

## Thesis Summary

A thesis "CODING MATRICES FOR THE SEMI-DIRECT PRODUCT GROUPS" submitted in partial fulfillment for the degree of master of mathematical sciences (Algebra).

Coding theory is the study of methods for efficient and accurate transfer of information from one place to another. In Hurley's paper, T. Hurley proved that the group ring  $RG$  of a group  $G$  of order  $n$  over a ring  $R$  is isomorphic to a certain ring of  $(n \times n)$  matrices over  $R$ . This representation enabled them to describe the unit and zero-divisors of the group ring in terms of properties of these matrices, and where appropriate in terms of the determinate of the matrices. Now, the coding matrices were determined for several classes of finite groups such as cyclic, direct product, elementary-abelian, dihedral groups and the general linear groups. In this study, we generalize Hurley's theorem to semi-direct product groups and hence, determine the coding matrices of these groups.

We introduced three chapters in this thesis as following:

Ch1: Codes; the concept and the main problem.

Ch2: Group Rings as a Ring of Matrices.

Ch3: Coding Matrices for the Semi-Direct Product Groups.

We deduced the coding matrices for  $D_{2n} \cong C_n \times_{\phi} C_2$  and the transfer map between the identity matrix to another matrix for this coding matrices, and explained the semi-direct product groups zero-divisor codes.