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GENERALIZED FRACTIONAL AND CIRCULAR COLORINGS

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An additive hereditary property of graphs is a class of simple graphs which is closed under unions, subgraphs and isomorphism. Let \mathcal{P} and \mathcal{Q} be additive hereditary properties of graphs. For positive integers r, s a *(weak) $(\mathcal{P}, \mathcal{Q})$ -total fractional/circular (r, s) -coloring* of a simple graph G is a coloring of the vertices $V(G)$ and edges $E(G)$ of G by arbitrary/consecutive s -element subsets of \mathbf{Z}_r , such that for each color i the vertices colored by sets containing i induce a subgraph of property \mathcal{P} , the edges colored by sets containing i induce a subgraph of property \mathcal{Q} and incident vertices and edges obtain disjoint sets. We present general basic results on $(\mathcal{P}, \mathcal{Q})$ -total fractional/circular (r, s) -colorings. For specific properties we determine the $(\mathcal{P}, \mathcal{Q})$ -total fractional and circular chromatic numbers of complete graphs.