann-Whitney U test is preferred to a t-test when
   a) Data are paired b) Sample sizes are small c) The assumption of normality is not met d) Samples are dependent

5. To perform a Run test for randomness , the data must be
   a) Qualitative b) Quantitative c) Divided into at least two categories d) Divided into exactly two categories

6. The choice of one-tailed test and two tailed test depends upon
   a) Null hypothesis b) Alternative hypothesis c) None of these d) Composite hypothesis

7. The range of test statistic-Z is
   a) 0 to ∞ b) 0 to 1 c) $-\infty$ to $+\infty$ d) -1 to +1

8. When testing for randomness , we can use
   a) Mann-Whitney U test b) Sign test c) Runs test d) None of these

9. A passing student is failed by an examiner, it is an example of
   a) Type I error b) Type II error c) Best decision d) All of the above

10. Homogeneity of several variances can be tested by
    (a) Bartlett's test (b) Fisher's exact test (c) F test (d) T-test.

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PAPER: Parametric and Nonparametric Tests (Theory) **MAX. TIME: 2 Hrs. 45 Min.**
Course Code: STAT-301 Part – II **MAX. MARKS: 50**

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Questions with short answers. **(5 x 4 = 20)**

a) How do non-parametric tests differ from parametric tests? Discuss the advantages of non-parametric tests over parametric tests.
b) Write the procedure of a non-parametric test which is equivalent to paired samples T-test.
c) What is the Power of the test
d) Write the procedure of Bartlett test
e) What is the purpose of goodness-of- fit test? Describe three situations where this test might be used appropriately.

Q.3. Use the median test at the $\alpha = 0.05$ level, to test the null hypothesis that the two samples are drawn from populations with the same median.

Sample 1	92, 63, 30, 78, 24, 19, 26, 79, 54, 57, 97, 46, 58, 74, 77, 80, 93, 99, 78, 50.
Sample 2	77, 87, 98, 62, 76, 47, 66, 83, 72, 80, 53, 80, 48, 75, 76, 78, 97, 53, 64, 67.

(8)

Q.4. a) Discuss fully the procedure and rationale of a two-sample median test.

b) Using the data in question 24.12, test at $\alpha - 0.05$ the hypothesis that mean and women come from populations with the same median, applying the median test.

(10)

Q.5. a) A random sample of size 4 is drawn from a normal population with known variance 15. A one-tailed test of the form $\mathbf{H_o: \mu \leq 30}$ against $\mathbf{H_1: \mu > 30}$ at the 5% level of significance is performed. Calculate the probabilities of **type II error (β)** for the values of μ= 32, 36 and 34.5 in the alternative hypothesis. Also calculate the powers of the test.

(5)

b) The various sums for two sets of data, each of 4 observations are as follows:

Set	$\sum X$	$\sum Y$	$\sum XY$	$\sum X^2$	$\sum Y^2$
A	8	37	76	18	349
B	15	47	179	59	557

i) Find the estimates of β_1 and β_2, the regression coefficients of two linear regression lines.
ii) Construct the 95% confidence interval for β_1-β_2 and test the hypothesis that H_o :$\beta_1 = \beta_2$ against the H_1:$\beta_1 \neq \beta_2$ at the 0.05 level of significance

(7)