

DISCRETE MATHEMATICS

Unit-I Set Relation And Function :

Sets & subsets, set operation, power set, cartesian product of two sets composition of relation, type of relation, mapping, mathematical function, exponential & logarithmic functions.

Group & fields:

Group, sub group, Finite & infinite group, cyclic group, permutation group, homomorphism, isomorphism, automorphism, endomorphism, coset, Field, sub field & Ring.

Unit - II

Mathematical Logic:

Statement & Notations, connectives, Normal forms, Theory of inference for the statement calculus, Predicate calculus.

Unit - III

Basic concept of Graph:

Basics of Graph, Pseudograph, Multigraph, Simple graph, Bipartite graph and Complete Bipartite graph, Hand Shaking Lemma, Sub graphs, Operations on graph, Walk, Path and Circuits and their properties. Shortest Path Problem.

Unit - IV

Eulerian and Hamiltonian Graph:

Unicursal and Eulerian graph, Randomly Eulerian graph, Fleury's Algorithm, Chinese Postman Problem, Hamiltonian Graph, Necessary and Sufficient conditions, Traveling Salesman Problem.

Unit - V

Trees and Spanning Trees:

Tree, Properties of tree, Distance, Radius, Diameter of a tree, Spanning tree, Fundamental Circuit, Cayley's Formula for number of spanning tree, Minimal spanning tree : Kruskal's and Prim's Algorithm, Connectivity and Seperability.

Network Flow:

Networks: Flows, Cuts in a Network, Max-flow Min-cut theory, Augmenting path, Ford and Fulkerson algorithm, Edmonds and Karp algorithm, Menger's Theorems.

Books:

1. Elements of Discrete Mathematics: C.L. Liu
- S. Pal, "Graph Theory and its Applications", Umesh Pub.,

Unit 1

Fundamentals of Cyber Security and Threat Landscape Importance and challenges in Cyber Security, Cyberspace, and Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure

Cyber Attacks and Intrusion Techniques Types of Hackers - Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access - Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks. Worms, Trojans, Viruses, Backdoors.

Unit 2

Cyber crime and Cyber law

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India, Case studies.

Unit 3

Ethical Hacking and Information Security Practices Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modeling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing

Social Engineering and Insider Threats Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social engineering Targets and Defence Strategies.

Recommended Books:

1. Cyber Security and Cyber Laws Nilakshi Jain Wiley
2. Cyber Security Nina Godbole Wiley
3. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
4. Introduction to Cyber Security, Chwan-Hwa(John) Wu, J. David Irwin, CRC Press T&F Group.