**Outline of GIST of Lectures**

**Dr. MD. M. Ashraf**

**Department of Mathematics**

**U.G (Hons) – 1ST SEM.**

***August-2017 (No of lectures:02)***

**Lecture 1:** Matrices, Introduction, Algebra of Matrices.

**Lecture 2:** Transpose of Matrices, Properties, Reversal Law.

***September-2017 (No of lectures:15)***

**Lecture 1:** Symmetric, Skew- Symmetric Matrices & related Theorem.

**Lecture 2:** Complex Matrices, Transposed Conjugate of matrices & its Properties.

**Lecture 3:** Hermitian, Skew- Hermitian.

**Lecture 4:** Problems on Hermitian, Skew-Hermitian matrices.

**Lecture 5:** Minor, Cofactor & Adjoint of Matrices & Theorems.

**Lecture 6:** Theorems on Inverse of Matrices. Properties: Reversal Law.

**Lecture 7:** Orthogonal Matrices, its Properties & examples.

**Lecture 8:** Unitary matrices, its Properties & examples.

**Lecture 9:** Minor & Rank of Matrices & examples.

**Lecture 10:** Elementary operation of Matrices.

**Lecture 11:** Rank of Matrices by transforming to Canonical & Echelon form.

**Lecture 12:** Examples Related to Canonical form & echelon form.

**Lecture 13:** Elementary Matrices. Elementary Row & Column Operation of Matrices.

**Lecture 14:** Property related to elementary matrices. Elementary matrices are non-singular Matrices.

**Lecture 15:** Problems on Rank of matrices.

***November-2017 (No of lectures:14)***

**Lecture 1:** Properties of elementary matrices

**Lecture 2:** n-vectors, Linear dependence & independence of vectors.

**Lecture 3:** Problems on Linear dependence & independence of vectors.

**Lecture 4:** Problems on Linear dependence & independence of vectors.

**Lecture 5:** Row rank & column rank.

**Lecture 6:** Equivalence of row rank & column rank.

**Lecture 7:** Theorems on rank of matrices.

**Lecture 8:** Problems

**Lecture 9:** Definition of characteristic equation & polynomials.

**Lecture 10:** Eigen values & Eigen vectors.

**Lecture 11:** Properties of Eigen Values & Eigen Vectors.

**Lecture 12:** Properties of Eigen Values & Eigen Vectors.

**Lecture 13:** Problems on Eigen Values & Eigen Vectors.

**Lecture 14:** Different cases of solutions.

***December-2017 (No of lectures:10)***

**Lecture 1:** Cayley Hamilton Theorem.

**Lecture 2:** Problems on Caley Hamilton Theorem.

**Lecture 3:** Necessary & Sufficient condition of existence of solution of simultaneous equations.

**Lecture 4:** Solution of non-homogeneous simultaneous equation.

**Lecture 5:** Different cases (Unique, Infinitely many solutions & no solution).

**Lecture 6:** Problems discussed.

**Lecture 7:** Problems discussed.

**Lecture 8:** Homogeneous equation(Trivial & non-trivial solutions).

**Lecture 9:** Problems discussed.

**Lecture 10:** Problems discussed.

***January-2018 (No of lectures:10)***

**Lecture 1:** Different types of relations.

**Lecture 2:** Examples of different types of relations.

**Lecture 3:** Equivalence class & examples.

**Lecture 4:** Theorem on equivalence relation.

**Lecture 5:** Congruence modulo relation.

**Lecture 6:** Partition by equivalence relation.

**Lecture 7:** Fundamental theorem of equivalence relation.

**Lecture 8:** Set mapping & properties.

**Lecture 9:** Theorems on mapping.

**Lecture 10:** Problems discussed.

***February-2018 (No of lectures:05)***

**Lecture-1:** Revision & Discussion.

**Lecture-2:** Revision & Discussion.

**Lecture-3:** Revision & Discussion.

**Lecture-4:** Revision & Discussion.

**Lecture-5:** Revision & Discussion.