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# Sagar Sawant

Curriculum Vitae

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## RESEARCH INTERESTS

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Symmetric and Quasisymmetric functions arising as chromatic invariants, graph algorithms, simplicial complexes of graphs

## EDUCATION

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**Indian Institute of Technology Madras**, Chennai, India Jan 2019 — Aug 2024  
Doctor of Philosophy CGPA: 9.47/10.00  
Thesis: On Distinguishing Graphs by their Symmetric and Quasisymmetric functions.

**University of Mumbai**, Mumbai, India July 2016 — May 2018  
Master of Science in Mathematics CGPA: 9.13/10.00

**R. N. Ruia College (Aff. University of Mumbai)**, Mumbai, India July 2013 — May 2016  
Bachelor of Science in Mathematics Percentage: 92%

## ACADEMIC EXPERIENCE

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**Postdoctoral Research Fellow** Dec 2024 — Present  
*Chennai Mathematical Institute* Chennai, India.

**Research Associate** Nov 2024 — Dec 2024  
*Indian Institute of Science* Bangalore, India.

**Visiting Research Fellow** Aug 2024 — Oct 2024  
*Institute of Mathematical Sciences* Chennai, India.

**Research Scholar** Jan 2019 — Aug 2024  
*Indian Institute of Technology Madras* Chennai, India.

**Visiting Faculty** July 2018 — Dec 2018  
*Mithibai College* Mumbai, India  
Course instructor for Functional Analysis for M.Sc Mathematics

## PUBLICATIONS/PREPRINTS

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- **Sagar S. Sawant**. Distinguishing and Reconstructing Directed Graphs by their B-Polynomials. *Annals of Combinatorics* (2024): 1-23. <https://doi.org/10.1007/s00026-024-00702-5>
- Ganesan, Arunkumar, Narayanan Narayanan, BV Raghavendra Rao, and **Sagar S. Sawant**. Proper q-caterpillars are distinguished by their Chromatic Symmetric Functions. *Discrete Mathematics*. 347, no. 11 (2024): 114162. <https://doi.org/10.1016/j.disc.2024.114162>
- Sounak Mishra, Rohini S. and **Sagar S. Sawant** Complexity of near 3-choosability problem. *Graphs and Combinatorics* 40, 104 (2024), <https://doi.org/10.1007/s00373-024-02837-x>.
- Raju Kumar Gupta, Sourav Sarkar, **Sagar S. Sawant** and Samir Shukla. On the matching complexes of categorical product of path graphs <https://arxiv.org/abs/2403.15298>. *Submitted*.

- **Sagar S. Sawant.** New shuffle algebra for Tutte symmetric functions. *In preparation.*
- Akanksha Agrawal, Sounak Mishra, **Sagar S. Sawant** and Rohini S. FPT algorithms for 2-choosability problems. *In preparation.*

## AWARDS

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**R. Balakrishnan Endowment Award for Best Contributed Talk** in Annual Conference of RMS-2022  
**Institute Research Award-2024** from Indian Institute of Technology Madras.

## CONFERENCES/WORKSHOPS/TALKS

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### Attended

- 34<sup>th</sup> Formal Power Series and Algebraic Combinatorics. May 2022. IISc Bangalore, India.
- NCM workshop “Cohen-Macaulay simplicial complexes of Graphs”. July 2023. Chennai Mathematical Institute, India.

### Oral Presentation

- 39<sup>th</sup> Colloquium on Combinatorics. Nov-2022. Paderborn University, Germany.
- 37<sup>th</sup> Annual Conference of the Ramanujan Mathematical Society. Dec 2022. Chennai, India.
- First Meru Annual Combinatorics Conference. May 2023. Pondicherry, India.
- International Conference on Graph Theory and its Applications. Dec 2023. Amrita University, Coimbatore, India.
- Second Meru Annual Combinatorics Conference. June 2024. Bhimtal, India.
- The Fifth Annual Algebraic Combinatorics Virtual Expedition. June 2024. (Online)

### Selected Talks

- “On distinguishing digraphs by their quasisymmetric  $B$ -polynomial at In-House Symposium, Dept of Mathematics, IIT Madras in July-2022.
- “A counterexample to Hedetniemi’s Conjecture” at Mumbai University in Feb-2020.
- “On distinguishing digraphs by their quasisymmetric  $B$ -polynomial” at Gustave-Eiffel University, Paris, France in April-2023.
- “On digraph analog of Stanley’s Tree Conjecture” at IRIF, Paris, France in April-2023.
- “Stanley’s Tree Isomorphism Conjecture” at In-House Symposium, Dept of Mathematics, IIT Madras in July-2023.
- “On distinguishing proper  $q$ -caterpillars by their chromatic symmetric functions at Algebraic Combinatorics Seminar, IMSc in Sept-2023.

### Expository Talks

- “Essentials of Mathematics in competitive exams” at R. N. Ruia Autonomous College(Mumbai) in Nov-2020.
- “Linear algebra methods in combinatorics” at Summer school for MSc students, Dept. of Mathematics, IIT Madras in June-2023.
- “Polynomial factorizations in Integral Domains” at Summer school for MSc students, Dept. of Mathematics, IIT Madras in June-2024.

## SCHOLARSHIPS/FELLOWSHIPS

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**CSIR NET** (National Eligibility Test for Assistant Professor).

AIR 3

**CSIR JRF** (National Test for Research Fellowship).

AIR 28, AIR 78

**GATE** (General Aptitude Test for Research Fellowship).

AIR 62

## TEACHING EXPERIENCE

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### Teaching Assistantship at IIT Madras

Jan 2020 - Dec 2023

Course	Course Code	Year
Series and Matrices.	MA1102.	Spring 2020, Spring 2022, Spring 2023
Mathematical Logic.	MA6190.	Fall 2020
Combinatorics.	MA5350.	Spring 2021, Spring 2023
Functions of Several Variables.	MA1101.	Fall 2021
Data Structures and Algorithms.	MA5910.	Fall 2022

### Teaching Assistantship at NPTEL

Jan 2019 - Present

Course	Instructor	Year
Basic Calculus-I	Dr. Arindama Singh.	Spring 2024.
Combinatorics	Dr. Narayanan N.	Fall 2021, Fall 2022, Fall 2023, Fall 2024.
Commutative Algebra	Dr. Dilip Patil.	Spring 2019.
Galois Theory	Dr. Dilip Patil.	Spring 2019, Fall 2021, Fall 2022, Fall 2023, Fall 2024.
Introduction to Algebraic Geometry and Commutative Algebra	Dr. Dilip Patil.	Spring 2020, Spring 2021, Spring 2022, Spring 2024.
Introduction to Algebraic Topology-Part II	Dr. Anant Shastri.	Fall 2021
Linear Algebra:	Dr. Dilip Patil.	Fall 2021, Fall 2022, Fall 2023, Fall 2024.

### Teaching Assistantship at Additional Courses

- Advanced Instructional School - Algebraic Combinatorics and Spectral Graph Theory. Sivakasi, May 2022.
- Annual Foundation School-1. Sivakasi, Dec 2022.
- Teachers Enrichment Workshop-Linear Algebra and Discrete Mathematics. Institute of Mathematical Science, Jan 2023.

## SKILLS

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- **Programming:** Python, Sagemath (involved in Development)
- **Environment:**  $\text{\LaTeX}$ , Microsoft Office
- **Operating System :** Windows, Linux

## CO-CURRICULAR

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- Honoured as the *Best Cadet for NCC(Senior Wing)* at Ramnarain Ruia Autonomous College — 2014.
- 10m Open Sight Air Rifle intercollegiate competition(Mumbai University). *Silver Medal*(Team) - 2015. *Silver Medal*(Individual) - 2016. *Gold Medal*(Team) - 2016.
- Sangeet Visharad - Tabla — 2016 (Equivalent to Bachelors in Music).
- National Cadet Corps Senior Wing Certificate examinations qualified with “A” grade — 2017.

## INTERESTS

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Hindustani and Carnatic Classical music, Percussions instruments, Board games, Card games, Ultimate Frisbee.