P R E F A C E

This dissertation consists of two chapters. The first chapter contains definitions and the results which are used in the second chapter. Every chapter is divided into three sections. These sections are numbered as 1,1, 1.2 etc. Hence 2.3 means the third section in Chapter II. The definitions are numbered within the section and are put within the brackets. Therefore, (1.2.4) means 4th definition in the Section 2 of Chapter-I. Similarly propositions, theorems and corollaries are also numbered.

References to the literature that have been used in this work are given at the end of this dissertation in an alphabetical order. In the text these have been referred to by putting within square brackets the serial number of the reference.

This work is devoted to the understanding of universal derivation modules, and their colimits. Kahler in 1953 introduced the concept of a complex over an R-algebra where R is a commutative ring with unity and A is a commutative unitary R-algebra. He defined and constructed universal algebra complex over an R-algebra. For a given R-algebra this complex is unique upto isomorphism.[7]

Every complex (x,d) over an R-algebra A gives rise to a derivation module (M,δ) of A where M is the module of homogeneous of degree 1 of X and δ is the restriction of d to A. It is proved that [17] (x,d) is a universal complex over A iff (X_1,d_0) is a universal derivation module of A and X is the exterior algebra of X_1. Hence our interest in universal derivation modules.

In [6], derivation modules are treated as triples (A, M, d) where A is an R-algebra, M is an A-module and d is an R-derivation of A to M. These triples form a category. It is proved there, that this category is complete and cocomplete.

In the present work we have proved that the colimit of a diagram, in which every object is a universal derivation module, is a universal derivation module. To be more precise we have proved the following :

Let$((A_\alpha,\ u_\alpha,\ d_\alpha),\ (\emptyset_{\beta\alpha},\ \gamma_{\beta\alpha})$ be a diagram in the category of derivation modules such that $(A_\alpha,\ u_\alpha,\ d_\alpha)$ is universal, then we have proved that its colimit object (A, u, d) is a universal derivation module, where A is the colimit algebra of the diagram $(A_\alpha,\ \emptyset_{\beta\alpha})$ in the category of commutative unitary R-algebra.

This result has been used to obtain the universal derivation modules of algebraic extension and of modular inseparable extensions in terms of the universal derivation modules of simple extensions.

These results are established by defining functors on certain categories.