

## **First paper**

### **Graph Theory**

Graphs, vertices of graphs, Walks and connectedness, Degrees, Operations on graphs, Blocks-cut points, Bridges, Block graphs and cut point graphs.

Acyclic graphs, trees, cut edges, cut vertices, Spanning Trees, Planar graphs, Eulers Formula.

Colorability, The chromatic number, five color theorem, Four color Conjecture, map coloring theorem, The adjacency matrix, incidence matrix, cycle matrix.

Eulerian and Hamiltonian graphs, line graphs, properties and characterization of line graphs, traversability and total graphs.

Coverings and independence, critical points and line, planes and planar graphs, outer planar graphs, Kurtowski's theorem.

### **References**

1. Graph Theory by F. Harary Addition Wesley Reading mass, 1969.
2. Graph Theory with Applications to engineering and Computer Science, by N. Dew, Prentice Hall of India, 1987.
3. J.N Bondy and U.S.R Murthy-Graph theory with applications, Elevier, 1976
4. D.B, West- Introduction to Graph Theory.

## **Second paper**

### **Linear Algebra**

Vector spaces, Subspaces, Linear combinations and systems of linear equations, Linear independence and linear dependence, Bases and Dimension, maximal linearly Independent subsets.

Inner product spaces, orthogonality, The adjoint of linear transformation, unitary operations, Self adjoints and normal operators, Polar and singular value, Decomposition.

Eigen values and Eigen vectors, Diagonalisability, Invariant subspaces and Caley-Hamilton theorem, The Gram-Schmidt orthogonalisation process and orthogonal complements.

### **References**

1. Linear Algebra by S.Lang, Springer
2. Linear Algebra by Bisht and Sahai
3. Linear Algebra by Hoffman & Kunza
4. Linear Algebra & its applications, by David. C. LayPearson