

Paper VII : Mathematical methods and statistical techniques

Subject description: Basic mathematics pertaining to bioinformatics is included in this paper

Goals: To learn the basic idea that are essential for a clear understanding of various algorithms and some techniques.

Objectives: Students should be able to understand algorithms in sequence analysis and develops simple tools in bioinformatics.

Unit-I

Matrices: Types of matrices –Operation on matrices-inverse of matrix- solving simultaneous equations: matrix method, Gauss elimination , Gauss Jordan and Gauss Seidal method.

Unit –II

Numerical method and optimization: Errors-Solving ODE: RK method, Taylor’s series,Euler’s method; Minimization and maximization of function: Golden section search in one dimension, Quadratic interpolation method, Downhill simplex method in multidimension.

Unit-III

Fourier Transform : definition-Properties, simple problems. Applications of discrete Fourier transform, fast Fourier transform. Randomized minimization technique: Monte –Carlo minimization, Genetic algorithm.

Unit-IV

Statistical Technique: Frequency distribution, graphical representation, Measures of central tendency: mean, median and mode. Measures of dispersion : range, standard deviation ,coefficient of variation. Correlation: Karl Pearson coefficient of correlation, rank correlation. Regression.

Unit-V

Test of Significance: large sample test –single mean and differences of two mean. Small sample test(t – test) Single mean and difference of two means , Chi square test for goodness of fit. Anova: one way and two way classification.

References:

- 1.. Numerical methods in science and engineering- M K Venkataraman.
- 2.. Numerical methods for engineers with personal computer applications
Chopra S C Raman and Canale P
- 3..Optimization Techniques by S S Rao
- 4..Statistical methods – S P Gupta
- 5..Engineering Mathematics- T Veerarajan.