Abstract for the CIMPA Course 2015
Finite Groups, Representation Theory and Combinatorial Structures

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The main of the course is to provide sufficient Group Theory and Representation Theory background for constructing Designs and Codes from Finite Groups. The inter play between Finite Groups and Combinatorial Structures would be studied

We will provide the students with properties of Finite Groups, Groups of Small order, Permutation Groups, Some Simple and Linear Groups, Permutation and Linear Representations of Finite Groups, Character Theory. We will discuss Designs and Codes and introduce two methods for constructing designs and codes from finite groups. We use the properties of these groups to obtain results about designs and codes and their automorphisms.

This course will also contain several theoretical and computational problems. The Computational Systems MAGMA and GAP will be used.

For topis on Group Theory, Character Theory of Finite Groups and on Design and Codes, the following are very useful references:

1 An Introduction to the Theory of Groups, J J Rotman, Graduate Texts in Mathematics, Springer-Verlag, 1994.

2 Character Theory of Finite Groups, I M Issacs, AMS Chelsea Publishing, 2006.

3 Designs and Their Codes, E F Assmus and J D Key, Cambridge University Press, 1992.