Dr. RAJNI BALA
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Research Interests:

I am working in research field for last thirteen years and have a great passion for research. My research work is mainly focused on the Topology and Category Theory. I want to do research in the fields of Analytic Number Theory, Cryptography and Coding Theory in future.

Educational Details:

- Ph.D. in Mathematical Sciences (Topology & Category Theory) from Department of Mathematics, Punjabi University, Patiala, Punjab, India.
- M.Sc. (Mathematics) from Department of Mathematics, Punjabi University, Patiala, Punjab, India.
- B.A. from Rajindra College, Bathinda, Punjabi University, Patiala, Punjab, India.

Employment Details:

- Assistant Professor, Department of Mathematics, Punjabi University, Patiala, Punjab, India. (Oct. 2006 -Present).

Teaching Interests:

There is a great importance of both teaching as well as research. In my point of view, teaching should be the primary focus because if we teach well enough today then student can become an asset for institute as well as for country. Teaching is simply an investment in students so that big goals can be achieved in future. Research should also be done but without compromising teaching. Research is my passion but teaching is my first duty.

I teach Analytic Number Theory, Abstract Algebra, Mathematical Analysis, Functional Analysis, Discrete Mathematics, Topology, Mathematical Methods, Calculus etc. and any other course offered to teach. I am involved in designing and teaching different courses of Mathematics in the Department.

Professional Societies:

- Physics Teachers Association -Life Member.

- Him Science Congress Association (HSCI) – Life Member.
- Punjab Science Congress Association– Life Member.

List of Publications in Journals and Conferences

Publications in International/National Journals

1. N.S. Noorie, **Rajni Bala**, Some Characterizations of Open, Closed, and Continuous Mappings, International Journal of Mathematics and Mathematical Sciences, 2008.
2. Bikramjeet Singh, Gurpreet Kaur, Paviter Singh, Kulwinder Singh, Baban Kumar, Ankush Vij, Manjeet Kumar, **Rajni Bala**, Ramovatar Meena, Ajay Singh, Anup Thakur, Akshay Kumar*, Nanostructured Boron Nitride With High Water Dispersibility For Boron Neutron Capture Therapy, Scientific Reports (Nature Publishing Group), 6 (2016) 35535. (I.F.-3.998)
3. Gurpreet Kaur, Bikramjeet Singh, Paviter Singh, Manpreet Kaur, Karmjeet Kaur Buttar, Kulwinder Singh, Anup Thakur, **Rajni Bala**, Manjeet Kumar and Akshay Kumar*, Preferentially grown nanostructured iron disulfide (FeS_2) for removal of industrial pollutants, RSC Advances, 6 (2016) 99120-99128. (I.F.-3.119)
4. Paviter Singh, Manpreet Kaur, Bikramjeet Singh, Gurpreet Kaur, Kulwinder Singh, Manjeet Kumar, **Rajni Bala**, Anup Thakur and Akshay Kumar*, Gap state related blue light emitting boron-carbon core shell structures, AIP Conference Proceedings, 1728 (2016) 020690.
5. Paviter Singh, Harwinder Singh, Bikramjeet Singh, Manpreet Kaur, Gurpreet Kaur, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Synthesis and characterization of nanostructured titanium carbide for fuel cell applications, AIP Conference Proceeding, 1724 (2016) 020067.
6. N.S. Noorie, **Rajni Bala**, On a natural transformation between generalized topologies and strongly generalized interior operators, Global Journal of Pure and Applied Mathematics, 13 (7)(2017) 3301-3305.
7. Gurpreet Kaur, Pooja D., Manjeet Kumar, Anup Thakur, **Rajni Bala**, Akshay Kumar*, Electrochemical aspects of photocatalysis: Au@FeS_2 nanocomposite for removal of industrial pollutant, Physical Chemistry Chemical Physics, 19 (2017) 32412. (I.F.-3.430)
8. Bikramjeet Singh, Gurpreet Kaur, Paviter Singh, Kulwinder Singh, Jeewan Sharma, Manjeet Kumar, **Rajni Bala,** Ramovtar Meena, Saurabh k sharma, Akshay Kumar*, Nanostructured BN-TiO_2 composite with ultra-high photocatalytic activity, New Journal of Chemsitry, 41 (20, 2017), 11640-11646. (I.F.-3.288)
9. Gurpreet Kaur, Bikramjeet Singh, Paviter Singh, Kulwinder Singh, Anup Thakur, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Iron disulfide (FeS_2): A promising material for removal of industrial pollutants, Chemistry Select, 2 (2017) 2166-2173. (I.F.-1.811)
10. Paviter Singh, Kulwinder Singh, Manpreet Kaur, Harpreet Kaur, Bikramjeet Singh, Gurpreet Kaur, Manjot Kaur, Manjeet Kumar, Kamalpreet Kaur, **Rajni Bala,** Akshay Kumar*, Preferentially grown nanostructured MgB_2C_2: A new material for lightening applications, Superlattices and Microstructures, 103 (2017) 1-8. (I.F.-2.120)
11. Paviter Singh, Manpreet Kaur, Gurpreet Kaur, Bikramjeet Singh, Kulwinder Singh, Harpreet Kaur, Mandeep Singh, Manjeet Kumar, **Rajni Bala,** Ramovatar Meena and

Akshay Kumar*, Effect of processing parameters on synthesis of nanostructured boron carbide, Advanced Materials Proceedings, 2 (2017) 128-131.

12. Gurpreet Kaur, Bikramjeet Singh, Paviter Singh, Manpreet Kaur, Anup Thakur, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Effect of varying reactant precursors on the synthesis of nanostructured iron disulfide, Advanced Material Proceedings, 2(2) (2017) 117-118.

13. **Rajni Bala**, Hg normal and Hg regular spaces, International journal of theoretical and applied sciences 9 (2)(2017), 305-308.
14. Paviter Singh, Gurpreet Kaur, Kulwinder Singh, Manjot Kaur, Manjeet Kumar, Ramovatar Meena, **Rajni Bala,** AkshayKumar*, Nanostructured boron carbide (B_4C): A bio-compatible and recyclable photo-catalyst for efficient wastewater treatment, Materialia 1 (2018) 258–264.
15. Paviter Singh, Gurpreet Kaur, Kulwinder Singh, Bikramjeet Singh, Manpreet Kaur, Manjot Kaur, Unni Krishnan, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Specially designed B_4C/SnO_2 nanocomposite for photocatalysis: traditional ceramic with unique properties, Applied Nanoscience, 8 (2018) 1-9. (I.F.-2.880)
16. Gurpreet Kaur, Pooja D. Sharma, Anup Thakur, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Synthesis of nanostructured Marcasite (FeS_2) for energy storage applications, AIP Conference Proceedings, 1953 (2018) 030086.
17. Paviter Singh, Gurpreet Kaur, Kulwinder Singh, Bikramjeet Singh, Manjot Kaur, Manjeet Kumar, **Rajni Bala,** Akshay Kumar*, Comparative studies of electrochemical properties of Carbon Nanotubes and Nanostructured Boron Carbide, AIP Conference Proceedings, 1953 (2018) 030077.
18. Kulwinder Singh, Manjeet Kumar, Dilpreet Singh, Manjinder Singh, Paviter Singh, Bikramjeet Singh, Gurpreet Kaur, **Rajni Bala**, Anup Thakur, Akshay Kumar*, Fluorine doped NiO nanostructures: structural, morphological and spectroscopic studies, AIP Conference Proceedings, 1953 (2018) 030219.
19. Paviter Singh, Gurpreet Kaur, Rohit Kumar, Umesh Kumar, Kulwinder Singh, Manjeet Kumar, **Rajni Bala,** Ramovatar Meena, Akshay Kumar*, Boron carbide nanostructures: a prospective material as an additive in concrete, AIP Conference Proceedings, 1953 (2018) 030264.
20. **Rajni Bala,** Some Separation Axioms Using Hereditary classes in Generalized topological Spaces, Italian Journal of Pure and Applied Mathematics, (42)(2019), 403-412.
21. **Rajni Bala,** Categorical Representation of Generalized Topologies, Generalized Neighbourhood Systems and Generalized Interior and Closure Operators, Italian Journal of Pure and Applied Mathematics, (46)(2021), 857-873.

Paper Presentations in Conferences:

1. International Conference on "Emerging Areas of Mathematics for Science and Technology", Department of Mathematics, Punjabi University, Patiala, Punjab, Jan. 30-Feb. 01, 2015.

2. Multidisciplinary National Conference on "Innovative Trends in Science, Technology and Management-II", Sri Sai University, Palampur, Himachal Pradesh, June 19, 2015.

3. International Conference on "Recent Advances in Emerging Technologies ICRAET-2016",

Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, Feb. 23-24, 2016.

4. International Conference on "Science: Emerging Scenario and Future Challenges", National Institute of Technology, Hamirpur, Himachal Pradesh, Sept. 08-09, 2018.

5. The 7th HSCA International Conference on "Chemical, Physical and Biological Sciences", Chitkara University, Himachal Pradesh, Oct. 20-21, 2019.

6. 25th Punjab Science Congress-2022 on "Future endeavours of Science & Technology for Sustainable Growth", Sri Guru Teg Bahadur Khalsa College, Sri Anandpur Sahib, Punjab, Feb 07-09, 2022.

7. The 9th HSCA International Conference on "Recent Trends in Bio and Materials Sciences", Sardar Patel University, Mandi, Himachal Pradesh, Oct. 10-11, 2022.

Attended Workshops:

1. Regional Workshop on "Indian Women and Mathematics: Research and Career Opportunities", Department of Mathematics, Punjabi University, Patiala, Punjab, Feb. 06-07, 2017.
2. Three Days National Workshop on "Latex and Technical Writing", Department of Basic and Applied Sciences, Punjabi University, Patiala, Punjab, Nov. 23-25, 2018.
3. "Science Leadership Workshop", Central University of Punjab, Bathinda, Punjab, June 22-28, 2020.
4. "70th Online Short Term Course on E - Content Development", UGC-Human Resource Development Centre, Gujarat University, Ahmedabad, Gujarat, June 25- July 01, 2020
5. One-week online Faculty Development Programme on "Advanced Materials (Fabrication, Characterization and Applications)", School of Mechanical Engineering, Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, Odisha, July 20-25, 2020.