

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2024
(Third Semester)

Branch – STATISTICS

HYPOTHESES TESTING

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. A test with critical region w is a level α test if
 - i) $P\{X \in W/H_0\} \geq \alpha$
 - ii) $P\{X \in W/H_0\} \leq \alpha$
 - iii) $P\{X \in W/H_0\} > \alpha$
 - iv) $P\{X \in W/H_0\} < \alpha$
2. A test function $\varphi(x)$ is invariant under a group G of transformations, for $x \in X$ and $\forall g \in G$, if
 - i) $\varphi[g(x)] = \varphi(x)$
 - ii) $\varphi[g(x)] < \varphi(x)$
 - iii) $\varphi[g(x)] > \varphi(x)$
 - iv) $\varphi[g(x)] \neq \varphi(x)$
3. If $l(x)$ is the LR for testing $H_0: \theta = \theta_0$ against $H_1: \theta \neq \theta_0$, where θ is a scalar then the asymptotic distribution of $-2\ln l(x)$ is
 - i) $\chi^2(n)$
 - ii) $\chi^2(n-1)$
 - iii) $\chi^2(2)$
 - iv) $\chi^2(1)$
4. SPRT terminates with probability
 - i) 0
 - ii) 0.50
 - iii) 0.75
 - iv) 1.0
5. In non – parametric test the variable under study is
 - i) discrete
 - ii) continuous
 - iii) discrete or continuous
 - iv) none

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a State NP lemma.
OR
b Define : i) size ii) power iii) most powerful test.
- 7 a Write a note on similar test.
OR
b Explain UMPUT.
- 8 a Briefly explain likelihood ratio test .
OR
b Define chi-square test . Give its applications.
- 9 a Explain SPRT.
OR
b What are the five points of OC curve?
- 10 a What is non- parametric test? Mention its assumptions.
OR
b Write the procedure of sign test.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11 a Describe randomized and non- randomized test.

OR

b To test $H_0 : \theta = \theta_0$ Vs $H_1 : \theta = \theta_1$ ($\theta_1 > \theta_0$) . Assume $X \sim B(n, p)$, find the most powerful test of level α .12 a Let X_1, X_2, \dots, X_n be a iid random sample from a population with a pmf

$$p(x) = \begin{cases} \theta(1 - \theta)^x & ; x = 0, 1, 2, \dots \\ 0 & \text{otherwise} \end{cases}$$

Find the UMP test of level α for testing the hypothesis $H_0 : \theta \leq \theta_0$ Vs $H_1 : \theta > \theta_0$

OR

b What is one parameter exponential family of distribution? How do you test?

13 a Prove that LR test always function of the sufficient statistics if it exists.

OR

b Discuss the LR test criterion of asymptotic distribution.

14 a Obtain the ASN function of SPRT.

OR

b Derive the boundary constants of SPRT.

15 a Distinguish between parametric and non- parametric test.

OR

b Describe Mann- Whitney U - test.

Z-Z-Z

END