No. of Printed Pages : 3

GS-330

IV Semester B.Sc. Examination, May/June 2019

STATISTICS-IV

Statistical Inference-II

(CBCS) (Fresh) (2018-19 and Onwards)

Time : 3 Hours Max. Marks : 70

Instructions to Candidates :

*(i) Answer **any ten** subdivisions from **Section-A** and **any five** questions from **Section-B**.*

(ii) Scientific calculator are allowed.

SECTION - A (20 marks)

I. Answer **any ten** subdivisions from the following questions : **10x2=20**

1. (a) What are simple and composite hypotheses ?

(b) State Neyman-Pearson Lemma.

(c) Explain normal test of significance.

(d) Write the test statistic for paired t-test with appropriate degrees of freedom.

(e) How Yate's correction is adapted in Chi-square test for independence of attributes in (2x2) contingency table ?

(f) Define Yule's coefficient of association (Q).

(g) What are non-parametric tests ? State the assumptions involved.

(h) Define a run. Find the number of runs from the following sequence.
AAABBBABABBAA

(i) Discuss the problem of zero differences (tied observations) in a sign test. How is it resolved ?

(j) Differentiate between sign test and sign rank test in terms of their test statistics.

(k) Define Wilcoxon rank sum T statistic and Mann-Whitney U statistic.

(l) What is meant by Wald's sequential test ? State its utility.

P.T.O.

SECTION - B (50 marks)

II. Answer **any five** questions from the following :

2. (a) Define test function. Consider the following test function **5+5**

$$\phi(x_1, x_2, x_3) = \begin{cases} 1, & \text{if } x_1 + x_2 + x_3 > 5 \\ 0.5, & \text{if } x_1 + x_2 + x_3 = 5 \\ 0, & \text{if } x_1 + x_2 + x_3 < 5 \end{cases}$$

What is your decision if the sample observations are

(i) $x_1 = 2, x_2 = 1, x_3 = 2$

(ii) $x_1 = 3, x_2 = 3, x_3 = 4$

(iii) $x_1 = 0, x_2 = 1, x_3 = 1$

(b) It is desired to test $H_0 : P = 1/2$ against $H_1 : P = 1/4$, based on 5 tosses of a coin. If $X < 1$ is the critical region, then find the probability of Type I error and power of the test.

3. (a) Obtain the most powerful test (M.P) of level α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (> \theta_0)$ in $P(\theta)$ distribution. **5+5**

(b) Find M.P test of level α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (> \theta_0)$ in $f(x, \theta) = \theta e^{-\theta x}$, $x > 0$.

4. (a) Explain the test procedure for testing $H_0 : \mu = \mu_0$ against various alternatives, when σ^2 is unknown. **5+5**

(b) Describe the large sample test procedure for testing the significance of difference between two population means.

5. (a) Describe Chi-square test for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$, where σ^2 is the population variance of $N(\mu, \sigma^2)$ distribution. **5+5**

(b) Describe the large sample test procedure for testing $H_0 : P = P_0$ against $H_1 : P > P_0$, where P is the population proportion.

6. (a) Describe the test procedure for testing $H_0 : \rho_1 = \rho_2$ against $H_1 : \rho_1 \neq \rho_2$, where ρ_1 and ρ_2 are two independent correlation coefficients. (Use Z transformation) **4+6**

(b) Discuss F-test for testing multiple correlation coefficient.

7. (a) Describe Chi-square test for independence of attributes. 5+5
   (b) State the conditions for the validity of Chi-square test for goodness of fit. Also describe the Chi-square test for goodness of fit.

8. (a) Describe Wald-wolfowitz run test of randomness for single sample. 5+5
   (b) Explain Median test.

9. Describe Sequential Probability Ratio Test (SPRT) for testing the mean of a normal population with unit variance. Obtain acceptance and rejection lines and represent them graphically. 10

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