BACHELLOR OF ARTS / SCIENCE
6th SEMESTER
OPTION-I
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEs)

MM620DA: MATHEMATICS: LINEAR ALGEBRA

CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: To find the solutions of systems of equations and their consistency rising from various branches of science and social science.

UNIT-1 (15 HOURS)

Types and properties of matrices, Inverse of a square matrix, matrix polynomials, characteristic equation, Cayley-Hamilton Theorem , Eigen values and eigen vectors of matrices and their determination, rank of a matrix, invariance of rank matrix under elementary transformations. Reduction of matrix to normal form, elementary matrices.

UNIT-2 (15 HOURS)

Linear dependence and linear independence of row(column) vectors, conditions for columns of a matrix to be linearly dependent, matrix A has rank r iff it has r linearly independent columns, analogous results for rows. Linear homogeneous and non-homogeneous equations, inner product of two vectors, orthogonal and unitary matrices, determination of orthogonal matrices.

UNIT-3 (15 HOURS)

Vector spaces, examples, subspaces, algebra of subspaces, quotient spaces, linear dependence, independence and linear span of vectors, basis and dimensions of vector spaces.

UNIT-4 (15 HOURS)

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations, dual space and dual basis, homomorphism and isomorphism, isomorphism theorems.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

17. Tutorials based on Unit I & II - **1 credit**
18. Tutorials based on Unit III & IV – **1 credit**.

Text Books Recommended:

1. A. Aziz, N. A. Rather and B. A. Zargar, A Text Book of Matrices, KBD.
2. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, PHI.
3. S. Lang, Introduction to Lineaer Algebra, Springer.
4. Shanti Narayan, A Text Book of Matrices.
5. Gilbert Strang, Linear Algebra and its Applications, Thomson (2007)

BACHELLOR OF ARTS / SCIENCE
6th SEMESTER
OPTION-II
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEs)
MM620DB: MATHEMATICS: THEORY OF PROBABILITY

CREDITS THEORY-4, TUTORIAL: 2

THEORY (4 CREDITS: 60 HOURS) **MAXIMUM MARKS: 60, MINIMUM MARKS: 24**

Objectives: To introduce the students to study the situations involving uncertainty that arising day to day life and applications in other subjects.

UNIT-1 (15 HOURS)

The probability set functions, its properties, probability density function, the distribution function and its properties, mathematical expectations, some special mathematical expectations, inequalities of Markov, Chebyshev and Jensen.

UNIT-2 (15 HOURS)

Conditional probability, independent events, Baye's theorem, distribution of two and more random variables, marginal and conditional distributions, conditional means and variances, correlation coefficient, stochastic independence and its various criteria.

UNIT-3 (15 HOURS)

Some Special Distributions, Bernoulli, Binomial, trinomial, multinomial, negative binomial, Poisson, gamma, chi-square, beta, Cauchy, exponential, geometric, normal and bivariate normal distributions.

UNIT-4 (15 HOURS)

Distribution of functions of random variables, distribution function method, change of variables method, moment generating function method, t and F distributions, distribution of order statistics, distribution of $\overline{X}$ and $\frac{nS^2}{\sigma^2}$. Limiting distributions, different modes of convergence, central limit theorem.

TUTORIALS (2 CREDITS: 30 HOURS) **Maximum Marks: 30 Minimum Marks: 12**

19. Tutorials based on Unit I & II - **1 credit**
20. Tutorials based on Unit III & IV – **1 credit**.

Recommended Books:

1. Hogg and Craig, An Introduction to Mathematical Statistics.

2. Mood and Grayball, An Introduction to Mathematical Statistics.

References

3. C. R. Rao, Linear Statistical Inference and its Applications.

4. V. K. Rohatgi, An Introduction to Probability and Statistics.