A COHOMOLOGICAL INVESTIGATION OF THE DISCRIMINANT OF A NORMAL ALGEBRAIC NUMBER FIELD

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Dedicated to the memory of Professor TADASI NAKAYAMA

1. Let F be an algebraic number field of finite degree, and let K/F be a normal extension of degree n. Denote by O_K the ring of all integers in K. In [1][1] we proved the following:

THEOREM 1. *The relative traces of all integers of K to F constitute an integral ideal $\mathfrak{a}$ of F and the ideal $\mathfrak{a}$ is characterized as the smallest ideal of F dividing the relative different $\mathfrak{D}_{K/F}$.*

In other words,

THEOREM 1′. *The 0-dimensional Galois cohomology group of O_K with respect to K/F is trivial if and only if K/F is tamely ramified at every prime ideal of F*[2].

Moreover we obtained there the following:

THEOREM 2. *If K/F is tamely ramified at every prime ideal of F, then the Galois cohomology group of O_K with respect to K/M is trivial for every dimension and for any intermediate field M of K/F*[3].

Namely, so far as we consider only the ring of all integers in an algebraic number field, the Galois cohomology group is trivial for every dimension whenever the normal extension is tamely ramified at every prime ideal. Therefore, we now consider more generally ambiguous ideals[4] instead of the ring of all integers in a normal extension field, and generalizing the theorem 1 we chara-

Received May 24, 1965.

1) Cf. [1] p. 83, Theorem 1.

2) Cf. [1] p. 86, Corollary 1.

3) Cf. [1] p. 86, Corollary 1, Corollary 2, [2] and [3].

4) This means ideals invariant under the operator of the Galois group.