

# Combinatorics And Graph Theory: Proceedings Of The Symposium Held At The Indian Statistical Institut

## On Extension of Regular Graphs

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### Abstract

In this article we have discussed when we can extend an  $r$ -regular graph to an  $r+1$  regular by only adding edges. The problem has been approached in several ways. For the extension of regularity, different conditions on the number of vertices  $n$  and regularity  $r$  have been developed. We have shown an upper bound of  $r$ , depending on  $n$ , for which every regular graph  $G(n, r)$  can be extended to an  $r+1$ -regular graph with  $n$  vertices. Presence of cycles, induced complete bipartite subgraph and complete subgraph has been discussed for extension of regularity.

**AMS classification:** [05C]

**Keywords:** Regular graph; Matching on regular graph; Bipartite regular graph; Extension of regularity.

### 1 Introduction

A graph  $G(n, r)$  with  $n$  vertices is called regular of degree  $r$  if each of its vertices are with degree  $r$ . Many studies have been done on the regular graphs till date. Not only these graphs are interesting in network theory [4] but also they are quite fascinating geometrically [11].

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