Branch Specific Courses for Applied Mathematics & Humanities Department

Foundation Course in Mathematics-I		**L**	**T**	**P**	**Credit**
MAMA 102 S1	**Scheme**	**3**	**1**	**0**	**04**

- **SET THEORY** **(7 Hours)**
  Sets, Intervals, Boundedness of sets,Supremum and infimum, Neighborhood, interior points, Open and closed sets, Limits points, Bolzano – Weierstrass Theorem, Countable and uncountable sets, Compact sets and related results. Finite Sets, Countable sets, Schroder –Berstein Theorem and Knaster – Tarski Theorem, Axoim of choice, Zorn's Lemma, Haussdorff's Maximality Principle and Well – Ordering Theorem and their equivalence.

- **RELATIONS AND FUNCTIONS** **(7 Hours)**
  Definitions, Types of relations and related properties, Cartesian product, One to one and onto functions, composite functions, inverse of a function, Binary operations. Function as a special kind of relation from one set to another. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions.

- **PARTIAL ORDER SET** **(7 Hours)**
  Basic Definitions: Partial Order, least element, greatest element, maximal element, minimal element, upper bound, lower bound, least upper bound, greatest lower bound, total order and totally ordered sets, chain. Hasse Diagrams and Lattices.LUB Property, GLB Property and their equivalence

- **LIMITS AND CONTINUITY OF FUNCTIONS ON R** **(7 Hours)**
  Limit of a function, Theorems on limits, Continuity of functions and properties, Uniform continuous functions and related results. Definitions of derivatives and related results, Increasing and decreasing functions, Darboux's theorem, Rolle's theorem, Mean value theorems of differential calculus and their applications.

- **FUNCTIONS OF BOUNDED VARIATIONS** **(7 Hours)**
  Functions of bounded variations and their properties, Variation function and related results, Jordon theorem, Vector valued functions, Vector valued functions of bounded variation and related results
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- **PRINCIPLE OF MATHEMATICAL INDUCTION** **(7 Hours)**
  Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers.The principle of mathematical induction (weak and strong) and simple applications.

Total Lecture Hours: 42+Tutorial Hours: 14

Books Recommended:

1. W. Rudin: Principles of Mathematical Analysis, 3rdEdition, McGraw Hill, New York 1976.
2. S.C. Malik and Savita Arora: Mathematical Analysis, 2ndEdition, New Age International (P) Limited, New Delhi, 1994.
3. T. Apostol: Mathematical Analysis, 2nd ed., Narosa Publishers, 2002.
4. H. L.Royden: Real Analysis, 3rd Edition, Macmilan Publishing Co. Inc., New York, 4th Ed., 1993.
5. N.S. Gopalakrishnan: University Algebra- New Age International (P) Limited, New Delhi, 2018
6. Joseph.A. Gallian: Contemporary Abstract Algebra, 9th Edition, Cengage Learning, 2016

Foundation Course in Mathematics-II

MAMA 113 S2

	L	T	P	Credit
Scheme	**3**	**1**	**0**	**04**

Group Theory

- **UNIT-I** **(6 Hours)**
  Binary relation, Function, Binary Operation, Groups, Various properties and examples of group, Subgroups, Properties of subgroups, Normal subgroups and important results, Cyclic groups, generator, Properties of Cyclic groups.

- **UNIT-II** **(6 Hours)**
  Cosets, Lagrange's theorem, Euler theorem, Fermat's theorem (with proofs), Isomorphism and homomorphism of groups and their examples and results, Quotient group.

- **UNIT-III** **(6 Hours)**
  First, Second and Third Isomorphism Theorems (with proofs), Direct product of groups and its related results.

- **UNIT-IV** **(6 Hours)**
  Permutations, even and odd permutations, transportation, disjoint cycles, permutation groups and its related results, Cayley's theorem, Cauchy's theorem (with proofs)

Trigonometry

- **UNIT-V** **(10 Hours)**
  Exponential values of sines, cosines and hyperbolic functions. Inverse circular and hyperbolic functions.Logarithm of the complex quantities.

- **UNIT-VI** **(08 Hours)**
  Gregory's series.Summation of series. Infinite product of sine and cosine

(Total Lecture Hours: 42 + Tutorial Hours: 14)

Text Book:

1. N.S. Gopalakrishnan: University Algebra- New Age International (P) Limited, New Delhi, 2018
2. Joseph.A. Gallian: Contemporary Abstract Algebra, 9th Edition, Cengage Learning, 2016
3. J.B. Fraleigh: "First Course in Abstract Algebra", A. Third Editon, Narosa Publishing House New Delhi 2003.
4. S. L. Loney: Plan Trignometry-I, Palala Press, 2016
5. S. L. Loney: Plan Trignometry-II, Palala Press, 2016