



# ALGEBRA - I

**PROF. S VISWANATH**

Department of Mathematics  
IMSc

**TYPE OF COURSE** : New | Core | PG

**COURSE DURATION** : 12 weeks (20 Jul' 20 - 9 Oct' 20)

**EXAM DATE** : 18 Oct 2020

**PRE-REQUISITES** : BSc-level linear algebra

**INTENDED AUDIENCE** : Any interested learners

**COURSE OUTLINE :**

Foundational PG level course in Algebra, suitable for M.Sc and first year PhD students in Mathematics.

**ABOUT INSTRUCTOR :**

Prof. S. Viswanath is a faculty at The Institute of Mathematical Sciences, Chennai. His research interest is in representation theory.

Prof. Amritanshu Prasad is a faculty at The Institute of Mathematical Sciences, Chennai. His research interest is in representation theory.

**COURSE PLAN :**

**Week 1:** Permutation Groups, symmetries of graphs

**Week 2:** Abstract Groups, homomorphism, isomorphism, subgroup, quotient group

**Week 3:** Group actions

**Week 4:** Sylow theorems

**Week 5:** Examples and definition of rings

**Week 6:** Homomorphisms, ideals, quotients, integral domains, fraction fields

**Week 7:** Principal ideal domains, Unique factorization domains and Euclidean domains

**Week 8:** Modules, definition and examples, submodules, simplicity, indecomposability

**Week 9:** Tensor products

**Week 10:** Jordan-Holder and Krull-Schmidt theorems

**Week 11:** Classification of finitely generated modules over PID's

**Week 12:** Applications of classification to finitely generated abelian groups and Jordan canonical form