Discussiones Mathematicae
General Algebra and Applications 41 (2021) 419–420
https://doi.org/10.7151/dmgaa.1372

ON ORDER PRIME DIVISOR GRAPHS OF FINITE GROUPS

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Abstract

The order prime divisor graph $\mathscr{POD}(G)$ of a finite group G is a simple graph whose vertex set is G and two vertices $a, b \in G$ are adjacent if and only if either $ab = e$ or $o(ab)$ is some prime number, where e is the identity element of the group G and $o(x)$ denotes the order of an element $x \in G$. In this paper, we establish the necessary and sufficient condition for the completeness of order prime divisor graph $\mathscr{POD}(G)$ of a group G. Concentrating on the graph $\mathscr{POD}(D_n)$, we investigate several properties like degrees, girth, regularity, Eulerianity, Hamiltonicity, planarity etc. We characterize some graph theoretic properties of $\mathscr{POD}(\mathbb{Z}_n)$, $\mathscr{POD}(S_n)$, $\mathscr{POD}(A_n)$.

Keywords: group, dihedral group, complete graph, Eulerian graph, regular graph, planar graph, order prime divisor graph.

2010 Mathematics Subject Classification: 05C25, 05C07, 05C45, 05C76.

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Received 3 July 2019
Revised 1 November 2020
Accepted 1 November 2020