BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-III Computer Science & Business Systems : SUMMER : 2025
SUBJECT: COMPUTATIONAL STATISTICS

Day : Friday
Date : 16/05/2025

S-29216-2025

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B :

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1	Write a detailed note on file handling in Python. Explain different modes of file operations and demonstrate file reading and writing operations with examples.	**(10)**
	OR	
Q.1	Explain the concept of constructors in Python. Explain all types of constructors with examples.	**(10)**
Q.2	Explain the concept of time ranges, frequencies and shifting in time series data. How do these operations help in the analysis and manipulation of time-indexed data?	**(10)**
	OR	
Q.2	Describe the process of resampling time series data using different frequencies (such as daily to monthly). Provide an example where frequency changes help in making better insights.	**(10)**
Q.3	Derive formula for conditional normal distribution. Interpret the significance of conditional mean and variance.	**(10)**
	OR	
Q.3	Explain the multivariate regressions model in detail. Derive the mathematical formulation and discuss how it can be applied to predict multiple dependent variables.	**(10)**
Q.4	Discuss comparatively three methods for dimension reduction. **i)** Linear Discriminant Analysis (LDA) **ii)** Principal Component Analysis (PCA) **iii)** Factor Analysis (FA)	**(10)**
	OR	
Q.4	How to classify a new observation using Linear Discriminant Analysis. Explain in detail.	**(10)**
Q.5	How do you determine the number of factors to retain in Factor Analysis? Discuss criteria such as eigenvalues, scree plot and the interpretability of factors.	**(10)**
	OR	
Q.5	Design the classic equation of Principal Component Analysis $\|S-\lambda I\|=0$.	**(10)**
Q.6	Define clustering and explain its significance in unsupervised learning. Illustrate how it can be applied in real-world scenarios.	**(10)**
	OR	
Q. 6	Compare and contrast K-means and hierarchical clustering. In what scenarios would one approach be preferred over the other?	**(10)**

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