QP CODE: D3BST2404 **(Pages: 2)** **Reg. No : ....**

Name : ....

THIRD SEMESTER FYUGP EXAMINATION, NOVEMBER 2025

Discipline Specific Core (DSC) Course - Minor

STA3MN201 : Statistical Inference using R

(Credits: 4)

Time: 2 Hours **Maximum Marks: 70**

Section A

Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)

1.	If X_1 , X_2 is a random sample of size two from a population with mean μ and variance σ^2 , compare the efficiencies of the estimators $4X_1 - 3X_2$ and $3X_1 -2 X_2$.	BL2	CO1
2.	Give an example for an estimator which is unbiased as well as consistent.	BL1	CO1, CO2
3.	Estimate the parameters of the binomial distribution if the mean of the sample is 6 and variance is 3/2.	BL2	CO1
4.	Define point estimation? In the case of normal distribution, what is the point estimator of population mean?	BL2	CO1, CO2
5.	Write down the test statistic for testing single proportion.	BL1	CO4
6.	Give the confidence interval for the mean of a normal population when σ is known.	BL1	CO2
7.	What types of datasets are suitable for representation using multiple bar diagrams in R?	BL1	CO5
8.	How can you calculate the range in R?	BL1	CO5
9.	Write down the syntax to find mean of the given data in R x: 5 10 15 20 25 30 35 f: 2 8 3 7 4 1 6	BL2	CO5
10.	Describe how to label and format a histogram in R.	BL1	CO5

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	Discuss the method of moment estimation.	BL1	CO1
12.	A survey found that 120 out of 200 people prefer chocolate ice cream over vanilla. Construct a 95% confidence interval for the proportion of people who prefer chocolate ice cream.	BL2	CO2, CO3

(PTO)

13. A local bakery claims that the average weight of its loaves of bread is 500 grams. A sample of 100 loaves is taken, and the sample mean weight is found to be 495 grams. The standard deviation of the weights is known to be 15 grams. Test the bakery’s claim at a 0.05 significance level. BL3 CO6

14. A survey amongst women was conducted to study the family life. The observations are as follows : BL3 CO6

	Family Life	
	Happy	Not Happy
Educated	70	30
Uneducated	60	40

Test whether there is any association between family life and education.

15. Write down the steps to display the given table in R using data.frame. BL2 CO5

Name	Gender	Age	Height	Weight
Sandhya	Female	54	164	68
Rahul	Male	28	172	75
Sneha	Female	25	159	65
Kiran	Male	32	180	84

16. Describe data.frame with example. BL1 CO5

17. According to genetic theory, the seeds collected from a field of pink pea should produce plants with white, pink and red flowers in the proportion 1 : 2 : 1 . Of 400 plants from such seeds, 93 were white, 211 were pink and 96 were red. Does this result contradict genetic theory? BL3 CO6

18. Define M.L.E. What are the properties of M.L.E? BL1 CO1

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19. Let X_1 , X_2 , ... , X_n be a random sample of size n taken from N (μ , $\boldsymbol{\sigma}$) BL2 CO1, CO2

(i) Show that sample mean is a sufficient estimator of population mean, where population variance is known.

(ii) Obtain the sufficient estimator of population variance when population mean is known.

20. (i) Define two types of errors in testing of hypothesis. BL2 CO4

(ii)Suppose $X \geq 1$ is the region of rejection based on a single sample from exponential population with mean $1/\theta$, where hypotheses states that $H_0 : \theta = 2$ and $H1 : \theta = 1$ respectively. Obtain the size and power of the test.

CO : Course Outcome

BL : Bloom’s Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)