INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	RAMESH PRASAD PANDA
Roll Number	:	136123001
Programme of Study	:	Ph.D.

Thesis Title: Connectedness and Spectral Properties of Power Graphs of Finite Groups

Name of Thesis Supervisor~~(s)~~	:	DR. K. V. KRISHNA
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SHORT ABSTRACT

The power graph of a group G is the graph whose vertex set is G and two distinct vertices are adjacent if one is a power of the other. In this thesis, a study on connectedness, structural and spectral properties of power graphs of finite groups is presented. Several characterizations of minimal separating sets of power graphs of groups in terms of their quotient power graphs are given, and some minimal separating sets of power graphs of finite cyclic groups are obtained. Consequently, two upper bounds of vertex connectivity of power graphs of finite cyclic groups and their actual value for some orders are determined. Some structural properties of components of power graphs of p-groups are studied and the number of components of that of abelian p-groups is counted. Moving forward, it is shown that minimum degree and edge connectivity of power graphs of finite groups are equal. Then the minimum degree of power graphs of finite cyclic groups (for some orders), dihedral groups, dicyclic groups and abelian p-groups are computed and its equality with the vertex connectivity of the respective power graphs is characterized. Laplacian spectra of power graphs of finite cyclic groups, dicyclic groups and p-groups are investigated. Multiplicity of the Laplacian spectral radius and some bounds of the algebraic connectivity of these power graphs are supplied. A characterization such that the power graph of a dicyclic group is Laplacian integral is given. It is shown that the power graph of any p-group is Laplacian integral. Some characterizations for the equality of the vertex connectivity and algebraic connectivity of power graphs of finite cyclic groups, dicyclic groups are supplied. It is then proved that the equality always holds for p-groups. Cririal and minimal connectivity of power graphs of finite groups are investigated. Certain characterizations for power graphs that are minimally vertex (edge) connected have been presented. These notions are further examined on power graphs of some finite groups.