



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Derivations and Darboux polynomials are useful methods to study polynomial or rational differential system. In the vocabulary of differential algebra, Darboux polynomials coincides with generators of polynomial differential ideals, that is $f \in k[x_1, \dots, x_n]$ is a Darboux polynomial iff $f \neq 0$ and the ideal (f) is differential. The present thesis studies certain classes of derivations having no Darboux polynomials with monomial cofactor. Another important notion in commutative algebra, simple derivations has also been studied in this thesis. Simple derivations play an important role in numerous problems. This thesis studies certain classes of derivations that are simple. In Chapter-1, we talk about definitions, notations and basic facts. In Chapter-2, we study a class of derivations having no Darboux polynomial with monomial cofactor. In Chapter-3, we study simplicity of certain polynomial derviations in the polynomial ring $k[x, y]$. In Chapter-4, we generalize the results obtained in Chapter-3 in more than two variables, i.e., we talk about few classes of simple derivations of the polynomial ring $k[x_1, \dots, x_n]$. In this Chapter-5, We pose some problems arising out of the work carried out in this thesis.