Construction of irreducible polynomials with prescribed fixed divisor

For a prime number p, the *localization* of $\mathbb{Z}$ at p is defined as

$$\mathbb{Z}_{(p)} = \left\{ \frac{a}{b} \colon a, b \in \mathbb{Z} \text{ and } b \notin p\mathbb{Z} \right\}.$$

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 polynomials $f \in \mathbb{Z}_{(p)}[x]$ 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* $\mathsf{d}(f)$ of f (in $\mathbb{Z}_{(p)}$) to be the largest prime power p^t with $t \in \mathbb{N}_0$ such that $p^t \mid f(a)$ 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

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