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Notice for the PhD Viva-Voce Examination

Mr Rohith Raja M (Registration Number: 1840083), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend his PhD thesis at the public viva-voce examination on Friday, 17 November 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	:	**A Study on Some Eccentricity Related Problems in Graphs**
Discipline	:	**Mathematics**
External Examiner (Outside Karnataka)	:	**Dr Aparna Lakshmanan** Associate Professor Department of Mathematics Cochin University of Science & Technology Cochin University P. O. Ernakulam, Kerala – 682022
External Examiner (Within Karnataka)	:	**Dr Kishori P Narayankar** Associate Professor Department of Mathematics Mangalore University Mangalagangotri - 574199 Karnataka
Supervisor	:	**Dr Paradesi Tabitha Rajashekar** Assistant 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: 06 November 2023

ABSTRACT

The distance between two vertices u and v in the vertex set V(G) of G, denoted by d(u,v), is the length of the shortest path joining them. An eccentric vertex of a vertex u is a vertex v such that the distance d(u,v) is maximum. The eccentricity of a vertex v, denoted by ecc(v), is the length of the shortest path between v and its eccentric vertex u. This work deals with various concepts related to the eccentricity of vertices in a graph. The eccentric graph G_e of a graph G is a derived graph with the vertex set same as that of G and two vertices in G_e are adjacent if one of them is the eccentric vertex of the other. The eccentric graphs have been under study since 1985 and in this work, the eccentric graphs of some graph operations are explored. The iterated eccentric graphs, denoted by G_e^k are introduced and the process of finding the eccentric graphs, termed eccentrication, is studied in detail. The graphs obtaining a complete graph K_n on eccentrication are characterised and then the cyclic property of eccentrication is established for various cycle related graphs. The eccentrication of tree graphs is then studied in detail, and a general result cyclic property for trees is obtained. This leads to a conjecture on the cyclic property of eccentrication of any graph G, in general. An analogy between the cyclic nature of eccentrication of graphs and the dichotomy of the Riemann sphere or the extended complex plane into Fatou and Julia sets is obtained. The eccentricity induced signed graph of a graph G is a graph with an edge between the vertex u and the vertex v receiving the sign $\sigma = (-1)^{|ecc(u)-ecc(v)|}$, where ecc(u) is the eccentricity of a vertex u of the graph G. Some of the general properties of the ei-signed graphs of graphs such as homogeneity, consistency, switching and sign compatibility are discussed. The properties that can't be generally stated, and that behave differently with respect to the graph classes are explored for various classes of graphs. Finally, the scope for the study is presented along with some open problems in the area.

Keywords: Eccentric graph, iterated eccentric graphs, eccentricity, eccentric join, eccentricity-induced signed graphs

Publications:

1. **M. R. Raja,** T. A. Mangam and S. Naduvath, "Eccentric Graph of Join of Graphs", Data Science and Security: Proceedings of IDSCS 2021, 366-373, 2021.
2. **M. R. Raja,** T. A. Mangam and S. Naduvath, "Eccentric Completion of a Graph" in Communications in Combinatorics and Optimization vol. 7 no.2, 193-201, 2022.
3. **M. R. Raja,** J. Kok, T. A. Mangam and S. Naduvath, "Cyclic Property of Iterative Eccentrication of a Graph" in Discrete Mathematics, Algorithms and Applications vol.15 no.7, 2250155, 2023