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On the n-c-Nilpotent Groups

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Abstract

In this paper we introduce the notion of n-c-nilpotent group. It is shown that every nilpotent group of class at most c is n-c-nilpotent. Also we find a class of groups that all groups of it are n-c-nilpotent. Finally one equivalent condition for a n-c-nilpotent group to be torsion free is obtained.

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1 Introduction

In 1979 Fay and Waals [1] introduced the notion of the n-potent and the n-centre subgroups of a group G, for a positive integer n, respectively as follows:

$$G_n = \langle [x, y^n] | x, y \in G \rangle$$

$$Z^n(G) = \{x \in G | xy^n = y^n x, \forall y \in G\}$$

Where $[x, y^n] = x^{-1}y^{-n}xy^n$. It is easy to see that G_n is a fully invariant subgroup and $Z^n(G)$ is a characteristic subgroup of group G. In the case $n = 1$, these subgroups will be G' and $Z(G)$, the drive and center subgroups of G, respectively. In this paper we fix $n \in \mathbf{N}$.

Definition 1.1. A normal series $1 = G_0 \leq G_1 \leq \ldots \leq G_t = G$ of group G is called *n-central series* of length t if and only if

$$\frac{G_{i+1}}{G_i} \leq Z^n(\frac{G}{G_i})$$

Definition 1.2. A group G is called *n-c-nilpotent* if it has at least one n-central series of the length c such that c is the least of the lengths of its n-central series.

Now we introduce upper and lower n-central series of G which give us two examples of n-central series.

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