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Notice for the PhD Viva Voce Examination

Ms Anna Treesa Raj (Registration Number: 1740087), 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 Wednesday, 28 June, 2023 at 4.00 pm in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Topological Indices Based on Distance Labeling**
Discipline	:	**Mathematics**
External Examiner (Outside Karnataka, Maharashtra)	:	**Dr Sunil Mathew** Associate Professor Department of Mathematics National Institute of Technology Calicut Kerala - 673601
External Examiner (Within Karnataka)	:	**Prasanna Poojary** Professor Department of Mathematics Manipal Institute of Technology Bengaluru Karnataka - 560064
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.

Place: Bengaluru

Date: 26 June 2023

Registrar

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ABSTRACT

This thesis explores the prospect of combining two prime branches of graph theory, viz., topological indices and graph labeling, specifically radio labeling. The majority of the work includes the topological radio indices of graphs and their properties. Topological indices are numerical values associated with graphs and invariant with graph isomorphisms. Apart from Topological Radio Indices, it provides some additions to the eccentricity-based topological indices. Radio labeling or radio coloring, c, is assigned to a graph G such that the label difference between any two vertices must be greater than $diam(G)+1-d(u,v)$. Optimum radio labeling is the foundation for defining Topological radio indices. Labeling whose span is the radio number of the graph and which leads to the minimum value of the index is considered the optimum radio labeling. The topological radio indices and coindices are defined and are found out for some special classes of graphs, including gear graphs, wheel graphs, and star graphs.

The bounds for the first, second and third Zagreb radio indices have been established and characterized for the classes of graphs for which the bound is sharp. Furthermore, specific relationships between Zagreb radio indices and coindices are established concerning different parameters of the graph. The idea of consecutive radio labeling is explicitly studied. We have characterized the graphs with diameter 2 admitting consecutive radio labeling. We have studied the properties of graphs admitting consecutive radio labeling and stated the necessary and sufficient conditions for a graph to follow consecutive radio labeling. The study extended to eccentricity-based topological indices, viz., the forgotten eccentricity indices. The maximum d(u,v) for all v in V(G) is the eccentricity of the vertex u in G. This work also investigates eccentricity-based coindices and some of their properties. Apart from this, some uniquely radio colorable graphs are examined and characterized.

Keywords: Topological indices, Radio labeling, Eccentricity

Publications:

1. **Anna Treesa Raj**, Joseph Varghese Kureethara, "Zagreb Radio Indices and Coindices, Letters in Applied NanoBioScience
2. **Anna Treesa Raj**, Joseph Varghese Kureethara, "Consecutive Radio Labelling of Graphs", Lecture Notes in Networks and Systems
3. **Anna Treesa Raj**, Joseph Varghese Kureethara, "Upper Bounds of Zagreb Radio Indices", Proceedings of Second International Conference on Sustainable Expert Systems