BACHELOR OF ARTS / SCIENCE WITH MATHEMATICS
4th SEMESTER
DISCIPLINE SPECIFIC COURSE (CORE-4)
(& GENERIC ELECTIVE COURSE FOR HONOURS PROGRAMMES)

MM420: MATHEMATICS: ALGEBRA

CREDITS: THEORY-4, TUTORIAL: 2

THEORY: MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objectives: The aim of this course is to learn the concepts of algebraic structures and their applications in other sciences.

UNIT-1 (15 HOURS

Groups, Semi-groups and sub-groups, Cyclic groups and their sub-groups, cosets and Lagrange's theorem, product of sub-groups, counting principle for the number of elements in HK, normaliser ad centre.

UNIT-2 (15 HOURS

Normal subgroups and various criteria for normality of a sub-group, Qoutient Groups, Group homomorphism and isomorphism, Examples.

UNIT-3 (15 HOURS

Fundamental theorem of homomorphism, Correspondence theorem, second and third theorems of isomorphism, Permutation Group, Even and odd Permutations, Symmetric group of degree n, alternating group, simple group, Cayley's theorem.

UNIT-4 (15 HOURS

Rings, Division rings and Fields, Sub-rings and Sub-fields, Ideals, Quotient rings, Principal ideals, Prime ideals, Maximal ideals and characterisations in terms of their associated quotient rings, Ring homomorphism and isomorphism, theorems on ring isomorphisms.

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

11. Tutorials based on Unit I & II - **1 credit**
12. Tutorials based on Unit III & IV – **1 credit**.

Books recommended

1. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Pearson 2002.
2. M.Artin, *Abstract Algebra*, 2nd Ed., Pearson 2011.
3. Joseph A Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa 1999.
4. I. N. Herstien, Topics in Algebra.
5. S. Singh and Q. Zameer Din, Modern Algebra.