

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - II Computer Science & Business Systems : WINTER- 2022
SUBJECT : STATISTICAL METHODS

Day : Friday

Time : 10:00 AM-01:00 PM

Date : 25-11-2022

W-24137-2022

Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

Q.1 What is sampling? Discuss the categories of sampling. [10]

OR

Q.1 What is simple random sampling? What are its types? Explain with suitable example. [10]

Q.2 a) If $r_{12} = 0.9$, $r_{13} = 0.75$, $r_{23} = 0.7$. Find $R_{1,23}$. [05]

b) If $r_{12} = 0.77$, $r_{13} = 0.72$, $r_{23} = 0.52$. Find $R_{1,23}$. [05]

OR

Q.2 The three samples below have been obtained from normal populations with equal variances. Test the hypothesis that the sample means are equal: [10]

08	07	12
10	05	09
07	10	13
14	09	12
11	09	14

The table value of F at 5% level of significance for $v_1 = 2$ and $v_2 = 12$ is 3.88.

Q.3 If a random sample x_1, x_2, \dots, x_n of size n be drawn from a normal population $N(\mu, \sigma^2)$, then show that $T = \sum_{i=1}^n x_i^2$ is an unbiased estimator of $\mu^2 + \sigma^2$. [10]

OR

Q.3 Find the maximum likelihood estimate of θ in the Bernoullian probability distribution. [10]

$$f(x) = \theta^x (1-\theta)^{1-x}, \quad x=0, 1.$$

Q.4 Let P be the probability that a coin will show head in a single toss in order to test $H_0: P = \frac{1}{2}$ against $H_1: P = \frac{3}{4}$. The coin is tossed 3 times and H_0 is rejected if more than two heads are obtained. Find the probability of type - I and type - II errors. Also obtain the power of the test. [10]

OR

Q.4 Explain the procedure of testing of hypothesis. [10]

P.T.O.

- Q.5 Use the sign test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use 0.05 significance level. [10]

Before	30	28	34	35	40	42	33	38	34	45	28	27	25	41	36
After	32	29	33	32	37	43	40	41	37	44	27	33	30	38	36

OR

- Q.5 On a commuter train, the conductor wants to see whether the passengers entering a train enter in a random manner. He observes the first 25 people with the following sequence of males (M) and females (F)
 FFFMMFFFFMFMMMFFFFMMFFMM.
 Test for randomness at 5% level of significance by run test. [10]

- Q.6 Estimate the trend values using the data given by taking a four-yearly moving average. [10]

Year	1996	1997	1998	1999	2000	2001	2002
Value	12	25	39	54	70	87	105

Year	2003	2004	2005	2006	2007	2008	2009
Value	100	82	65	49	34	20	7

OR

- Q.6 What are different components of time series? Describe briefly each of these components. [10]

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