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The Cluster University of Srinagar
Syllabus for Generic Elective (Mathematics)

Semester-I
Course title: Discrete Mathematics-I
Course code: MA-GE1
Total credits: 06

Maximum marks: 90
End-term examination: 56
Internal assessment: 30
Attendance: 04

Unit-I

Sets & Relations: Sets, representation of sets, types of sets, subset, power set, number of subsets of a finite set, universal set, operation on sets, union, intersection, difference, complement of a set, algebra of sets, DeMorgan's law.

Cartesian product of sets, relation, types of relations, domain and range of a relation, Equivalence relation, partial ordering relation.

Unit-II

Matrices, types of matrices, equality, addition & multiplication of matrices, transpose of a matrix & its properties, symmetric, skew-symetric. Every square matrix can be uniquely expressed as the sum of the symmetric & the skew-symmetric matrices. Trace of a square matrix, $\mathrm{tr}(\lambda A) = \lambda \mathrm{tr} A$, $\mathrm{tr}(A \pm B) = \mathrm{tr}A \pm \mathrm{tr}B$, $\mathrm{tr}(AB) = \mathrm{tr}(BA)$, Determinant of a square matrix (order 2 & 3), properties of determinants, area of a triangle and collinearity of three points using determinants, Cramer's rule.

Unit-III

Adjoint of a square matrix, singular & non-singular matrices, inverse of a square matrix, solution of system of linear equations by matrix method, Characteristic equation of a matrix, Cayley-Hamilton theorem (without proof), Inverse of a matrix using Caley-Hamilton theorem, Rank of a matrix, elementary transformations, elementary transformation do not alter the rank (illustration only), rank using elementary transformations.

Unit-IV

Mathematical logic: Statement, conjunction, disjunction, negation, Conditional and Bi-conditional statements, Tautology, Contradiction, Validity of argument, Logical equivalence (truth tables) and principle of duality, Boolean Algebra, Basic theorems, applications of Boolean algebra to switching circuits.

Text Books Recommended

(1) *NCERT Text book of Mathematics for Class 11th & 12th*

(2) *Discrete Mathematics and its applications* by Kenneth H. Rosen, Mcgraw Hill Education.