Abstract No: 200 ***ICT, Mathematics and Statistics***

GENERALIZED HADAMARD MATRICES AND 2-FACTORIZATION OF COMPLETE GRAPHS

W.V. Nishadi* and A.A.I. Perera

Department of Mathematics, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka
**vindinisha@hotmail.com*

Graph factorization plays a major role in graph theory and it shares common ideas in important problems such as edge coloring and Hamiltonian cycles. A factor F of a graph G is a spanning subgraph of G which is not totally disconnected. An n- factor is an n- regular spanning subgraph of G and G is n-factorable if there are edge-disjoint n-factors $F_1, F_2, \dots, F_k$ such that $G = F_1 \cup F_2 \cup \dots \cup F_k$. We shall refer $\{F_1, F_2, \dots, F_k\}$ as an n-*factorization* of a graph G. In this research we consider 2-factorization of complete graph. A graph with n vertices is called a complete graph if every pair of distinct vertices is joined by an edge and it is denoted by K_n. We look into the possibility of factorizing K_n with added limitations coming in relation to the rows of generalized Hadamard matrix over a cyclic group. Over a cyclic group C_p of prime order p, a square matrix $H(p, v)$ of order v all of whose elements are the p^{th} root of unity is called a generalized Hadamard matrix if $HH^* = vI_v$, where H^* is the conjugate transpose of matrix H and I_v is the identity matrix of order v. In the present work, generalized Hadamard matrices $GH(3, 3^m)$ over a cyclic group C_3 have been considered. We prove that the factorization is possible for K_{3^m} in the case of the limitation 1, namely, if an edge $\{i, j\}$ belongs to the factor F_k, then i^{th} and j^{th} entries of the corresponding generalized Hadamard matrix should be different in the k^{th} row. In Particular, $\frac{(n-1)}{2}$ number of rows in the generalized Hadamard matrices is used to form 2-factorization of complete graphs. We discuss some illustrative examples that might be used for studying the factorization of complete graphs.

Keywords: Factor, Factorization, Generalized Hadamard matrices, Kronecker product