

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – STATISTICS

STATISTICAL INFERENCE - II

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

- 1 Neyman – Pearson lemma helps to determine the size of _____ and _____ errors for the given range of the variable X.
(i) Type I and Type II errors (ii) Standard error and type I error
(iii) Both (a) and (b) (iv) Neither (a) nor (b)
- 2 A uniformly most powerful test among the class of unbiased test is termed as
(i) Minimax test
(ii) Minimax unbiased test
(iii) Uniformly most powerful unbiased test
(iv) All the above
- 3 Testing $H_0: \mu = 1500$ vs $H_1: \mu < 1500$ leads to
(i) One – sided lower tailed test (ii) One – sided upper tailed test
(iii) Two – tailed test (iv) All the above
- 4 The range of statistic - χ^2 is
(i) - 1 to + 1 (ii) - ∞ to ∞ (iii) 0 to ∞ (iv) 0 to 1
- 5 The notation (ABC) represents:
(i) Combination of the attributes A,B and C
(ii) Cell in a contingency table
(iii) The frequency of the class ABC
(iv) None of the Above

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6 a Define Null Hypothesis and Alternative Hypothesis.
OR
b Explain the Uniformly Most Powerful Test.
- 7 a Prove that *Every most powerful (MP) critical region (CR) is necessarily unbiased if W be an MPCR of size of α for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1$ when it is necessarily unbiased.*
OR
b Explain the L.R test procedure for testing the mean of a normal population.
- 8 a Describe that the test procedure for single mean in small sample.
OR
b Describe the students's t – distribution.
- 9 a Explain the test for significance of multiple correlation coefficient.
OR
b Describe the tests for the homogeneity of several variance coefficient.

Cont...

- 10 a Explain the Yule's Coefficient of Association
OR
b Write a short notes about "Association of attributes"

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

- 11 a State and Prove Neymann Person Lemma.
OR
b A single observation is taken from binomial population to test : $H_0: p = 1/2$ against : $H_1: p = 3/4$ based on the critical region $w = \{x : x > 4\}$ where x denotes the number of heads when the coin is tossed 6 times. find α, β and power of the test.

- 12 a Explain the the method of construction of likelihood ratio test for exponential distribution.

OR

- b Given a random sample $x_1, x_2, \dots, x_n$ from the distribution with pdf $f(x, \theta) = \theta e^{-\theta x}$, $x > 0$. Show that there exists no UMP test for testing $H_0: \theta = \theta_0$ against $H_1: \theta \neq \theta_0$.

- 13 a Explain the procedure of the test for the equality of mean of two normal populations.

OR

- b A random sample of 27 pairs observation from a bivariate normal population give a correlation coefficient of 0.42. Can you conclude that the variables in the population are uncorrelated.

- 14 a Four models of lacrosse helmets were compared. Measurements of Gadd severity index were made on each of 10 hits per helmet. Test whether helmet means are significantly different at $\alpha = 0.05$ significance level.

Brand	Mean	SD	Sample Size
Sports Helmets Cascade	1166.1	152.40	10
Sports Helmets Cascade Air Fit	1117.6	216.23	10
Sports Helmets Ultralite	857.0	151.54	10
Bacharach Ultralite	1222.8	123.08	10

OR

- b The theory predicts the proportion of beans in 4 groups A, B, C, and D should be 9:3:3:1. In an experiment of 1600 beans the frequencies in the four groups are 822, 313, 287, 118. Do these experiment results support the theory ?
- 15 a A sample of 1000 children, 400 came from higher income group and rest from lower income group. The number of delinquent children in these groups was 50 and 200 respectively. Calculate the coefficient of association between delinquency and income groups.

OR

- b 1660 candidates appeared for competitive examination 425 were successful, 252 had attended a coaching class and of these 150 came successful. Is there any association between success and utility of coaching class?

Z-Z-Z

END