NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

SEMESTER- III

Course Code: CS13105/MA13101 (CSE/ECE/EEE)

Course Title: Computational Mathematics (CSE/ECE/EEE)

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Module-I: Number Theory

Integers, divisibility, Prime numbers, Primality testing, Unique factorization, Chinese remainder theorem, congruence, Diophantine equations and arithmetic functions.

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Module-II: Operation Research

Introduction to Linear Programming Model, Graphical method, Simplex Method, Nonlinear Optimization, Lagrange Method. **8**

Module-III: Graph Theory and Combinatorics

Introductions, Basic terminology, Simple graph, Multi graph, Pseudo graph, Degree of a vertex, Types of graphs, Sub graphs, Isomorphic graph, Bipartite graphs Walks, Paths, Cycles and Connectivity, Eulerian and Hamiltonian graphs, Shortest Path Problems, Representation of Graph(Adjacency and Incidence matrices), Planar Graph, Graph Coloring, Chromatic Numbers, Matching.
Introduction to Combinatroics, Permutations and Combinations, Pigeonhole Principle, Binomial theorem, Extended Binomial Theorem, Counting techniques, Recurrence relations, generating function. **13**

Module IV: Stochastic Process

Definition and examples of stochastic process, Poisson processes, Random walk, Markov chain; Discrete time Markov chain: Definition and examples, Classification of states, Stationary probability, Finite Markov chain, Transition probability and transition matrix**.** **11**

Text Books:

1. David Burton, Elementary Number Theory, 7th edition, McGraw Hill.
2. H. A. Taha, Operation Research: An Introduction, 9th edition, Dorling Kindersley, Pearson.
3. Kenneth H. Rosen, Discrete Mathematics and Its Applications with Combinatorics and Graph Theory, 7th edition, MsGraw Hill.
4. R. J. Wilson, Introduction to Graph Theory, 4th edition, Dorling Kindersley Pearson.

5. Sheldon M Ross, Stochastic Process, 2nd edition, Willey.

Reference Books:

1. D. B. West, Introduction to Graph Theory, 2nd edition, Dorling Kindersley Pearson.