UNIT 1 GRAPH THEORY

10 Hrs.
Basic Concepts, Algorithms for connectedness, Shortest path, Minimum Spanning Tree

UNIT 2: HIGH DIMENSIONAL SPACE

10 Hrs.
Properties, Law of large numbers, Sphere and cube in high dimension, Generating points on the surface of a sphere, Gaussians in High dimension, Random projection, Applications.

UNIT 3: RANDOM GRAPHS AND SINGULAR VALUE DECOMPOSITION (SVD)

10 Hrs.
Large graphs, G (n, p) model, Giant Component, Connectivity, Cycles, Non-Uniform models, Applications. SVD: Best rank k approximation, Power method for computing the SVD, Applications.

UNIT 4: RANDOM WALKS AND ALGORITHM FOR MASSIVE DATA PROBLEMS

10 Hrs.
Reflection Principle, Long leads, Changes of Sign, Illustrations. Frequency Moments of data streams, matrix algorithms.