FULLY LEFT BOUNDED LEFT NOETHERIAN RINGS

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A left Noetherian ring R is <u>fully left bounded</u> $\Longleftrightarrow$ for each cyclic module ${}_RM$ there exist elements $m_1,\ldots,m_n \in M$ such that $\mathrm{Ann}(M) = \mathrm{Ann}(m_1,\ldots,m_n)$. Question: For what rings is there a uniform bound on the number of elements required? In particular, does a Noetherian ring with polynomial identity have a uniform bound? The condition is easily seen to be satisfied for any left Artinian ring or any ring finitely generated (as a module) over its center. A left Noetherian ring has bound one if and only if every left ideal is two-sided.