



## Faculty Performa

| Title                                       | Dr        | First Name   | Shobha | Last Name              | Bagai | Photograph                             |
|---|-----------|--|--------|------------------------|-------|--|
| Designation                                 |           | Professor  |        |                        |       |  |
| Address                                     |           | Cluster Innovation Centre<br>Rugby Seven's Building (University Stadium)<br>Third Floor<br>G C Narang Road<br>University of Delhi - 110007 |        |                        |       |  |
| Phone No                                    | Office    | 011 - 27666702   |        |                        |       |  |
|   | Residence |  |        |                        |       |  |
|   | Mobile    | 9810909650   |        |                        |       |  |
| Email                                       |           | shobhabagai@gmail.com  |        |                        |       |  |
| Web-Page                                    |           |  |        |                        |       |  |
| Educational Qualifications                  |           |  |        |                        |       |  |
| Degree                                      |           | Institution  |        |                        | Year  |  |
| Ph.D.                                       |           | IIT, Delhi   |        |                        | 1993  |  |
| PG (M.Sc Mathematics)                       |           | IIT, Delhi   |        |                        | 1989  |  |
| UG  |           | Panjab University  |        |                        | 1987  |  |
| Career Profile                              |           |  |        |                        |       |  |
| <b>Organisation/<br/>Institution</b>        |           | <b>Designation</b>   |        | <b>Year</b>            |       | <b>Role</b>                            |
| Cluster Innovation Centre, Delhi University |           | Professor  |        | March 2015 – Till date |       | Teaching, Mentoring and Administration |
| Cluster Innovation Centre, Delhi University |           | Associate Professor  |        | Sept 2011 – March 2015 |       | Teaching, Mentoring and Administration |

|  |                              |  |                           |
|--|------------------------------|--|---------------------------|
| SPM College, Delhi University  | Associate Professor          | July 1995 – Sept 2011                                | Teaching & Research       |
| Institute of Lifelong Learning, Delhi University                         | Fellow in Mathematics        | January 2008 – December 2009                         | Research & Administration |
| IIT Bombay   | Visiting Assistant Professor | July 2002 – July 2004                                | Research & Teaching       |
| Department of Mathematics, Delhi University (under cooperative teaching) | Associate Professor          | August 2001 to March 2002, July 2004 till April 2011 | Postgraduate Teaching     |
| Jesus and Mary College   | Lecturer                     | August 1993 to April 1995                            | Teaching                  |

#### Administrative Assignments

- Programme coordinator of B.Tech (IT and Mathematical Innovations), Cluster Innovation Centre, University of Delhi
- Member of the Internal Quality Assurance Cell, Ramanujan College
- Chairperson (Acting), Delhi University Social Centre Co-Ed School
- Member of the Community Development Cell Committee, University of Delhi
- Member of Unnat Bharat Abhiyan, University of Delhi
- Coordinator of the eYantra (IIT, Bombay) Nodal Centre at Cluster Innovation Centre (CIC), University of Delhi
- Invited to be subject expert in Board of Studies, Christ University, Bangalore
- Chaired the session on “Peer Learning” at the Academic Congress, hosted by University of Delhi from September 6, 2013 to September 7, 2013.
- Invited as a member of the delegation to ESPRC/ DST Scoping Meeting in Applied Mathematics (July 12 – July 13, 2012), University of Edinburgh.
- Member of the Empowered Committee of the Foundation Courses (a) Building Mathematical Ability (b) Information Technology at University of Delhi
- Convened and conducted orientation programmes for teachers for the foundation course “Building Mathematical Ability” at University of Delhi
- Member of Local Organizing Committee, International Conference “The Legacy of Srinivasa Ramanujan” organized by University of Delhi from 17-22 December 2012.
- Member of Jury committee of INSPIRE AWARD National Level Exhibition and Project Competition (NLEPC-2012) conducted by Department of Science and Technology (DST), Ministry of Science and Technology, Government of India held from October 21-23, 2012 at Pragati Maidan, New Delhi !
- Member in a Committee constituted by the Vice Chancellor to organize “Antardhvani 2013: Cultural Festival of Delhi University”.
- Member of the Bachelor Degree Programme syllabus revision committee, IGNOU, Delhi.
- Member of the Expert Group to formulate Undergraduate Program Mathematics syllabus, Ambedkar University, Delhi.
- Member of Vice Chancellor constituted sub-committee of the BA Programme committee for the semesterisation of the BA Programme, Delhi University.
- Member of Vice Chancellor nominated Empowered Committee to formulate the syllabus of B.Sc (Hons) Mathematics, Delhi University.
- Organized workshops for the teachers of Mathematics, Delhi University.

| Areas of Interest / Specialization   |
|--|
| <ul style="list-style-type: none"> <li>Differential Equations and Modelling</li> <li>Fluid Dynamics (Porous Media)</li> </ul>  |
| Subjects Taught  |
| <ul style="list-style-type: none"> <li>Calculus (Undergraduate)</li> <li>Differential Equations (Undergraduate and Postgraduate)</li> <li>Mechanics (Undergraduate and Postgraduate)</li> <li>Fluid Dynamics (Postgraduate)</li> <li>Probability and Statistics (Undergraduate)</li> <li>Algebra (Undergraduate)</li> <li>Discrete Mathematics (Undergraduate)</li> <li>Numerical Analysis (Undergraduate)</li> <li>Linear Algebra (Undergraduate)</li> <li>Linear Programming (Undergraduate)</li> </ul>  |
| Research Guidance  |
| Supervision of Doctoral thesis (Degree Awarded – One, Ongoing – One)   |
| Publications Profile   |
| <p><b><u>LIST OF PUBLICATIONS</u></b></p> <ol style="list-style-type: none"> <li>“Effect of Temporal Variations in Permeability of a Porous Medium on Convective Heat Transfer Rate”, Modeling, Simulation and Control, B, Vol. 42, No. 1, pp. 41 - 52, 1992.</li> <li>“Transient Free Convection Flow with Temperature Dependent Viscosity in a Fluid Saturated Porous Medium”, International Journal of Engineering Science, Vol. 30, No. 8, pp. 1083 - 1087, 1992.</li> <li>“Transient Free Convective Flow About a Non-Isothermal Vertical Flat Plate Immersed in a Saturated Inhomogeneous Porous Medium,” International Communications in Heat and Mass Transfer, Vol. 19, pp. 687 - 699, 1992.</li> <li>“Effect of Discontinuities in Wall Temperature on Natural Convection Flow over a Vertical Flat Plate”, Modeling, Simulation and Control, B, Vol. 47, No.1, pp. 1 - 11, 1993.</li> <li>“Effect of Temperature Dependent Viscosity on Free Convection Flow across an Impermeable Partition”, International Journal of Engineering Science, Vol. 31, No. 7, pp. 1093 - 1103, 1993.</li> <li>“Free Convection About Axisymmetric Bodies Immersed in Inhomogeneous Porous Medium”, International Journal of Engineering Science, Vol. 32, No 6, pp. 945 - 953, 1994.</li> <li>“Convective Heat Transfer Across a Horizontal Impermeable Partition”, International Journal of Engineering Science, Vol. 32, No. 9, pp. 1451 - 1458, 1994.</li> <li>“Transient Non-Darcy Free Convection in Inhomogeneous Porous Medium”, Proceedings of 14th IMAC’s World Congress, Georgia Institute of Technology, Atlanta, GA 30332 USA, 1994.</li> <li>“Transient Non-Darcy Free Convection with Temperature Dependent Viscosity”, International Journal of Engineering Science, Vol. 33, No. 3, pp. 371 - 378, 1995.</li> <li>“Similarity Solutions of Free Convection Boundary Layers Over a Body of Arbitrary Shape in a Porous Medium with Internal Heat Generation”, International Communications in Heat and</li> </ol> |

Mass Transfer, Vol. 30, No. 7, pp. 997 - 1003, 2003.

11. "Effect of Variable Viscosity on Free Convection over a Non-Isothermal Axisymmetric Body in a Porous Medium with Internal Heat Generation", Acta Mechanica, Vol. 169, No. 1-4, pp. 187 – 194, 2004
12. "Free convection in a non-Newtonian fluid along a horizontal plate embedded in porous media with internal heat generation", International Communications in Heat and Mass Transfer, Vol. 39, No. 4, pp. 537 – 540, 2012.
13. "Effect of Variable Viscosity on Free Convective Heat Transfer over a Non- isothermal Body of Arbitrary Shape in a Non-Newtonian Fluid Saturated Porous Medium with Internal Heat Generation", Transport in Porous Media, Vol. 94, Number 1, pp 277 – 288, 2012.
14. "Similarity Solution to Study the Effect of Variable Viscosity on Non-Newtonian Buoyancy Induced Flow Over an Axisymmetric Body Immersed in a Porous Medium Saturated By A Nanofluid" presented in International Conference on Electrical, Electronics, Computer Science and Mathematics Physical Education and Management, Delhi, 1<sup>st</sup> Dec 2013.
15. "Buoyancy induced flow past a non-isothermal arbitrary shaped axisymmetric body immersed in a non – Newtonian porous medium saturated with Nanofluid", Journal of Nanofluids, pp. 1 – 9, 2014.
16. "Effect Of Temperature Dependent Viscosity On Natural Convective Boundary Layer Flow Over A Horizontal Plate Embedded In A Nano-Fluid Saturated Porous Medium", Proceedings of Fifth International Conference on Porous Media and its Applications in Science, Engineering and Industry, Kona, Hawaii, USA, 2014.
17. "Effect of Variable Viscosity and Permeability on Natural Convective Heat Transfer Across a Vertical Cone Embedded in a Porous Medium Saturated with nanofluid", Journal of Nanofluids, pp. 91 – 99, 2015.
18. "A Graph Based Ranking Strategy for Automated Text Summarization", DU Journal of Undergraduate Research and Innovation, Vol. 1, February 2015.
19. "Analysis of transport system in a semiurban village: A case study of Jagatpur Village, Delhi, India", DU Journal of Undergraduate Research and Innovation, Vol. 1, February 2015.
20. "Fast & Dynamic Image Restoration using Laplace equation Based Image Inpainting", DU Journal of Undergraduate Research and Innovation, Vol. 1, Volume 1, Issue 3 pp 115 - 123, 2015
21. "Extension of the Josephus Problem with Varying Elimination Steps", DU Journal of Undergraduate Research and Innovation, Vol. 1, Volume 1, Issue 3 pp 211 - 218, 2015.
22. "Buoyancy Induced Flow Past A Non-Isothermal Axisymmetric Body Immersed In A Porous Medium Of Varying Permeability Saturated By Non-Newtonian Nanofluids", Vol. 1, No. 2, pp 141-158, Vijnana Bharathi, 2016.
23. "A Mathematical Model for the Effect of Earthquake on High Rise Buildings of Different Shapes", Vol 2, Issue 1, pp 180 – 188, 2016.

#### **BOOK**

1. *Foundation Course - Building Mathematical Ability*, S Chand and Co., 2013 – Author and Chief Editor
2. *A Bridge to Mathematics*, 1<sup>st</sup> Ed., New Delhi: Sage, 2017 – Co-Author

#### Conference Organization/ Presentations (in the last three years)

1. "Effect of Variable Permeability on Free Convection Boundary Layer over A Vertical Cone in Non-Newtonian Fluid Saturated Porous Medium with Internal Heat Generation", 8<sup>th</sup> International Congress on Industrial and Applied Mathematics which was held at Beijing China, 10<sup>th</sup> August 2015 – 14<sup>th</sup> August 2015.

2. "Buoyancy Induced Flow over Axisymmetric Bodies Immersed in Porous Medium Saturated by a Nanofluid", National Conference on Mathematics and its Applications, AIT, Chikmagalur, 22<sup>nd</sup> December – 23<sup>rd</sup> December 2015.
3. "Project Based Learning: Through the lens of Linear Algebra", Refresher Course, Bangalore University, 1<sup>st</sup> – 2<sup>nd</sup> June, 2015, Bangalore.
4. "Mathematical Modelling in Computational Biology – I & II", Refresher Course, Bangalore University, 1<sup>st</sup> – 2<sup>nd</sup> June, 2015, Bangalore
5. "On Road Colouring Problem", National Conference on Recent Statistical Computing Techniques and their Applications, Ramanujan College, 11<sup>th</sup> – 12<sup>th</sup> March 2016.
6. "Mathematical Modelling of Wildlife Reserves", UGC sponsored 2 day National Conference on *Recent Advances in Mathematical Sciences*, 9<sup>th</sup> – 10<sup>th</sup> Feb, 2017, Bangalore.
7. "Construction of Fire Altars and Geometry in Ancient India", National workshop on Science and Technology in Ancient India, Zakir Hussain Delhi College, 18<sup>th</sup> April 2017, Delhi.
8. "Modeling Infectious Diseases: Childhood Diseases", International Conference of Mathematics and Applications, Ramjas College, 26<sup>th</sup> – 28<sup>th</sup> April, 2017
9. "Problem based learning in Mathematics at UG level", 32<sup>nd</sup> Annual conference of the Ramanujan Mathematical Society, 23<sup>rd</sup> – 25<sup>th</sup> June, 2017.
10. "Effect of variable fluid properties on free convection flow in porous medium saturated by nanofluids", International conference on fluid dynamics and its applications, Bangalore, 12<sup>th</sup> – 14<sup>th</sup> July 2017.
11. "Mathematics Drills to Thrill Gifted Students", 8<sup>th</sup> Conference on Technology and Innovation in Mathematics Education, Kochi, 7<sup>th</sup> – 10<sup>th</sup> Dec, 2017.
12. "Role of Students in Technology Enabled Learning – Challenges and Prospects", IQAC students seminar, PSGR Krishnammal College for Women, Coimbatore, 2<sup>nd</sup> March 2018.

#### Research Projects (Major Grants/Research Collaboration)

1. Creating a manuscript related to mathematics for liberal arts students funded by Ambedkar University, Delhi.
2. Identification and mentoring of potentially gifted children in India in Science and Mathematics funded by DST (Office of Principal Scientific Advisor to GOI)
3. Establishing process based identification and mentoring practices for potentially gifted children in Science and Mathematics funded by DST (Office of Principal Scientific Advisor to GOI)
4. 24 x 7 water supply in villages and small towns of India funded by University of Delhi
5. Solutions for road management from modeling and simulation of traffic flow on selected road of Delhi funded by University of Delhi
6. IT model for parking space management: optimal and efficient parking – retrieval of vehicles funded by University of Delhi
7. Impact of FDI in multi-brand retail on local kirana shops funded by University of Delhi
8. Weaving Dreams for Destitutes – Night Shelters funded by University of Delhi

Along with the above mentioned projects carried out number of projects with undergraduate and postgraduate students at Cluster Innovation Centre.

#### Awards and Distinctions

- Awarded Certificate of Best Poster in Research Display at the Convocation Ceremony, University of Delhi, 19<sup>th</sup> Nov 2016
- Teaching excellence award for innovation by University of Delhi, 1<sup>st</sup> May 2015.
- Gold Medallist – Panjab University

## Association With Professional Bodies

Life member of Ramanujan Mathematical Society  
Alumini – IIT Delhi

## Other Activities

- Participated in the workshop “The intertwining strands in Physics and Mathematics”, IISER Pune, 19<sup>th</sup> – 23<sup>rd</sup> Feb 2018.

## **INVITED TALKS**

- “Geometrical Interpretation of Eigen Values and Eigen Vectors”, Gargi College and Aryabhata College
- “Enhancing Mathematical Ability by PBL”, Christ University
- “Mathematical Modelling of Wildlife Reserves”, Kalindi College.
- “Thinking Mathematically”, *Omicron 17*, Kamla Nehru College.
- “Mathematical Modelling of Wildlife Reserves”, St Stephen’s College, Delhi.
- “On Road Colouring Problem”, National Conference on Recent Statistical Computing Techniques and their Applications, Ramanujan College
- “Project Based Learning: Through the lens of Linear Algebra”, Refresher Course, Bangalore University
- “Discrete Mathematical Modelling”, Refresher Course, Bangalore University
- “Mathematical Modelling in Computational Biology – I & II”, Refresher Course, Bangalore University
- “Modelling Pharmokinetics”, Acharya Narendra Dev College
- “Predicting future with Mathematics: Differential Equations”, Deshbandhu College
- “Games and Puzzles: Discovering the art of Mathematics”, Kalindi College
- “Discrete and Continuous Mathematical Modeling”, Ramanujan College.
- “Mathematical Modeling in Physiology”, Hansraj College.
- “Impact of the progress of science”, Delhi Public School, R K Puram, Delhi.
- “Conjugate natural convection across impermeable partition imbedded in porous medium”, IIT Bombay.
- “Similarity solutions of free convection problem of non-isothermal axi-symmetric body in porous medium with internal heat generation”, IIT, Bombay.
- “Buoyancy induced flow over axisymmetric bodies immersed in porous medium saturated by a nanofluid”, Christ Univesity, Bangalore
- “Exact Methods of Differential Equations” in three week Refresher Course conducted by CPDHE, University of Delhi.
- “Women in Mathematics”, St Stephen’s College, University of Delhi
- “Functions of Several Variables”, University of Delhi, South Campus.
- “Calculus via Graphs”, B R Ambedkar College, University of Delhi
- “Applications of Graph Theory”, Maitreyi College, University of Delhi
- “Population Models”, Lady Sri Ram College, University of Delhi
- “Predator-Prey Models and its Analysis”, Miranda House, University of Delhi
- “Mathematical Modeling”, Kirorimal College, University of Delhi
- “Popular Lecture Series – Building Mathematical Ability”, ARSD College, University of Delhi
- “Mathematical Fallacies”, Hindu College, University of Delhi

- “Foundation Courses in FYUP – Building Mathematical Ability”, Inaugral Lecture, Daulat Ram College, University of Delhi
- “Mathematical Modelling in School Curriculum”, S D Public School, Delhi

### **COMPUTER PROFICIENCY**

Languages: Fortran, Pascal, C, C++

Operating System: Windows, Macintosh, Linux

CAS: MATHEMATICA, MATLAB, R

Signature of Faculty Member

(Updated in March 2018)