

BACHELORS WITH BOTANY AS MAJOR (CT - III)

7th SEMESTER

BOT722J3: BOTANY _ BIOSTATISTICS AND BIOTECHNIQUES

CREDITS: THEORY: 4; PRACTICALS: 2

LEARNING OBJECTIVES:

The objectives of the course are to impart to the students an in-depth understanding and training of collection, analysis, interpretation and presentation of data; hypothesis testing through statistical tests, sampling techniques, designing of experiments and the correlation and regression; and the applications of various bio-techniques.

LEARNING OUTCOME:

The students will be able to comprehend the types, collection and analyze the data, learn the sampling techniques, will be able to design experiments in biology, test the hypothesis through statistical tests and will be able to understand the principles and application of various scientific techniques like chromatography, electrophoresis, centrifugation etc. in biology

THEORY (4 CREDITS)

UNIT: I

Data types and collection: data types- data on ratio, interval, ordinal and nominal scales; continuous and discrete data; methods of primary and secondary data collection and their limitations; frequency and cumulative frequency distributions.

Processing and analysis of data: measures of central tendency- arithmetic mean, mode, median; measures of dispersion- mean deviation, variance, standard deviation, coefficient of variation.

UNIT: II

Sampling techniques: principles and various steps in sample survey; procedures and practices involved in simple, systematic, stratified, cluster and multistage random sampling.

Design and analysis of experiments: principles of experimentation; experimental designs- layout, analysis of variance and comparison of treatments in completely randomized design, randomized complete block design and factorial experiments.

UNIT: III

Probability Distribution: Probability distributions (Binomial, Poisson and Normal) (Brief concept)

Testing of hypothesis: basic concepts, procedure for hypothesis testing; test difference between two means (- independent and paired samples); test of proportions and test of goodness of fit.

Simple correlation and regression: basic idea, scatter diagram, calculation of an estimated correlation coefficient, significance tests for correlation coefficients; simple linear regression- calculation of regression coefficient, standard errors and significance test.

UNIT: IV

Chromatography: principles and applications of paper, thin layer, HPLC, ion exchange and gas liquid chromatographic techniques.

Electrophoretic and Centrifugation Techniques: Gel electrophoresis; ultra-centrifugation

Biophysical methods: concepts of spectroscopy, laws of photometry, Beer-Lambert's law, use of various spectroscopic techniques like UV-Visible in biology

Radio-labeling Techniques: properties of different radio-isotopes and their applications in biology, Safety guidelines.

LABORATORY EXERCISES (2 CREDITS):

- ❖ Collection of raw data on different parameters and classification of ungrouped data into grouped data (discrete and continuous series) i.e. frequency distribution
- ❖ Frequency distribution table and Construction of Simple bar chart, Histogram and Scatter plot.
- ❖ To find the various measures of central tendency (mean, mode and median) of the given data.
- ❖ To find the various measures of dispersion (mean deviation, standard deviation, variance and coefficient of variation) of the given data.
- ❖ Drawing of a sample from a given population by various sampling techniques (simple random, systematic and stratified sampling)
- ❖ Drawing of a sample from a given population by lottery method and random number table method
- ❖ To perform the t-test of two paired and independent samples
- ❖ To perform One-way ANOVA and Two-way ANOVA of the given data sets.
- ❖ To estimate the correlation (through scatter diagram and correlation coefficient) and linear regression between variables
- ❖ Gel electrophoresis techniques and analysis.
- ❖ Paper and thin layer (TLC) chromatography.
