BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
Computer Science & Business Systems
B. Tech. Sem - II :SUMMER : 2023
SUBJECT : STATISTICAL METHODS

Day : Wednesday
Date : 24-05-2023

Time : 10:00 AM-01:00 PM
S-24137-2023
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 Draw a random sample of size 3 from a population of 7 units, **(10)**
(a) without replacement.
(b) with replacement.

OR

Q.1 What is stratified sampling? What are advantages and disadvantages of stratified sampling? Explain. **(10)**

Q.2 Calculate: i) $R_{1.23}$ ii) $R_{3.12}$ iii) $R_{2.13}$ for the following data: **(10)**

$\bar{x}_1 = 6.8$ $\bar{x}_2 = 7.0$ $\bar{x}_3 = 74$

$s_1 = 1.0$ $s_2 = 0.8$ $s_3 = 9$

$r_{12} = 0.6$ $r_{13} = 0.7$ $r_{23} = 0.65$

OR

Q.2 A test was given to 5 students chosen at random from the M. Com. class of each of three universities in Bihar. Their scores were found as follows: **(10)**

University	Scores				
A	90	70	60	50	80
B	70	40	50	40	50
C	60	50	60	70	60

Perform a analysis of variance and show if there is any significant difference between the scores of students in the three universities (Given: $F_{0.5} = 3.44$)

Q.3 Show that if T s a consistent estimator of θ then, T^2 is also consistent estimator of θ^2. **(10)**

OR

Q.3 Find the maximum likelihood estimate of θ, in Bernoullian probability distribution **(10)**
$f(x) = \theta^x (1-\theta)^{1-x}$, x = 0,1.

Q.4 What is testing of hypothesis? Write procedure of testing of hypothesis. **(10)**

OR

Q.4 Let P be the probability that a coin will show head in a single toss. In order to test $H_0 : \frac{1}{2}$ against $H_1 : \frac{3}{4}$, the coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Find the probability of Type – I error and power of the test. **(10)**

P.T.O

Q.5 The following data relate to the daily production of current (in m. tonnes) a large plant for 30 days **(10)**

11.5	10.0	11.2	10.0	12.3	11.1	10.2	9.6	8.7	9.3
9.3	10.7	11.3	10.4	11.4	12.3	11.4	10.2	11.6	9.5
10.8	11.9	12.4	9.6	10.5	11.6	8.3	9.3	10.4	11.5

Use sign test to test the null hypothesis that the plants average daily production of cements is 11.2m.tonnes against alternative hypothesis u<11.2 m tonnes at the 0 .05 level of significance.

OR

Q.5 Consider a survey on two different universities at the postgraduate students on the topic of their willness to join the research funding project on Artificial Intelligence.The following results obtained **(10)**

University 1	3	2	3	5	8	9	8	8
University 2	2	8	2	4	4	3	6	0

Determine whether the samples for university 1 and university 2 come from same distribution? (Use Kolmogorov – Smirnov test)
(Given: $D_{0.05} = 0.714285$)

Q.6 What is time series analysis? What are components of time series. Discuss. **(10)**

OR

Q.6 Estimate the trend values using the data given by taking a four yearly moving average. **(10)**

Year	value	Year	Value
1996	12	2003	100
1997	25	2004	82
1998	39	2005	65
1999	54	2006	49
2000	70	2007	34
2001	87	2008	20
2002	105	2009	7

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