**BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)**
**B. Tech. Sem - III Computer Science & Business Systems : SUMMER : 2025**
**SUBJECT: COMPUTATIONAL STATISTICS**

Day : Friday
Date : 16/05/2025

**S-24145-2025**

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) Assume suitable data **WHEREVER** necessary.
4) Draw neat labeled diagrams **WHEREVER** necessary.

**Q.1** What is a class and what role does a constructor play within it? Demonstrate the implementation of various types of constructors in Python with appropriate examples. **(10)**

**OR**

**Q.1** What are the various data structures used in Python? Explain with examples important functions associated with each data structures. **(10)**

**Q.2** What role do time series play in data analysis? Explain with examples some important time series functions. **(10)**

**OR**

**Q.2** What is the importance of pivot tables and crosstab functions in data analysis and how can they be used effectively in Python? **(10)**

**Q.3** Derive formula for Conditional Normal Distribution. Interpret the significance of Conditional Mean and Conditional Variance. **(10)**

**OR**

**Q.3** Estimate the parameters of Simple Linear Regression Model $\beta_0, \beta_1$ and $\delta^2$ using Least Square Method. **(10)**

**Q.4** Design the model for Multivariate Regression Model. **(10)**

**OR**

**Q.4** Design a classifier model using Fisher Linear Discriminant Function. **(10)**

**Q.5** Design the model for Factor Analysis. List out and explain assumptions of Factor Analysis. **(10)**

**OR**

**Q.5** How to decide the total number of Principal Components to be retained. Explain three methods for the same. **(10)**

I. Eigen values and Eigen vectors
II. Cumulative % variance explained
III. Scree Plot

**Q.6** Provide an overview of the K-means algorithm, elucidate its working using an example. Also discuss its advantages and disadvantages. **(10)**

**OR**

**Q.6** What are the various distance metrics utilized to determine proximity in clustering tasks. Explain in detail. **(10)**

*****