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2509N513

Candidate's Seat No : _____

B.Sc Sem.-6 (Rep) Examination
CC 307
Statistics
September-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions

1. *All questions are compulsory and carry equal marks.*
2. *Figures to the right indicate full marks of the questions/sub-questions.*

Q-1 *(a)* Define terms: Statistical hypothesis, Simple and composite hypothesis, critical region, type I and Type – II errors, level of significance. **(07)**

(b) When a balanced die is tossed, p be the probability that it shows an even number. It is desired to test the hypothesis that $H_0: p = \frac{1}{2}$ *vs* $H_1: p = \frac{1}{3}$. For this a procedure is given below: Toss the die twice and accept H_0 if both times it shows even number. Find probabilities of Type – I and Type – II errors and also find power of the test. **(07)**

OR

Q-1 *(a)* Define Most Powerful Critical Region and Most Powerful Test. Hence or otherwise, State and prove Neyman Pearson Lemma. **(07)**

(b) A random sample of size n is taken from $Ber(1, \theta)$, Use Neyman Pearson Lemma to find out most powerful critical region for testing $H_0: \Theta = \Theta_0$ *Vs* $H_1: \Theta = \Theta_1$, (Where $\Theta_0 > \Theta_1$). **(07)**

Q-2 *(a)* Explain the test procedure to test the significance of difference between two means, based on two large samples. **(07)**

(b) Derive test statistic for testing the null hypothesis $H_0: \rho = 0$. **(07)**

OR

Q-2 *(a)* Explain test procedure of testing significance of difference between two population means. **(07)**

(b) Given a single observed correlation coefficients r based on a bivariate random sample of size n, then discuss a test procedure of testing significance of single observed correlation correlation. Also, find 100(1-α)% confidence Interval for ρ. **(07)**

Q-3 *(a)* Derive a test statistic for testing hypothesis independence of two attributes. **(07)**

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(b) State applications of t – distribution. **(07)**
Derive test statistic to test null hypothesis H_0: $r_{12.3} = 0$.

OR

Q-3 *(a)* Explain test procedure to test null hypothesis H_0:$p_1 = p_2$ against alternative hypothesis H_1: $p_1 < p_2$ **(07)**

(b) Explain variance ratio test, in details. **(07)**

Q-4 *(a)* What are nonparametric tests? **(07)**
Describe test procedure of large sample sign test.

(b) Explain in detail Mann Whitney test. **(07)**

OR

Q-4 *(a)* What is median test? **(07)**

(b) State differences between parametric and nonparametric tests. **(07)**

Q-5 Answer the following Questions. **(14)**

i) What is type II error?,

ii) Define Uniformly Most powerful critical region.

iii) What is power of the test.?

iv) A probability distribution of a test statistic defined on a large sample, is approximately normal. Do you agree?

v) Select an appropriate option from (i) and (ii) for the following:
In paired t – test, difference is
(i) d = x- y (ii) d = $\bar{x} - \bar{y}$

vi) State the variance of a distribution of a test statistic, used for testing an observed partial correlation coefficient.

vii) Which distribution is useful in deriving a test statistic for testing significance of observed multiple correlation coefficient.

viii) Give a value of test statistic to test $H_0: \sigma = \sigma_0$

ix) Define null and alternate hypotheses.

x) Give one limitation of nonparametric test.

xi) State situation, in which median test is useful.

xii) Define RUN.

xiii) State one assumption associated with nonparametric test.

xiv) With respect to Test of hypothesis, out of two types of errors, which one is more serious?

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