POWERS IN COMPLETE DISCRETE VALUATION RINGS

DIBYAJYOTI DEB AND DAVID B. LEEP

ABSTRACT. Let R be a discrete valuation ring with maximal ideal generated by a prime element π and let R_π denote the completion of R with respect to the π-adic topology on R. Let U denote the group of units of R_π. Let m be a positive integer. For each positive integer i, there is a surjective group homomorphism $f_i : U \longrightarrow R/(\pi^i)^\times/(R/(\pi^i)^\times)^m$. It is clear that $U^m \in \ker(f_i)$ for all $i \geq 1$. In this paper we determine the least value of i, if one exists, such that $\ker(f_j) = U^m$ for all $j \geq i$. In other words, when can one say that if $\alpha \in R_\pi$ is an m^{th} power modulo π^i, then α is an m^{th} power in R_π?

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF KENTUCKY, LEXINGTON KY 40506-0027

E-mail address: `ddeb@ms.uky.edu`

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF KENTUCKY, LEXINGTON KY 40506-0027

E-mail address: `leep@ms.uky.edu`