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# Notice for the PhD Viva Voce Examination

Ms Angeliya C U, Registration Number: 2190050, PhD Scholar at the Department of Mathematics, School of Sciences, CHRIST (Deemed to be University), will defend her PhD thesis at the public viva-voce examination on Thursday, 12 November 2026, at 11.00 am in Room No. 628, 6th Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

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| **Title of the Thesis** | : | **Chromatic Bounds and X-Binding Functions of Graphs** |
| **Discipline** | : | **Mathematics** |
| **External Examiner - I** | : | **Dr Anita Das**<br>Associate Professor<br>Department of Mathematics<br>School of Basic Sciences, Humanities and Management<br>Manipal Institute of Technology<br>Bengaluru - 560064, Karnataka |
| **External Examiner - II** | : | **Dr Rogers Mathew**<br>Associate Professor<br>Department of Computer Science and Engineering<br>Room: CS-514, Computer Science Building<br>Indian Institute of Technology Hyderabad<br>Kandi - 502284, Telangana |
| **Supervisor** | : | **Dr Mayamma Joseph**<br>Professor (Former)<br>Department of Mathematics<br>School of Sciences<br>CHRIST (Deemed to be University)<br>Bengaluru - 560029 Karnataka |
| **Co-Supervisor** | : | **Dr Sheshayya A Choudum**<br>Professor (Former)<br>Department of Mathematics<br>School of Sciences<br>CHRIST (Deemed to be University)<br>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:** 03 November 2026

**Registrar (Academics)**

# ABSTRACT

A *proper vertex coloring* of a graph G is an allocation of colors to the vertices of G subject to the condition that every pair of vertices connected by an edge receives distinct colors. The least number of colors required for G to admit a proper vertex coloring is called the chromatic number of G, and is denoted by $\chi(G)$. The *clique number* of G is the cardinality of the largest set in which every pair of distinct vertices is adjacent, and is denoted as $\omega(G)$. Since $\omega(G) \leq \chi(G)$ for every graph G, it is obvious to investigate whether the chromatic number can be bounded above in terms of the clique number. For a perfect graph G, the chromatic number and clique number coincides for every induced subgraph H of G. The notion of *$\chi$-binding function* was introduced by Gya`rfa`s in 1987. A hereditary family G of graphs is called $\chi$-bounded if it admits a $\chi$-binding function, that is, a function $f : N \rightarrow R$ with $\chi(H) \leq f(\omega(H))$ for every $H \in G$, where $f(1) = 1$ and $f(x) \geq x$ for all $x \in N$.

A graph G is said to be (H1, H2, . . .)-free if none of the graphs in {H1, H2, . . .} are contained as an induced subgraph of G. This study investigates the chromatic bounds and $\chi$-binding functions of some interesting hereditary graph classes defined by forbidden induced subgraphs. Improved $\chi$-binding functions are established for the classes of $(2K1 \cup K2)$-free and $(P3 \cup K1)$- free graphs. Optimal and linear $\chi$-binding functions are obtained for three subclasses of P5-free graphs, thus contributing to two existing open problems. Furthermore, the chromatic bounds of (P5, banner, H)-free graphs for $H \in \{C4 \cup K1, K4 - e \cup K1, K3 \cup 2K1, paw \cup K1\}$ are investigated. This work also studies the notion of near optimal colorable graphs introduced by Ju and Huang in 2024. A class G of graphs is called near optimal colorable if, for some positive integer c, the chromatic number of every graph $G \in G$ is bounded above by $\max\{c, \omega(G)\}$. For $H \in \{2P1 \cup P3, 3P1 \cup P2, P2 \cup P4\}$, the class of (H, K4 − e)-free graphs is shown to be near optimal colorable. Consequently, these results partially resolve an open problem on the near optimal colorability of (H, Kt − e)-free graphs.



**Keywards:** *Graph coloring, Chromatic number, Chromatic bound, Clique number, $\chi$-binding function, Near optimal colorable graphs, Hereditary family, Graph classes.*


**Publications:**

1. **C. U. Angeliya**, S. Choudum, and M. Joseph, "Towards optimal $\chi$-binding functions of $(2K1 \cup K2)$-free graphs and $(P3 \cup K1)$-free graphs", Graphs and Combinatorics, 41(2), 39, 2025.
2. **C. U. Angeliya**, A. Char, and T. Karthick, "On near optimal colorable graphs", Discrete Applied Mathematics, 381, 214 – 231, 2026.
3. **C. U. Angeliya**, T. Karthick, and S. Huang, "Tight chromatic bound for (P2+P4, K4−e)- free graphs", Discrete Applied Mathematics, 389, 308 – 322, 2026.
4. **C. U. Angeliya**, S. Choudum, and M. Joseph, "Chromatic bounds of some (P5, banner)- free graphs", Asian-European Journal of Mathematics, 2026.