TM252552M

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, MARCH 2025

2020, 2021, 2022, 2023 ADMISSIONS SUPPLEMENTARY

SEMESTER II - CORE COURSE

ST2C09TM - Statistical Computing I

Time : 3 Hours **Maximum Weight : 30**

Part A

I. Answer any Five questions. Each question carries 6 weight **(5x6=30)**

1. Fit a binomial distribution for the following data and test the goodness of fit.

x	0	1	2	3	4	5	6	Total
f	5	18	28	12	7	6	4	80

2. In a study of the use of sampling to cut down the work in talking inventory in a stock room, a count is made of the articles on each of 36 shelves in the room, The values to the nearest dollar as follows

29	28	42	44	45	47	51	53	53	54	56	56
58	56	58	59	60	60	60	60	61	61	61	62
64	65	63	67	67	68	69	71	74	77	82	85

The estimate of the total value made from a sample is to be correct within 200 dollars, apart from a 1 in 20 chance. An advisor suggests that a srs of 12 shelves will be sufficient. Do you agree?

3. The following data shows the stratification of all the farms in a country by farm size, the average yield of corn per acre and SDs. It is proposed to select a random sample of 100 farms for study. Compute the respective sample size and compare the precisions of estimator under

   (i) Proportional allocation.

   (ii) Optimum allocation.

Farm saize	No.of Farms	Avg.Corn/farm	S.D
0-40	394	5.4	8.3
41-80	461	16.3	13.3
81-120	391	24.3	15.1
121-160	334	34.5	19.8
161-200	169	42.1	24.5
201-240	113	50.1	26.0
>240	148	63.8	35.2

4. From the normal density with a= 10, σ= 2, draw a random sample of size 10 and find an unbiased estimate for a and σ^2. Also, find UMVUE for a+ σ^2 and a+ 6 σ^2.

5. Given below is a random sample of size 11 from a normal population,
   15.97, 14.38, 28.02, 14.67, 10.15, 18.08, 14.61, 15.56, 19.73, 26.80, 23.85.
   If standard deviation is 5.28 units. Determine the 95% and 98% confidence interval for the mean.

6. Vehicles arrive at a toll booth at an average rate of 300/hr and the average service rate is 360 vehicles per hour. If both arrivals and departures are exponentially distributed,
   a) What is the average number of vehicles in the system?
   b) What is the average queue length?
   c) What is the average delay per vehicle?

d) What is the average time a vehicle is in the system?

7. Examine whether the ultimate extinction was certain for the following process

   a. P(s) = $\frac{1}{2} + \frac{1}{2}s^2$

   b. P(s) = $\frac{1}{2} + \frac{s}{4} + \frac{s^2}{4}$

8. Find the means, variances and covariances of normal variates which have the quadratic form $2X_1^2 + X_2^2 + 4X_3^2 - X_1X_2 - 2X_1X_3$ in their distribution. Also find $R_{1.23}$ and $R_{3.12}$

9. Three characteristic were measured for samples of same species from fresh water and from sea water gave the following results:-

   Sample 1(fresh water): sample size =20, $meanvector = (126.55, 35.6, 21.65)$

   Sample 2(sea water): sample size =25, $meanvector = (130.00, 34.85, 21.00)$

   Give the dispersion matrices corresponding to fresh water & sea water as

   ∑1 = 128.151.4317.3463.3413.5620.93 & ∑2 = 124.31-7.1319.9518.394.8943.47

   Examine the equality of mean vectors.