



QP CODE: 26019298



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Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION MARCH 2026**Fourth Semester**

M.Sc STATISTICS (APPLIED)

ELECTIVE - ST830403 - DATA SCIENCE II USING R / PYTHON

2019 Admission Onwards

B71252AF

Time: 3 Hours

Weightage: 30

(Answer any **THREE** questions. Each question carries a weight of **10**)

1. Compute all the principal components and their corresponding variance explanation for the following given correlation matrix of a four variate normal population.

$$\begin{pmatrix} 1 & 0.7501 & 0.6329 & 0.6363 \\ 0.7501 & 1 & 0.6925 & 0.7386 \\ 0.6329 & 0.6925 & 1 & 0.6625 \\ 0.6363 & 0.7386 & 0.6625 & 1 \end{pmatrix}$$

2. The number of telephone calls during one hour period follows a poisson distribution with a mean θ . Obtain SPRT for testing $H_0 : \theta = 4$ Vs $H_1 : \theta = 6$. taking $\alpha = \beta = 0.01$. Draw the OC and ASN curves for the SPRT

3. A sample of size 25 from a trivariate normal population gave the following sample mean vector and sample dispersion matrix

$$\begin{pmatrix} 61.94 \\ 71.49 \\ 77.49 \end{pmatrix} \text{ and } \begin{pmatrix} 16.49 & 4.67 & 1.71 \\ 4.67 & 11.51 & -0.66 \\ 1.71 & -0.66 & 5.00 \end{pmatrix}, \text{ test whether the population mean vector } \mu = \begin{pmatrix} 60 \\ 75 \\ 80 \end{pmatrix}$$

4. For a trivariate population, the dispersion matrix is as given below. Obtain the first principal component and the amount of variation explained by it.

$$\begin{pmatrix} 20.520 & & \\ 7.085 & 15.288 & \\ 3.839 & 9.464 & 31.923 \end{pmatrix}$$

5. Three sides of an equilateral triangle were measured by 5 pupils with the following results. Are there any significance difference between the (1) pupils (2) sides of the triangles

		Pupils				
Sides		A	B	C	D	E
	(a)	5.44	5.41	5.43	5.42	5.43
	(b)	5.43	5.41	5.42	5.43	5.44
	(c)	5.45	5.42	5.43	5.43	5.44





6. Develop an SPRT for testing $H_0 : \lambda = 1.2$ Vs $\lambda = 1.5$ of a poisson distribution with parameter λ with $\alpha = 0.05, \beta = 0.10$. Draw the O.C. and A.S.N. functions of the test. Use the test for the sequence of observation 1,1,0,1,2,1,0,3,1,0,2,0,1,0.

