Construction of irreducible polynomials with prescribed fixed divisor

For a prime number $p$, the localization of $\mathbb{Z}$ at $p$ is defined as
\[ \mathbb{Z}(p) = \left\{ \frac{a}{b} : a, b \in \mathbb{Z} \text{ and } b \not\in p\mathbb{Z} \right\}. \]

Consider the ring $\mathbb{Z}(p)[x]$ of univariate polynomials with coefficients in $\mathbb{Z}(p)$, that is, the set of elements of the form $f = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$ with coefficients $a_0, \ldots, a_n$ in $\mathbb{Z}(p)$. A polynomial $f \in \mathbb{Z}(p)[x]$ is called irreducible if $f = gh$ for $g, h \in \mathbb{Z}(p)[x]$ implies that $g$ or $h$ are units in $\mathbb{Z}(p)[x]$.

For $f \in \mathbb{Z}(p)[x]$ we define the fixed divisor $d(f)$ of $f$ (in $\mathbb{Z}(p)$) to be the largest prime power $p^t$ with $t \in \mathbb{N}_0$ such that $p^t | f(a)$ for all $a \in \mathbb{Z}(p)$.

The aim of thesis is to investigate whether and under which conditions it is possible to construct polynomials in $\mathbb{Z}(p)[x]$ with prescribed fixed divisor.

For further details and literature talk to

**Roswitha Rissner**  
📞 Raum N.2.25  
📞 +43 463 2700 3149  
✉️ roswitha.rissner@aau.at