

ABSTRACT. Let E be a cyclic extension of degree p^n of a field F of characteristic p . Using arithmetic invariants of E/F we determine $k_m E$, the Milnor K -groups $K_m E$ modulo p , as $\mathbb{F}_p[\text{Gal}(E/F)]$ -modules for all $m \in \mathbb{N}$. In particular, we show that each indecomposable summand of $k_m E$ has \mathbb{F}_p -dimension a power of p . That all powers p^i , $i = 0, 1, \dots, n$, occur for suitable examples is shown in a subsequent paper, Mináč, Schultz and Swallow, 2008, where additionally the main result of this paper becomes an essential induction step in the determination of $K_m E/p^s K_m E$ as $(\mathbb{Z}/p^s \mathbb{Z})[\text{Gal}(E/F)]$ -modules for all $m, s \in \mathbb{N}$.