

Syllabus for B.A/B.Sc.. Mathematics. Semester - IV

Course Name: Algebra (6

credits) Course No:

BMM-CR-

16401

Unit-I

Definition and examples of groups, examples of abelian and non-abelian groups, the group Z_n of integers under addition modulo n and group $U(n)$ of units under multiplication modulo n . Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(N, r)$, groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle and (iv) a square, the permutation group $Sym(n)$, groups of quaternions.

Unit-II

Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, index of subgroup, Lagrange's theorem, order of an element.

Unit-III

Normal subgroups: their definition, examples, and characterizations, Quotient groups.

Unit-IV

Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Z_n the ring of integers modulo n , ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions, subrings and ideals, integral domain and fields, examples of fields: Z_p , Q , R and C . Field of rational functions.

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. George E Andrew, *Number Theory*, Hindustan Publishing Corporation, 1984.