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Notice for the PhD Viva Voce Examination

Ms Athira P Ranjith (Registration Number: 1881506), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Saturday, 19 August, 2023 at 10.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Sum Signed Graph**
Discipline	:	**Mathematics**
External Examiner (Outside Karnataka)	:	**Dr M Antony Arockiasamy** Associate Professor PG & Research Department of Mathematics Sacred Heart College (Autonomous) Thirupathur, 635601, Tamil Nadu
External Examiner (Within Karnataka)	:	**Dr P S K Reddy** Professor and Head Department of Mathematics JSS Science and Technology University Mysuru - 570006 Karnataka
Supervisor	:	**Dr Joseph Varghese** Professor Department of Mathematics School of Sciences CHRIST (Deemed to be University) Bengaluru – 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 17 August 2023

ABSTRACT

A sum signed graph $S = (G, f, \sigma)$ is a signed graph of the underlying graph G where $f : V(G) \longrightarrow \{1, 2, \ldots, |V(G)|\}$ is a bijective function and $\sigma : E(G) \longrightarrow \{+, -\}$ is a mapping such that $\sigma(uv) = +$, whenever $f(u) + f(v) \leq n$ and $\sigma(uv) = -$, whenever $f(u) + f(v) > n$. The minimum number of negative and positive edges among all the sum signed labelings of G is known as rna and rna complement number respectively. The maximum number of positive edges among all the sum signed labelings of G is known as adhika number. The set $X \subseteq V(G)$ is said to be a s - dominating of a signed graph whenever X is a dominating set and there exists exactly s number of negative edges between X and its complement. The minimum cardinality of such a dominating set over all signed graphs of the graph G is called an s - domination number.

In the present study, we initiate the study of a new labeling in signed graphs namely, sum signed labeling. The characteristics of sum signed graphs and the bound of rna number of in terms of the number of vertices in the underlying graph are explored by examining the rna number of different graphs. The properties of signed graphs such as negating and balancing is analyzed. The relation between rna number and rna complement number is established. The connection of sum signed labeling with parity signed labeling and cordial labeling is discussed. The absolute cordial condition for graphs satisfying sum signed labeling is examined.

The concept of s - domination was also introduced during this period of study. The s domination in both the positive and negative homogeneous signed graph is investigated for each value of s. The properties of s domination in sum signed graphs are also analyzed. The s - domination number for specific values of s is investigated for various graphs. The maximum value of s for a graph for which the s - domination will exist is discussed.

Keywords: Signed graph, Sum signed graph, Parity signed graph, Cordial labeling, rna number, rna complement number, Balanced signed graph, Domination, Domination in signed graph. s - domination, s - domination number.

Publications:

1. **P. Ranjith** and J. V. Kureethara, "Sum Signed Graphs - I", AIP Conference Proceeding, 2261, 1-4, (2020).
2. **P. Ranjith** and J. V. Kureethara,"Negative Domination in Networks", Proceedings of Second International Conference on Sustainable Expert Systems, Lecture Notes in Networks and Systems, Springer Nature Singapore, 679–690, (2022).
3. **P. Ranjith** and J. V. Kureethara, "Sum Signed Graphs, Parity Signed Graphs and Cordial Graphs", IAENG International Journal of Applied Mathematics, 53 (2), 497–506 (2023).
4. **P. Ranjith** and J. V. Kureethara, "Sum Signed Graphs - II", Ural Mathematical Journal, 9(1), 121-126 (2023).