Course Code	**MA 114**
Course Name	**An Introduction to Mathematical Concepts**
Total Credits	6
Type	T
Lecture	3
Tutorial	0
Practical	0
Selfstudy	0
Half Semester	N
Prerequisite	Nil
Text Reference	1. T. M. Apostol, Mathematical Analysis, (2nd edition) Narosa Publicating House, 1974. 2. D. M. Burton, Elementary number theory, 6th edition, McGraw-Hill, 2007. 3. J. B. Conway, Functions of one complex variable, 2nd edition, Springer, 1978. 4. J. P. D'Angelo and D. B. West, Mathematical thinking: Problem-solving and Proofs, 2nd edition,Prentice Hall, 1997. 5. R. R. Goldberg, Methods of real analysis, Oxform & IBH Pub. (Indian Edition), 1970. 6. P. R. Halmos, Naive set theory, Springer 1960 (Reprint 2017). 7. G. A. Jones and J. M. Jones, Elementary number theory, Springer Math Undergrad Series, 1998 (Indian edition available). 8. A. Kumar and S. Kumerasan, A Basic course in real analysis, CRC Press, 2014.
Description	Elementary Concepts: Statements and Quantifiers, Sets, Functions and Methods of proofs (Goldberg, Ch 1) (Burton, Ch 1) (Jones and Jones Appendix A). Basic Real Analysis: Least upper bound and applications, Archimedean property, Density of $\mathbb{Q}$, $\mathbb{R}\setminus\mathbb{Q}$, Greatest integer function, Nested Interval Theorem, Uncountability of $\mathbb{R}$ (Goldberg, Ch 1). Sequence of Real numbers: (Goldberg, Ch 2). Operations, Monotone sequences, Cauchy sequences. Convergence of Series: Convergence and divergence, Test for absolute convergence (Goldberg, Ch 3). Basic Algebra: Divisibility, Bezout's Identity, Prime Factorisation, Fundamental Theorem of Arithmetic, Division Algorithms, GCD and LCM (Burton, Ch. 2) (Jones and Jones Ch. 1 and 2). Relations, Equivalence, Partitions, Modular Arithmetic, Euler and Mobius functions and inversion. Groups and Subgroups (basic properties and examples) (Jones and Jones Appendix B, Sec 3.1, 5.1-5.3, 6.1, 8.2-8.5). Complex Plane: Polar representation and roots of unity, lines and half planes in $\mathbb{C}$, $\mathbb{C}$ as a vector space over $\mathbb{R}$, conjugation as a linear map over $\mathbb{R}$, extended complex plane and its spherical representation (Conway, Ch. 1).