UPTU 2018 Syllabus PAPER- 11 APTITUDE TEST FOR 2nd Year MCA (Lateral Entry)

MATHEMATICAL STRUCTURES

- **Modern Algebra and Matrices:** Algebraic structures and general properties, semigroups, groups. Rings and Fields: definitions, elementary properties and standard results. Matrices, operation on matrices, Inverse and rank of a matrix, Eigenvalues, eigenvectors and system of linear equations.
- **Set Theory:** Introduction, sets and cardinals, the combination of sets, multisets and set identities. Relations - definition, operations on relations, composite relations, properties of relations, partial order relations. Functions - definition, classification of functions, operations on functions, recursively defined functions.
- **Number Theory and Methods of Proof:** Natural numbers, factorization and prime numbers, floor and ceiling functions. Methods of proof – Introduction, direct and indirect methods of proof, mathematical Induction.
- **Combinatorics and Probability:** Introduction, counting techniques, Pigeonhole principle. Probability –definition, sample space, algebra of events, axioms of probability, prior and posterior probability, Bayes theorem.

COMPUTING CONCEPTS

- **Principles of Computer Science:** Computer organization - evaluation of computers, computer arithmetic, control design, processor design, input-output organization, memory organization. Data Structures – Arrays, lists, stacks, queues. Trees and graphs - definition, properties and applications. Analysis of algorithms.
- **Proposition logic and Boolean Algebra:** Propositions, truth tables, tautology, contradiction, algebra of propositions. Binary systems, axioms and theorems of Boolean algebra, Boolean functions and digital circuits.
- **Numerical Techniques:** Floating point Arithmetic, the solution of the system of linear equations, roots of polynomials, interpolation and curve fitting.
- **Theory of Computation:** Finite-state machines, regular and non-regular languages, Turing machines and applications.

REASONING ABILITY

- Questions in this part will be aimed to assess the reasoning and logical ability of the candidates.