

## ON THE GENUS OF THE IDEMPOTENT GRAPH OF A FINITE COMMUTATIVE RING

G. GOLD BELSI<sup>1</sup>, S. KAVITHA<sup>2</sup>

AND

K. SELVAKUMAR<sup>1</sup>

Reg. No. 18114012092031

<sup>1</sup>Department of Mathematics  
Manonmaniam Sundaranar University  
Tirunelveli 627 012, Tamil Nadu, India

<sup>2</sup>Department of Mathematics  
Gobi Arts and Science College  
Gobichettipalayam 638 476, Tamilnadu

**e-mail:** goldbelsi@gmail.com  
kavithaashmi@gmail.com  
selva\_158@yahoo.co.in

### Abstract

Let  $R$  be a finite commutative ring with identity. The *idempotent graph* of  $R$  is the simple undirected graph  $I(R)$  with vertex set, the set of all non-trivial idempotents of  $R$  and two distinct vertices  $x$  and  $y$  are adjacent if and only if  $xy = 0$ . In this paper, we have determined all isomorphism classes of finite commutative rings with identity whose  $I(R)$  has genus one or two. Also we have determined all isomorphism classes of finite commutative rings with identity whose  $I(R)$  has crosscap one. Also we study the the book embedding of toroidal idempotent graphs and classify finite commutative rings whose  $I(R)$  is a ring graph.

**Keywords:** idempotent graph, planar, genus, crosscap.

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