ST-569

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Seat No.	

B.Sc. (Part - III) (Semester - VI) Examination, December - 2016
STATISTICS
Statistical Inference - II (Paper - XIV)
Sub. Code : 65865

Day and Date : Thursday, 15- 12 - 2016 **Total Marks : 40**

Time : 12.00 noon to 2.00 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

Q1) Choose correct alternative from each of the following: **[8]**

a) Let $X_1, X_2, ...X_n$ be a random sample of size n taken from a population having density $f_X(x, \theta)$. A function of $(X_1, X_2, ...X_n)$ and θ whose distribution does not depend on θ is known as

i) Test statistic ii) Pivotal quantity

iii) Sufficient statistic iv) Distribution free test statistic

b) Which of the following is 99% confidence interval for the parameter μ of N (μ, σ^2) population based on a sample of size n.

i) $\overline{X} \pm 1.96\frac{\sigma}{\sqrt{n}}$ ii) $\overline{X} \pm 2.58\frac{\sigma}{\sqrt{n}}$

iii) $\overline{X} \pm 1.64\frac{\sigma}{\sqrt{n}}$ iv) $\overline{X} \pm 1.58\frac{\sigma}{\sqrt{n}}$

c) The likelihood ratio test statistic for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$ based on a sample of size n taken from $N(\mu, \sigma^2)$ population follows

i) t_{n-1} - distribution ii) F - distribution

iii) Chisquare distribution iv) Normal distribution

P.T.O.

d) If [X > 0.5] is the critical region for testing $H_0: \theta = 1$ against $H_1: \theta = 2$ based on a single observation having exponential distribution with mean θ, the probability of type I error is

i) 0.4 ii) 0.6

iii) 0.8 iv) 0.5

e) The Best Critical Region of size α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 > \theta_0$ when a sample of size n is taken from N (θ, σ^2) population (σ being known) is

i) $\overline{X} > \theta_0 + \frac{\sigma}{\sqrt{n}} z_\alpha$ ii) $\overline{X} < \theta_0 + \frac{\sigma}{\sqrt{n}} z_\alpha$

iii) $\overline{X} > \theta_1 + \frac{\sigma}{\sqrt{n}} z_\alpha$ iv) $\overline{X} > \theta_0 + \frac{\sigma}{\sqrt{n}} z_{1-\alpha}$

f) In SPRT of strength $(\alpha, \beta), \lambda_m$ denoting the likelihood ratio, m being sample size, H_0 is rejected if

i) $\lambda_m \geq \frac{1-\beta}{\alpha}$ ii) $\lambda_m \leq \frac{1-\beta}{\alpha}$

iii) $\lambda_m \leq \frac{\beta}{1-\alpha}$ iv) $\lambda_m \geq \frac{\beta}{1-\alpha}$

g) The Win - Lose record of a certain basketball team for their last 15 consecutive games is as follows.

WWLLWWLWWWLWLLW

The total number of runs in the sequence is

i) 8 ii) 7

iii) 9 iv) 6

h) A random sample of size 10 is taken from a population having distribution function F (x). To test H_0 : F (72) = $\frac{1}{2}$ against H_1: F (72) > $\frac{1}{2}$ we use

i) Run test ii) Median test

iii) Sign test iv) Mann-Whitney U test

Q2) Attempt any two of the following: **[16]**

a) State and prove Neyman- Pearson Lemma.

b) Define most powerful test. Obtain 100 $(1-\alpha)$% confidence interval for the parameter μ of normal distribution $N(\mu,\sigma^2)$ when

i) σ^2 is known

ii) σ^2 is unknown

c) Explain the procedure for Run test for one sample and Mann-Whitney U test.

Q3) Attempt any four of the following: **[16]**

a) Explain the procedure Wilcoxon's Signed Rank test for one sample.

b) Obtain 90% confidence interval a population proportion based on a large sample of size *n*.

c) Define Likelihood Ratio test and SPRT. State the properties of L - R Test.

d) Obtain 100 $(1-\alpha)$% confidence interval for the difference between two means $(\mu_1-\mu_2)$ based on a sample of size *n* taken from Bivariate normal population with parameters $(\mu_1,\mu_2,\rho,\sigma_1^2,\sigma_2^2)$.

e) Construct SPRT of strength (α,β) for testing H_0: $\theta=\theta_0$ against H_1: $\theta=\theta_1$, where θ is the parameter of exponential distribution.

f) Let $X_1, X_2, ...X_n$ be a random sample taken from a population having Bernoulli distribution with paramer P. Obtain BCR of size α for testing $H_0: P=\frac{1}{2}$ against $H_1: P=\frac{1}{3}$.