

DESIGNS IN PALEY GRAPHS AND PEISERT GRAPHS

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ABSTRACT. Fix positive integers p, q , and r so that p is prime, $q = p^r$, and $r = 1$ and $p \equiv 1 \pmod{4}$, or r is even and $p \equiv 3 \pmod{4}$. Fix a graph G as follows: If $r = 1$, let G be the q -vertex Paley graph; if r is even, let G be the q -vertex Peisert graph. We use the subgraph structure of G to construct four sequences of 2-designs, and we compute their parameters. Letting k_4 denote the number of 4-vertex cliques in G , we create 62 additional sequences of 2-designs from G , and show how to express their parameters in terms of only q and k_4 . We also explain how the presented techniques can be used to find many additional 2-designs in G .

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