

# On Graphs Defined on Algebraic Objects

*Thesis submitted for the partial fulfillment  
of the requirements for the degree  
Doctor of Philosophy in Science*

*by*

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*Under the Supervision of*

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**Thesis Title:** On Graphs Defined on Algebraic Objects

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**Ph.D. Registration No:** R-18RS213210245

**Date of Ph.D. Registration:** 27.04.2021

**Department:** Department of Mathematics

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**Signature of the Candidate with  
date**

*To my family*

# Acknowledgements

I feel really happy that I have the opportunity to pen down my gratitude for the people who inspired and supported me in the journey of my PhD tenure over the last five years.

Firstly, I am extremely grateful to two of my friends, Biplab Paul and Buddhadev Ghosh. Their encouragement made me believe that I should follow my passion and do research in Mathematics. I would not even know about my PhD entrance selection had Buddhadev not informed me ! A big thank you to them.

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**Signature of the Candidate with date**

# Declaration

I hereby declare that this thesis contains original research work carried out by me under the guidance of Angsuman Das, Assistant Professor, Department of Mathematics, Presidency University, Kolkata, India as part of the PhD programme.

All information in this document have been obtained and presented in accordance with academic rules and ethical conduct.

I also declare that, as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

I also declare that, this work has not been submitted for any degree either in part or in full to any other institute or University before.

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**Signature of the Candidate with date**

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### **Certificate**

This is to certify that the thesis entitled *On Graphs Defined on Algebraic Objects* submitted by Ms. Manideepa Saha, Registration Number R-18RS213210245 and date of registration 27.04.2021, in partial fulfilment of the requirements for the award of "Doctor of Philosophy", is a record of bonafide research work carried out by her under my supervision.

Neither her thesis nor any part of the thesis has been submitted for any degree/diploma or any other academic award anywhere before.

Angsuman Das.

# List of Published Research Papers

The following are the list of publications related to the proposed thesis:

1. **M. Saha**, A. Das, E.Y. Celikel and C. Abdioglu, Prime Ideal Sum Graph of a Commutative Ring, *To appear in Journal of Algebra and its Applications*. <https://doi.org/10.1142/S0219498823501219>
2. A. Das, **M. Saha** and S. Alkaseasbeh, On Co-Maximal Subgroup Graph of a Group, *Ricerche Di Matematica*. <https://doi.org/10.1007/s11587-022-00718-0>
3. **M. Saha**, S. Biswas and A. Das, On co-maximal subgroup graph of  $\mathbb{Z}_n$ , *Int. J. Group Theory*, Vol. 11, No. 4, pp. 221-228, 2022. <http://dx.doi.org/10.22108/IJGT.2021.129788.1732>
4. **M. Saha**, S. Biswas and A. Das, On perfectness of annihilating-ideal graph of  $\mathbb{Z}_n$ , *Communications in Combinatorics and Optimization*, Vol. 8, No. 1, pp. 173-181, 2023. <https://dx.doi.org/10.22049/cco.2021.27382.1252>

The following are the list of publications not related to the proposed thesis, but done during the doctoral tenure:

1. A. Das and **M. Saha**, Determining Number of Some Families of Cubic Graphs, *Journal of Algebra and Related Topics*, Volume 8, Number 2, pp. 39-55, 2020.