

MANGALORE UNIVERSITY
DEPARTMENT OF MATHEMATICS
MSC MATHEMATICS

MTS 507	Graph Theory	4 Credits (48 hours)
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Prerequisite: Knowledge of Mathematics at Under-Graduate Level.

Course Outcome: Graph Theory is an integral part of Discrete Mathematics and has applications in

diversified areas such as Electrical Engineering, Computer science, Linguistics. Students will have the knowledge and skills to apply the concepts of Trees, Eulerian Graphs, Matching, Vertex colorings, Planarity.

Course Specific Outcome: At the end of the course Students will have the knowledge and skills to explain Demonstrate accurate and efficient use of the following topics in various situations -

- The problem of Ramsey
- Extremal graphs, Operations on graphs,
- Menger's theorem
- Traversability and Planarity,
- Eulerian graphs, Hamiltonian graphs.
- Coloring
- Matrices associated with graphs.

Unit I - Graphs:

Varieties of graphs, Walks and connectedness, Degrees, The problem of Ramsey, Extremal graphs, Intersection graphs, Operations on graphs.

(10 Hours)

Unit II - Blocks, Trees and Connectivity:

Cut points, Bridges, Blocks, Block graphs and Cut point graphs, Characterization of trees, Centers and centroids, Block-Cutpoint trees, Independent cycles and cocycles. Connectivity and line-connectivity, Graphical variations of Menger's theorem.

(15 Hours)

Unit III - Traversability and Planarity:

Eulerian graphs, Hamiltonian graphs. Plane and planar graphs Outerplanar graphs.

(15 Hours)

Unit IV

Colorability: The chromatic number, The Five Color Theorem, The chromatic polynomial.

Matrices: The adjacency matrix, The incidence matrix and The cycle matrix, Matrix-Tree Theorem.

(8 Hours)

References

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- [1] F. Harary, *Graph Theory*, Addison-Wesley Series in Mathematics, 1969.
- [2] Narsingh Deo, *Graph Theory with Applications to Engineering and Computer Science*, Prentice Hall of India, 1987.
- [3] Bela Bollabas, *Modern Graph theory*, Springer, 1998.
- [4] R. Balakrishnan and K. Ranganathan, *A textbook of Graph Theory*, Springer-Verlag, 2000.
- [5] Douglass B. West, *Introduction to Graph Theory*, Prentice Hall of India, New Delhi, 1996.
- [6] O. Ore, *Theory of Graphs*, American Mathematical Society, Providence, Rhode Island, 1967.