

Reg. No.:



W7095

Name:

University of Kerala

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

STATISTICS

UK3DSCSTA208-STATISTICAL INFERENCE

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

Part A 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn.No.	Question	CL	CO
1	True or False: MLE always gives unbiased estimators for all sample sizes.	RE	2
2	F distribution curve in respect of tails is Options : A)negatively skew B)symmetrical C)positively skew D)nothing can be said	RE	1
3	Degrees of freedom for Chi-square test in case of 5x4 contingency table is Options : A)12 B)7 C)20 D)9	UN	4
4	Student's t distribution was given by Options : A)G. W. Snedecor B)R. A. Fisher C)W.S. Gosset D)None of the above	UN	1
5	A sample mean of 50 is drawn from a population with known $\sigma=10$ and $n=25$. Find the standard error of the sample mean.	UN	3
6	Give an example of an estimate which is consistent but biased	UN	2

Part B 8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn.No.	Question	CL	CO
7	A sample of size 16 is taken from a Normal population with mean 1 and S.D 1.5.Find the probability that the sample mean is negative.	UN	1
8	Differentiate between unbiasedness and consistency of an estimator.	UN	2

Qn.No.	Question	CL	CO
9	$X_1, X_2, \dots, X_n$ is a random sample from a population following poisson distribution with parameter (λ) . Suggest any three unbiased estimators of (λ)	AP	2
10	If X follows t distribution with n degrees of freedom, then find the distribution of X^2 ?	AP	1

Part C 28 Marks. Time: 60 Minutes (Cognitive Level: Apply (AP)/Analyse (AN)/Evaluate (EV)/Create (CR)) Long Answer: 7 marks each. Answer all 4 Questions choosing among options * within each question

Qn.No.	Question	CL	CO
11	A) x_1, x_2, x_3 are three independent observations from a population with mean μ and variance σ^2. If $t_1 = x_1 + x_2 - x_3$ and $t_2 = 2x_1 + 3x_2 - 4x_3$ compare the efficiencies of t_1 and t_2. OR B) Develop a maximum likelihood estimator of mean and variance for a normal population.	AP	2
12	A) Explain Chi Square test of independence and homogeneity in detail OR B) A random sample of 10 students' marks in statistics is: 42, 38, 40, 35, 44, 39, 41, 37, 43, 36. Calculate the 95% confidence interval for the population mean mark, assuming normality	AN	4
13	A) A population follows the normal distribution with parameters μ and σ To test the hypothesis $H_0: \mu = 5$ against $H_1: \mu = 7$, the test procedure suggested is to reject H_0 if $\bar{x} \geq 6$ where $\bar{x}$ is the mean of a sample of size 16. Evaluate the significance level, probability of type 2 error and power of the test OR	EV	3

Qn.No.	Question	CL	CO																									
	B) A sample of 20 observations from a normal population has variance $s^2= 25$. (i) Construct a 95% confidence interval for the population variance σ^2. (ii) Evaluate whether the assumption $\sigma^2= 20$ is reasonable.																											
14	A) Suppose you are working in a textile company. The manager wants to test whether the average length of cloth rolls produced is greater than 50 meters. Construct a large sample test problem with suitable null and alternative hypotheses. Choose a significance level and explain how would you test it. OR B) A survey was conducted in 3 cities to study preference among 3 brands of soap. The results are: <table><tr><th>City</th><th>Brand X</th><th>Brand Y</th><th>Brand Z</th><th>Total</th></tr><tr><td>City A</td><td>30</td><td>20</td><td>50</td><td>100</td></tr><tr><td>City B</td><td>25</td><td>35</td><td>40</td><td>100</td></tr><tr><td>City C</td><td>20</td><td>25</td><td>55</td><td>100</td></tr><tr><td>Total</td><td>75</td><td>80</td><td>145</td><td>300</td></tr></table> Test whether the preference for soap brands is homogeneous across the cities.	City	Brand X	Brand Y	Brand Z	Total	City A	30	20	50	100	City B	25	35	40	100	City C	20	25	55	100	Total	75	80	145	300	CR	4
City	Brand X	Brand Y	Brand Z	Total																								
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