



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:

The Hilbert-Samuel polynomial and its coefficients

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SHORT ABSTRACT

The Hilbert-Samuel function measures the length of quotients by powers of an m -primary ideal in a local ring R with maximal ideal m . Samuel showed that this function agrees with a polynomial, called the Hilbert-Samuel polynomial, for large powers of ideals. We study the coefficients of this polynomial, called as Hilbert coefficients. We investigate the Hilbert coefficients and their relation to the structural properties of the ring and various blow-up algebras. We obtain characterizations for the ring to be Cohen-Macaulay, generalized Cohen-Macaulay and Buchsbaum in terms of the finiteness properties of various sets of Hilbert coefficients. We mostly study the first and the second Hilbert coefficients and obtain uniform bounds for them in a number of cases.