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**Group divisible designs with two associate classes and \( \lambda \ 2 = 4 \)**


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**Abstract**

A group divisible design \( GDD(v = v_1 + v_2 + \cdots + v_g, g, k, \lambda_1, \lambda_2) \) is an ordered triple \((V, G, B)\), where \( V \) is a \( v \)-set of symbols, \( G \) is a partition of \( V \) into \( g \) sets of size \( v_1, v_2, \ldots, v_g \), each set being called a group, and \( B \) is a collection of \( k \)-subsets (called blocks) of \( V \), such that each pair of symbols from the same group occurs in exactly \( \lambda_1 \) blocks; and each pair of symbols from different groups occurs in exactly \( \lambda_2 \) blocks. Here, we focus on an existence problem of GDDs with two associate classes or when \( g = 2 \), and with blocks of size 3, when the required designs have two groups of unequal sizes and \( \lambda_2 = 4 \). We obtain the necessary conditions and prove that these conditions are sufficient. © 2011 Academic Publications, Ltd.

**Author Keywords**

Graph decomposition; Group divisible design

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