

- Document Type** : Thesis
- Document Title** : Regular Near Hexagons and Related Groups or Designs
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- Abstract** : The concept of a near $2n$ -gon is due to Shult and Yanushka [20]. Near $2n$ -gons are essentially a linear incidence system of points and lines. A near $2n$ -gon $(\mathcal{P}, \mathcal{L})$ has order (s, t) if each point lies on $1 + t$ lines and each line contains $1 + s$ points. A near $2n$ -gon of order (s, t) is called regular with parameters $(s, t_2, t_3, \dots, t_n = t)$ if, whenever two points p and q are at distance d ($1 \leq d \leq n$), then exactly $1 + td$ lines through q carry points at distance $d - 1$ from p . The thesis comprises into four chapters. The first chapter is introductory and gives some basic definitions, terminology and preliminary concepts. In the second chapter we list some known results about regular $2n$ -gons with $n = 2, 3, 4$. In the third chapter we find eleven necessary conditions for the existence of a regular near hexagon and classify the following: (a) Thin near hexagons and related designs. (b) Near hexagons of Hamming type and their existence. (c) Classical near hexagons and the related classical simple groups. In the fourth chapter we discuss sporadic near hexagons. We obtain twelve feasible parameter sets for $s = kt^2$, $1 \leq k \leq 5$. Out of these twelve cases, we find some realizable regular near hexagons. In some cases, near hexagons do not exist and the remaining cases are still undecided
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