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POST GRADUATE DIPLOMA IN

APPLIED STATISTICS (PGDAST)

Term-End Examination

Dec., 2021

MST-005 : STATISTICAL TECHNIQUES

Time : 3 Hours   *Maximum Marks : 50*

Note : (*i*) *Question No.* ***1*** *is compulsory.*

(*ii*) *Attempt any* ***four*** *questions from the remaining questions.*

(*iii*)*Use of scientific calculator (non-programmable) is allowed.*

(*iv*) *Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.*

(*v*) *Symbols have their usual meanings.*

P. T. O.

1. State whether the following statements are True *or* False. Give reasons in support of your answers : $5 \times 2 = 10$

    (a) Population made by the number of Heads or Tails based on the trial of a coin is an example of real population.

    (b) Non-sampling error occurs only in census study.

    (c) The precision of an experiment is measured by the reciprocal of the mean.

    (d) If we are interested to test the interaction between two factors and we have repeated observations, then were apply one-way ANOVA.

    (e) Consecutive 3 random numbers starting from 8937 by 'middle square method' are 8937, 8699, 6726.

2. (a) Suppose five observations 1, 2, 3, 4, 5 constitute a population. If sampling scheme is SRSWOR and sample size is 2, verify that sample mean square is an unbiased estimate of the population mean square.   5

   (b) A pathologist wants to determine the mean time required to complete a certain analysis so that he may 98% confident that the mean may remain within ± 3 days of the true mean. As per the available record, the population variance is 81 days. What must be the size of the sample for his study ? How large a sample would be required if the precision to be doubled ?   5

3. An experiment is performed to determine the effect of two advertising campaigns on three kinds of cake mixes. Sales of each mix were recorded after the first advertising campaign and then after the second advertising campaign. This experiment was repeated three times for each advertising campaign and got the following results :

	Campaign I	Campaign II
Mix 1	574, 564, 550	1092, 1086, 1065
Mix 2	524, 573, 551	1028, 1073, 998
Mix 3	576, 540, 592	1066, 1045, 1055

Perform an appropriate test to determine at 5% level of significance, whether there is a difference (i) Between the cake mixes and (ii) Between the campaigns.   10

4. Estimate the missing value in the following LSD and then analyse the design using appropriate test :   10

Row \ Column	I	II	III	IV
I	A 8	C 18	B 11	D 8
II	C 16	B 10	D 7	A Y
III	B 12	D 10	A 6	C 20
IV	D 10	A 9	C 28	B 16

5. The following table gives the frequency distribution of 100 variables generated from N (0, 1) distribution. Using Chi-square goodness of fit test, check whether fit is satisfactory :   10

Class Interval	Frequency
$\leq$—2.5	2
−2.5—(−1.5)	4
−1.5—(−1.0)	8
−1.0—(−0.5)	18
−0.5—0	19
0—0.5	12
0.5—1.0	14
1.0—1.5	14
1.5—2.0	5
2.0—2.5	2
2.5—3.0	2

6. (a) Using geometric random variables $x_1 = 2$, $x_2 = 3$, $x_3 = 1$, $x_4 = 5$ and $x_5 = 0$ with $p = 0.2$, generate a negative binomial variable with $k = 5$ and $p = 0.2$.   3

(b) Using the uniform random numbers given below obtain three Poisson random variables when $\lambda = 2$: 4

0.696, 0.457, 0.493, 0.784, 0.123, 0.478, 0.487, 0.031, 0.681, 0.258

(c) Differentiate between stratified and cluster samplings with examples. 3

7. (a) Explain sampling and non-sampling error.

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(b) Write a short notes on the following : 6

(i) Local control

(ii) Factorial Experiments

(iii) Systematic Sampling

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