

# Sharp Bounds on the Augmented Sombor Index and Related Inequalities

B. R. Rakshith<sup>a</sup>, P. Nagaraja<sup>b1</sup>

<sup>a,b</sup> School of Basic Science, Humanities and Management,  
Manipal Institute of Technology,  
Manipal Academy of Higher Education, Manipal 576 104, India.

e-mail: <sup>a</sup> ranmsc08@yahoo.co.in

<sup>b</sup> nagaraja1.dscmpl2023@learner.manipal.edu

**Abstract:** For any graph  $G$  containing no component isomorphic to  $P_2$ , the augmented Sombor index is defined as  $ASO(G) = \sum_{ij \in E(G)} \sqrt{(d_i + d_j - 2)^{-1}(d_i^2 + d_j^2)}$ ,

where  $d_i$  denotes the degree of vertex  $i$  in  $G$ . In this paper, we obtain sharp lower and upper bounds for the augmented Sombor index of connected graphs in terms of graph parameters such as the number of edges, pendant vertices, maximum degree, minimum non-pendent degree, and the forgotten index. We also determine the extremal graphs in classes with fixed independence number and fixed minimum degree. Furthermore, we establish several inequalities relating the augmented Sombor index to other well-know degree based indices, including the forgotten, Platt, Randić, atom-bond connectivity, sum-connectivity, and symmetric division degree indices.

**Keywords:** Sombor index, Augmented Sombor index.

## References

- [1] K. C. Das and A. Ali, On the augmented Sombor index of graphs, MATCH Commun. Math. Comput. Chem., 96(2026), 587-610.
- [2] I. Gutman, Geometric approach to degree-based topological indices: Sombor indices, MATCH Commun. Math. Comput. Chem., 86(2021), 11-16.
- [3] B. Zheng and Z. Lin, On the maximum augmented Sombor index of molecular trees with a perfect matching, Discrete Math. Lett., 16(2025), 121-126.
- [4] S. Rabizadeh, M. Habibi, and I. Gutman, Some notes on Sombor index of graphs, MATCH Commun. Math. Comput. Chem., 93(2025), 853-859.

---

<sup>1</sup>Presenting author