

Roll No.:

Total No. of Questions : 11] [Total No. of Printed Pages : 7

PK-536

M.Sc. II Semester Statistics (Reg./ATKT)

Examination June 2018

HYPOTHESIS TESTING

Paper - IV

Time Allowed : Three Hours]

[Maximum Marks : 85

Note : Attempt all questions as directed in each section.

Section - A

(Objective Type Questions)

Q.1. Choose the correct answer : $10 \times 1 = 10$

i) Which of the following is not a null hypothesis

(a) $\mu = 3, \sigma^2 > 0$

(b) $\mu = 3, \sigma^2 = 4$

(c) $\mu = \mu_0, \sigma^2 = 5$

(d) $\mu = 10, \sigma^2 = 9$

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P.T.O.

(2)

ii) If β denotes the probability of Type II error, thus which of the following is correct statement for $(1 - \beta)$:

(a) Size of test

(b) Power of the test

(c) Can be both (a) and (b)

(d) Cannot say anything

iii) If the null hypothesis is true and it is rejected, thus which type of error occurs:

(a) Type II

(b) Type I

(c) Can be both (a) and (b)

(d) None of these

iv) Neyman-Pearson Lemma is developed for testing which of the following:

(a) Simple null hypothesis against simple alternate hypothesis

(b) Simple null hypothesis against composite alternate hypothesis

(c) Composite hypothesis against composite alternate hypothesis

(d) None of these

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Contd...

(3)

- v) Which of the following appropriate for testing the composite hypothesis rather than simple hypothesis -
- Neyman - Pearson Lemma
 - Likelihood Ratio Test
 - Can be both (a) and (b)
 - Randomized test
- vi) Under certain assumptions likelihood ratio test is :
- consistent
 - unbiased
 - efficient
 - biased
- vii) In the Neyman-Pearson Lemma which of the following is correct statement for a density function $f(x, \theta)$:
- There is a single continuous variate
 - There is a single discrete variate
 - There are two continuous variates
 - There are two discrete variates

(4)

- viii) The OC function of SPRT is denoted by $k(\theta)$, thus $K(\theta)$ is equal to which of the following [where $\beta(\theta)$ is probability (reject H_0)]:
- $k(\theta) = \beta(\theta)$
 - $k(\theta) = 1 - \beta(\theta)$
 - $k(\theta) = \frac{1}{2} + \beta(\theta)$
 - None of these
- ix) Which of the following is appropriate test for testing randomness
- Median test
 - Sign test
 - Runs test
 - Mann-Whitney U-test
- x) Which of the following is not a parametric test -
- t-test
 - F-test
 - Z-test
 - Mood test

(5)

Section - B

Short Answer Type Questions

5×5=25

- Q.2. Explain the concept of null and alternate hypothesis with examples.

OR

Explain the concept of most powerful (MP) test.

- Q.3. Define randomized test, write the situations where randomized test is appropriate.

OR

Write the uses of Neyman-Pearson lemma in the construction of MP tests for simple null hypothesis against simple alternate.

- Q.4. Define likelihood ratio test. Write its properties.

OR

Explain the concept of asymptotic distribution of LR test statistic.

- Q.5. Explain the concept of Sequential Probability Ratio Test (SPRT).

OR

Describe the ASN function of SPRT.

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P.T.O.

(6)

- Q.6. Describe sign test for single mean problem.

OR

Write the assumptions of non-parametric tests.

Section - C

Long Answer Type Questions

5×10=50

- Q.7. Explain the following terms with examples -

i) Critical region <http://www.onlinebu.com>

ii) Type I and Type II errors.

OR

Explain the following terms

i) Uniformly most powerful test

ii) Test of hypothesis

- Q.8. State and prove Neyman-Pearson lemma.

OR

Examine whether a best critical region exists for testing the null hypothesis $H_0 = \theta = \theta_0$ against the alternative hypothesis $H_1 : \theta > \theta_0$, for the parameter θ of the distributions

$$f(x; \theta) = \frac{1 + \theta}{(x + \theta)^2}, 1 \leq x < \infty$$

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(7)

- Q.9. Derive the likelihood ratio test for testing $\theta = 0$ against $\theta \neq 0$ in a normal population $\mu(0, 1)$

OR

Discuss likelihood ratio tests for testing the variance of the normal distribution based on K-samples.

- Q.10. Prove that SPRT terminates with probability one.

OR

Define OC function of SPRT. Obtain the expression for the OC function of a SPRT for testing $H_0 = \theta = \theta_0$ against the alternative $H_1 = \theta = \theta_1$ in sampling from a population with density function $f(x, \theta)$.

- Q.11. Describe the median test for two samples.

OR

Describe Mann-Whitney U test.



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