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1. About the Department

In University of Delhi, Department of Mathematics was started in 1947 and in 1957 a post-graduate course in Mathematical Statistics was initiated. The department was therefore renamed as Department of Mathematics and Mathematical Statistics. In 1963 a two year postgraduate course in Operational Research was instituted under this department. As such the department expanded considerably and so did its activities. Consequently in December 1964 the Faculty of Mathematics was formed and in August 1973 the only department under the Faculty was divided into four departments, viz. Department of Mathematics, Department of Statistics, Department of Operational Research, and Department of Computer Science.

The impressive tradition of the Department of Mathematics derives its roots from the east which predates the formation of the post graduate department. Encompassed within the tradition are names such as P.L. Bhatnagar, J.N. Kapur, A.N. Mitra, and B.R. Seth, all of whom distinguished themselves by their teaching and research and who later carved out major roles for themselves on the Indian mathematical scenario even though they were not directly associated with the post-graduate department.

The post-graduate department was set up in 1947. It was fortunate to have Professor Ram Behari as its first head. Prof. Ram Behari was an eminent mathematician who specialised in the important field of Differential Geometry. He can be credited with having started the tradition of research in Differential Geometry, one of the first disciplines in pure mathematics to have been pursued in the department. He guided a number of research scholars and established the high traditions of teaching in the department. During his tenure, in 1957, the department also initiated an M.A./M.Sc. program in Mathematical Statistics and the department was designated as the Department of Mathematics and Mathematical Statistics.

In 1962, the department was given a formidable push when a distinguished mathematician, Prof. R.S.Verma, assumed the responsibilities of the head. It was entirely due to his dynamism and academic breadth that research activities in the department blossomed in several directions such as Operational Research, Information Theory, Coding Theory, Space Dynamics and in Complex Analysis. The first masters program in Operational Research in the country was started in this department under his leadership. This was even before any university in the U.K. and in several other advanced countries had done so. Since the activities and the courses in the department were now so wide and varied the department was enlarged into the Faculty of Mathematics at the initiative of Professor R.S.Verma.

In 1970, another distinguished mathematician, Prof. U.N.Singh, was appointed the Head of the Department and the Dean of the Faculty of Mathematics. He provided the department with the requisite strength and depth in the core areas of mathematics. He created strong research in Functional Analysis, Harmonic Analysis, and in Operator Theory. During his stewardship of the department, several distinguished mathematicians from all over the globe began to visit the department regularly and the department can be said to have attained full maturity. He foresaw the need to have separate departments within the overall set-up of the Faculty of Mathematics and thus were
created, in 1973, the Department of Mathematics, the Department of Statistics, the Department of Operational Research and the Department of Computer Science. The Faculty of Mathematics was re-designated as the Faculty of Mathematical Sciences.

The Department currently offers M.A./M.Sc. courses and runs M.Phil., and Ph.D. programs in Mathematics.

2. Faculty Members and Their Research

2.1. Faculty Members and their expertise. The area(s) of expertise of the faculty members of the department are given below.

<table>
<thead>
<tr>
<th>Professors</th>
<th>Banach Algebras, Complex Analysis, Functional Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dinesh Singh</td>
<td><a href="mailto:Dsingh@maths.du.ac.in">Dsingh@maths.du.ac.in</a></td>
</tr>
<tr>
<td>Tej B. Singh</td>
<td>Algebraic Topology</td>
</tr>
<tr>
<td>Ajay Kumar</td>
<td>Harmonic Analysis, Complex Analysis, Operator Algebras</td>
</tr>
<tr>
<td>R. K. Mohanty</td>
<td>Numerical Analysis, Differential Equations, Fluid Dynamics/ Mechanics</td>
</tr>
<tr>
<td>V. Ravichandran</td>
<td>Complex Analysis</td>
</tr>
<tr>
<td>V. Ravichandran</td>
<td><a href="mailto:Vravi68@gmail.com">Vravi68@gmail.com</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associate Professors</th>
<th>Algebraic Coding Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapna Jain</td>
<td><a href="mailto:Sapna@vsnl.com">Sapna@vsnl.com</a></td>
</tr>
<tr>
<td>Sachi Srivastava</td>
<td>Functional Analysis, Operator Theory, Abstract Differential Equations, Operator Algebras</td>
</tr>
<tr>
<td>C. S. Lalitha</td>
<td>Mathematical Programming, Optimization Theory</td>
</tr>
<tr>
<td>Vusala Ambethkar</td>
<td>Computational Fluid Mechanics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assistant Professors</th>
<th>Analysis of PDE, Nonlinear Functional Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratikanta Panda</td>
<td><a href="mailto:Rkpanda@maths.du.ac.in">Rkpanda@maths.du.ac.in</a></td>
</tr>
<tr>
<td>A. Zothansanga</td>
<td><a href="mailto:Azothansanga26@yahoo.cc">Azothansanga26@yahoo.cc</a></td>
</tr>
</tbody>
</table>
2.2. Recent Publications of the Faculty Members. The faculty members publish papers in national and international journals. The following is a partial list of the publications:

**2014/Accepted**

- Sumit Nagpal and V. Ravichandran, A comprehensive class of harmonic functions defined by convolution and its connection with integral transforms and hypergeometric functions, Studia Universitatis Babes-Bolyai Mathematica, accepted.
- Rajni Mendiratta, Sumit Nagpal and V. Ravichandran, Second-order differential superordination for analytic functions with fixed initial coefficient, Southeast Asian Bulletin of Mathematics, accepted.
- V. Ravichandran, Radii of starlikeness and convexity of analytic functions satisfying certain coefficient inequalities, Mathematica Slovaca, accepted.
- Sumit Nagpal and V. Ravichandran, Univalence and convexity in one direction of the convolution of harmonic mappings, Complex Variables and Elliptic Equations, appeared online.

2013

• Sapna Jain, K. P. Shum, Extended Varshamov-Gilbert-Sacks bound for linear Lee weight codes. Algebra Colloq. 19 (2012), Special Issue No.1, 893-904. 94B05
• J. Dutta, C.S. Lalitha, Optimality conditions in convex optimization revisited, Optimization Letters, 7(2) (2013) 221-229
• Lalit Kumar Vashisht, Geetika Khattar, On I-reconstruction property, Advances in Pure Mathematics Vol.3 No.3(2013), Article ID:31227, 7 pages
• A Gaur, A Sharma, Maximal Graph of a Commutative Ring, International Journal of Algebra 7 (12), 581-588
2012

- Kumar, Ajay; Rajpal, Vandana. Symmetry and quasi-centrality of the operator space projective tensor product. Arch. Math. (Basel) 99 (2012), no. 6, 519-529.
• Sapna Jain, K. P. Shum, Extended Varshamov-Gilbert-Sacks bound for linear Lee weight codes. Algebra Colloq. 19 (2012), Special Issue No.1, 893-904.
• S. Nagpal, V. Ravichandran, Applications of Theory of Differential Subordination for Functions with Fixed Initial Coefficient to Univalent Functions, Annales Polonici Mathematici, to appear (2012)
2011


• Sapna Jain, K. P. Shum, Construction of Lee weight codes detecting CT-burst errors and correcting random errors. Algebra Colloq. 18 (2011), Special Issue No.1, 847-856.


• Tanvi Jain, Derivatives for antisymmetric tensor powers and perturbation bounds, Linear Algebra and its Applications, 435, 1111-1121 (2011)

2010

• Dinesh Singh, S. Lata, M. Mittal, A Finite Multiplicity Helson-Lowdenslager-de Branges Theorem, Studia Mathematica, 200(3), 247-266 (2010)
• P. L. Q. Pergher, H. K. Singh and T. B. Singh, On $\mathbb{Z}_2$ and $S^1$ free actions on spaces of cohomology type $(a, b)$, Houston J. Math. 36 (2010), no. 1, 137–146.
• H. Begehr, A. Chaudhary, Ajay Kumar, Bi-polyanalytic Functions in the Upper Half, Complex Variables and Elliptic Equations, 55, 305-316 (2010)
- Sapna Jain, Singleton's bound in Euclidean codes. Algebra Colloq. 17 (2010), Special Issue No.1, 741-748.

2009

• S.C. Arora, J. Bhola, Essentially Slant Toeplitz Operators, Banach Journal of Mathematical Analysis, 3(2), 1-8 (2009)
• A. Chaudhary, Ajay Kumar, Boundary Value Problems in the Upper Half Plane, Complex Variables and Elliptic Equations 54(5), 441-448 (2009)
• R.K. Mohanty, A Variable Mesh C-SPLAGE Method of Accuracy $O(k^2 h_1^{1+k}h_1^{1+k}h_1^{2})$ for 1-D Nonlinear Parabolic Equations, Applied Mathematics and Computations, 213, 79-91 (2009)
• Sapna Jain, Ki-Suk Lee, An upper bound on the number of parity checks for burst error detection and correction in Euclidean codes. J. Korean Math. Soc. 46 (2009), no. 5, 967-977.
• V. Ravichandran, Criteria for Univalence of Integral Operators, Acta Universitatis Apulensis Inform., 17, 141-149 (2009)
• C.S. Lalitha, M. Mehta, Characterizations of Solution Sets of Mathematical Programs in Terms of Lagrange Multipliers, Optimization, 58(8), 885-1007 (2009)
2008

- R.K. Mohanty, A Two-level Implicit Non-uniform Mesh Cubic Spline Method of \(O(k^2h^{-1}_1 + k h_1 + h^3_1)\) for the Parabolic Equation \(u_{xx} = \varphi(x, t, u, u_x, u_t)\), Neural Parallel and Scientific Computations, 16, 449-466 (2008)
• Sapna Jain, CT bursts-from classical to array coding. Discrete Math. 308 (2008), no. 9, 1489-1499.
• L. Hola, Tanvi Jain, R. A. McCoy, Topological Properties of the Multifunction Space L(X) of Cusco Maps, Mathematica Slovaca, 58(6), 763-780 (2008)
• Tanvi Jain, S. Kundu, Atsuji Completions vis-a-vis Hyperspaces, Mathematica Slovaca, 58(4), 497-508 (2008)

2007

• Ajay Kumar, R. Prakash, Iterated Boundary Value Problems for the Inhomogeneous Polyanalytic Equation, Complex Variables and Elliptic Equations, 52, 921-932 (2007)
• Ajay Kumar, Operator Space Structure of Banach Spaces, Mathematics Student, 76, 239-248 (2007)
• Tanvi Jain, S. Kundu, Boundedly UC spaces: Characterisations and Preservation, Quaestiones Mathematicae 30, 247-262 (2007)
• R. A. McCoy, Tanvi Jain, S. Kundu, Factorization and Extension of Isomorphisms on $C(X)$ to Homeomorphisms on Hyperspaces, Topology and its Applications, 54, 2678-2696 (2007)

2.3. Research Grants. Some of the recent research grants received by the faculty members are listed below:

• Prof. D. Singh, Linear Mapping Associated with Banach Spaces of Functions, DST, 1998-2003
• Prof. Ajay Kumar
  – Complex Analytic methods in PDE, Univ. Delhi, 2009-10
  – Harmonic analysis on nilpotent Lie groups, Univ. Delhi, 2010-11
  – Potential theory on stratified Lie groups, Univ. Delhi, 2011-12
  – Operator space tensor product of C*-algebras, Univ. Delhi, 12-13
  – Schur tensor product of operator spaces and harmonic analysis, R&D grant from Univ. Delhi, 2013-14
  – DFG (German Research Foundation) collaboration with Indian National Science Academy at Freie Universitat, Berlin, Germany. 2008
  – JSPS (Japan Society for Promotion of Science) collaboration with Indian National Science Academy at Gunma University, Japan, 2012
• Prof. B. K. Dass Repeated Burst Error Control Codes, R & Grant from Univ. Delhi 2013-14
• Prof. R. K. Mohanty
  – High Order Off-step Discretization for Multi-dimensional Hyperbolic Equations, Univ Delhi, 2012-13
  – High Accuracy Approximation for Multi-dimensional Quasi-linear Hyperbolic Equations, Univ. Delhi, 2011-2012
  – Arithmetic Average Discretization for Multi-dimensional Non-linear Wave Equations, Univ. Delhi, 2010-2011
  – Computational Methods for the Solution of Fourth Order Partial Differential Equations, Univ. Delhi, 2009-2010
• Dr V Ravichandran
  – Geometric properties of harmonic univalent functions, Univ. Delhi, 2012-13
  – Linear operators associated with univalent and multivalent functions, 2008-09, 2009-10
  – Radius Problems for Starlike and Convex Univalent Functions R&D grant from Univ. Delhi, 2013-14
  – Co-investigator, On planar harmonic mappings and minimal surfaces, RU Grant, Universiti Sains Malaysia, Dec 2011-Nov 2014
• Dr Sapna Jain
  – Cyclic Codes in Array Coding, NBHM, 2007-2010
  – R&D grant, Univ. Delhi, 2008, 2009, 2010
• Dr. Sachi Srivastava Quantum Dynamical semigroups, R&D grant from Univ. Delhi, 2013-14
• Dr C. S. Lalitha
  – Reformulations for Generalized Nash Equilibrium Problems, Univ. Delhi, 2012
  – Stability and Well-Posedness in Vector Optimization, Univ. Delhi, 2011.
  – Nonsmoothness and Well-Posedness in Optimization Univ. Delhi, 2010
  – Optimality and Well-Posedness Aspects of Vector Optimization Problems Univ. Delhi, 2009
  – Optimisation and Nonsmooth Analysis, UGC Minor project, 2001-2003
  – Scalarization and Optimality of Vector-Valued Optimization, R&D grant from Univ. Delhi, 2013-14
• Dr V. Ambethkar
  – R & D grants, Univ. Delhi, 2008-09, 09-10,10-11,11-12,12-13
  – Finite Volume method and its application to Navier-Stokes equations and Heat Transfer, R & D grants, Univ. Delhi, 13-14
• A Zothansanga Generalization of Frames in Hilbert Space and the Feichtinger Conjecture, R & D grant from Univ. Delhi, 2013-14
• Dr Lalit Kumar
  – Frames, Atomic Decompositions and Riesz Bases in Banach Spaces, Univ. Delhi, 2010-11
  – Expansions property of Frames in Banach Spaces, Univ. Delhi, 2011-12
  – Frames in Banach Spaces, Univ. Delhi, 2012-13
  – The Reconstruction Property in Banach spaces and their applications, R&D grant from Univ. Delhi, 2013-14
• Dr Anupama P R & D grant, Univ. Delhi, 2010-11
• Dr Arvind Patel
  – Shock Phenomena in Conducting and Non-Conducting Media, Univ. Delhi, 2012-13
  – Study of Shock Phenomena in non-ideal Gas, Univ. Delhi, 2011-12
  – Study of Shock Wave via Lie-Group Analysis, R&D grant from Univ. Delhi, 2013-14
• Dr Atul Gaur
  – Generalization of Radical formula for Modules, Univ. Delhi, 10-11
  – To study the Idealization of a Module, Univ. Delhi, 2011-12
  – Graph theoretic properties of commutative rings, Univ. Delhi, 12-13
  – Automorphism group and crossing number of maximal graphs, R&D grant from Univ. Delhi, 2013-14

2.4. Conferences and Other Activities Organized.

Conferences/Workshops/Schools Organized

• Indo-French CIMPA research school (CRS) on Generalized Nash Equilibrium Problems, Bilevel Programming and MPEC, November 25-December 6, 2013
• National Seminar of Research Scholars in Mathematics, September 20-21, 2013
• Instructional Schools for Lecturers On Group Theory, June 3-15, 2013
• The Legacy of Srinivasa Ramanujan - An International Conference (2012)
• Advance Training in Mathematics (ATM) Schools in Real Analysis and Measure Theory (2012)
• Refresher Courses at CPDHE on Mathematics, Operations Research and Computer Science (2012)
• Workshop on Optimization and Statistics (2012)
• Workshop on Maxima (2012)
• Research Scholars' Seminar (2012)
• Advance Training in Mathematics (ATM) Schools in Geometric Complex Analysis (2011)
• Refresher Courses at CPDHE on Mathematics and Operational Research (2011)
• National Meet on History of Mathematical Sciences (2010)
• National Workshop on Differential Equations, Computing and Modelling (20th -24th December 2010)
• Training Programme on Optimization Theory and Apllications (Feb 10-14, 2010)
• Advance Training in Mathematics (ATM) Schools in Real Analysis (2010)
• Workshop on Mathematica (2010)
• Research Scholars' Seminar (2010)
• Advance Training in Mathematics (ATM) Schools in Complex Analysis (2009)
• Refresher Courses at CPDHE on Mathematics and its Applications (2009)
• Workshop on Mathematica (2009)
• Pre-ICM International Convention on Mathematical Sciences (2008)
• Research Scholars’ Seminar (2008)
• International Conference on Operator Theory and Related Areas (ICOTRA) (2008)

Regular Seminars and colloquium Organized

• Prof. Garth Dales, Lancaster University, Finitely-generated maximal left ideals in Banach algebras, Friday January 31, 2014, 3:00pm at Seminar Room 115, Arts Faculty, DU South Campus. This talk will be followed by a 15 minute lecture by Prof. Dales on Ethics, code of practice and open access.
• Prof. K. B. Sinha, Jawaharlal Nehru Center for Advanced Research, Bangalore, Semigroups of linear operators, three lectures, January 15, 17, and 21, 2014, 3:30 p.m.
• Prof. Om P. Ahuja, Kent State University, Ohio, Recent developments in harmonic univalent mappings and related functions, January 9, 2014, 3:00 p.m.
• Prof. James E. Jamison, University of Memphis, Some recent results on Hermitian Operators on Banach spaces, December 23, 2013, 11.30 a.m.
• Prof. Jan Rychtar, University of North Carolina, USA, Math Biology Research for UNCG Under-graduate Students, December 12, 2013, 11.00 a.m.
• Prof. Sat Gupta, University of North Carolina, USA, Field Work Validation of Optional Unrelated Question RRI Models-Predictors of STD, December 12, 2013, 12.00 noon.
• Prof. Shobha Madan, IIT Kanpur on 24th Oct. 2013
• Prof. Francois Labourie, University of Paris 11, Orsay, on Margulis Space-times November 7, 2013
• Prof. Ajay Kumar, University of Delhi on From Fourier Series to Harmonic Analysis on August 30, 2013
• Prof. Indira Chatterji, University of Orleans on Some geometry and analysis of hyperbolic groups on March 19, 2013
• Prof. Robert Tijdeman, Leiden University, The Netherlands on 14th Feb 2013
• Prof. Kapil Paranjape, IISER, Mohali on The Shlafly Double-Six on January 17, 2013.
• Paulsen, University of Houston, USA, Quantized Function Theory on January 10, 2012
• S.K. Khanduja, Punjab University, India, Irreducibility of Polynomials on March 13, 2012
• Aparna Mehra, Indian Institute of Technology Delhi, India, Portfolio Optimization on March 24, 2012
• R.K. Sharma, Indian Institute of Technology Delhi, India, Discrete Log Problems on March 24, 2012
• Rajinder Bhatia, Indian Statistical Institute Delhi, India, Unity of Mathematics in April, 2012
• Inder K. Rana, IIT Mumbai, Integration on Abstract Measure Spaces in April, 2012
• E.K. Narayanan, IISc.Bangalore, Integration on Locally compact Spaces in April, 2012
• P. Mohanty, IIT Kanpur, Abstract Lp spaces in April, 2012
• Joydeep Dutta, IIT Kanpur, India, On Error Bounds for Variational Inequality Problems on January 21, 2011
• Adam Koranyi, Lehman College, City University of New York, USA, Homogeneous Operators on Hilbert Spaces, Some New Results on January 27, 2011
• Didier Aussel, University of Perpignen, France, Gap Function for Variational and Quasivariational Inequalities on January 28, 2011
• Ram Murty, Queens University, Ontario, Canada, The Riemann Hypothesis and Grimm’s Conjecture on February 18, 2011
• Ajay Kumar, University of Delhi, India, Research Prospects for Young Researchers and Abroad on March 12, 2011
• P.K. Saxena, Director, SAG Group, DRDO, New Delhi, India, On Mathematics in Defence Applications on March 12, 2011
• K.B. Sinha, Indian Institute of Science, India, K-reins and Other Higher Order Operator on August 30, 2011
• Ken Ross, University of Oregon, United States of America, Frequencies of First Digits of Data on October 14, 2011
• F. Gianessi, University of Pisa Italy, Variational Analysis and Design of Aircrafts on November 28, 2011
• Mati Abel, University of Tartu, Estonia, Generalization of the Liouville’s Theorem and Their Applications in Theory of Topological Algebra on December 5, 2011
• Mati Abel, University of Tartu, Estonia, On Splittings of Extensions of Rings and Topological Rings on December 5, 2011
• Sat Gupta, University of North Carolina, USA, Optimality Issues in Two-Stage Optional RRT Models on December 22, 2011
• Mary Crowe, Anna Tuck, Sat Gupta, University of North Carolina, USA, Non-Medical Use of Stimulant Medication by College Students: an Optional Randomized Response Technique on December 22, 2011
• Prajeneshu, Indian Agricultural Statistics, Pusa Road, New Delhi, India, Non-linear Growth Models and their Applications on December 22, 2011
• Vijaya Kumar Murty, University of Toronto, Canada, The Tau of Ramanujan on December 22, 2011
• Juan Enrique Martinez Legaz, University of Barcelona, Spain, On a Sufficient Condition for Equality of Two Maximal Monotone Operators on August 23, 2010
• S.S. Khare, North-Eastern Hill university, Shillong, India, Taxi-Tab Geometry on November 18, 2010
• Jan Rychtar, Sat Gupta, Mary Crowe, University of North Carolina, USA, Interaction with Faculty and Research Students on December 11-15, 2010
• M.S. Raghunathan, TIFR Mumbai, India, Mathematics that would Rather be Science? n December 22, 2010)
• M.S. Raghunathan,Kalyan Sinha, R. Adiga, Interaction with Faculty and Research Students on December 22-23, 2010
• K.R. Parthasarathy, Quantum Probability, Computing and Information on March 13, 2009
• Daniel Wulbert, Locator Problem, on January 17, 2008
• S.S. Khare, Introduction and Some Applications of Algebraic Topology, on January 22, 2007
• James F. Glazebrook, Homotopy and Harmonic Maps, on February 11, 2008
• Peter Zvengrowski, Applications of Homotopy Theory to Colouring Groups on February 14, 2008
• Peter Zvengrowski, Seifert Manifolds-I on February 15, 2008
• Peter Zvengrowski, Seifert Manifolds-I on February 16, 2008
• B.P. Duggal, Totally Hereditarily Normaloid Operators; Property b and Elementary Operators on February 27, 2008
• D.N. Verma, Algebra is at the Heart of Mathematics and Classical Representation Theory is a Vital Key to Combinatorics on March 7, 2008
• I.B.S. Passi, Group Theory and Related Areas during March 19-20, 2008
• Sudesh K. Khanduja, Eisenstein-Schonemann Irredicibility Criterion from Valuation Theory Point of View on April 23, 2008
• K.B. Sinha, Introduction to Non-Commutative Mathematics I, II,III during April 29 to May 1, 2008
• S.G. Dhani, Diophantine Approximation Via Dynamics on October 30, 2008
• M.S. Narasimhan, Geometry and Partial Differential Equations on November 3, 2008
• R. Parathasarthy, Quantum Probability, Computing and Information on November 14, 2008
• Satya Deo Tripathi, Mapping Class GNnd non-metrizable Manifolds on December 12, 2008
• Laszlo Lovaszo, Large Networks and Their Challenge on December 22, 2008
• H. Begher, Freie Universitat, Berlin, delivered a series of eight lectures on Complex Analysis, Clifford Analysis, Boundary Value Problems during January 18 to February 16, 2007
3. COURSES/ADMISSION/STUDENTS

The department offers M. A./M. Sc. courses and runs M. Phil. and Ph. D. program in Mathematics. The Master degree programme is by course work while M. Phil and Ph. D. program includes course work as well as dissertation/thesis.

3.1. M. Phil./Ph. D. Courses. Twenty three seats are available for admission to M. Phil. programme including reserved seats as per the University norms. Admission to Ph. D. programme depends on the availability of supervisors on yearly basis. The M. Phil. programme is governed by Ordinance VI – Master of Philosophy (M.Phil.) of University of Delhi (available at http://www.du.ac.in/index.php?id=684). The Ph. D. programme is governed by the Ordinance VI-B – Doctor of Philosophy (Ph. D.) (available at http://www.du.ac.in/fileadmin/DU/about_du/PDF/Phd_ordinance.pdf) of University of Delhi.

3.1.1. Duration of the programs. The duration of the M. Phil. course is one and a half years. For Ph. D course, the minimum duration is 2 years and the maximum duration is 4-5 years.

3.1.2. Eligibility. For M. Phil programme, the candidate should have good academic record with first or high second class Master’s Degree or an equivalent degree of a foreign University in the subject concerned, or in an allied subject approved by the Dean of the Faculty of Mathematical Sciences and the Vice-Chancellor on the recommendation of the Head of the Department.

For Ph. D. Programme, the candidate must have obtained a Master’s/M. Phil. degree of the University of Delhi, or any other recognized University, or any degree recognized as equivalent, in Mathematics or in an allied subject. She/he must have obtained either a minimum of 50% marks or equivalent grade in the M. Phil. degree or a minimum of 55% marks or equivalent grade in the Master’s degree.

As per University rules, for admission to the M.Phil and Ph. D. programmes, the SC/ST candidates shall be given 5% relaxation in the minimum eligibility marks.

3.1.3. Selection Procedure. Admission to the M. Phil. and Ph. D. programmes will be done on the basis of the relative merit of students’ performance at undergraduate and post-graduate examinations and the written test (of two hours duration). The merit lists will be prepared by taking into account 25% weight of marks scored in each of undergraduate and post-graduate examinations and 50% weight of marks scored in the test.
The minimum qualifying marks for admission to Ph. D. programme is 60%. The University/College teachers holding a permanent, temporary or adhoc positions and having completed two years of service as teacher in a Department/Constituent Colleges of the University of Delhi and candidates having fellowships/scholarships instituted by the University/national and international agencies under schemes approved/recognized by the University (as well as certain other category (see the Ordinance) of students can be directly registered to the Ph. D. programme.

3.1.4. Application Form and Syllabus for the Test. Applications will be invited by placing an announcement in the department website every year. The application forms and the syllabus for the test can be downloaded from the website at http://maths.du.ac.in. It can also be obtained from the office of the Department of Mathematics, University of Delhi.

Separate applications for M. Phil. and Ph. D. programmes should be sent to the Head, Department of Mathematics, University of Delhi, Delhi 110 007. Each application should be accompanied by a Demand Draft for Rs.600/- (Rupees six hundred only) (Rs. 300 for SC/ST/PH candidates) drawn in favour of The Registrar, University of Delhi payable at Delhi/New Delhi.

3.2. Syllabus for M. Phil./Ph. D. Entrance Test.

Analysis. Finite, countable and uncountable sets, bounded and unbounded sets, Archimedean property, ordered field, completeness of \( \mathbb{R} \), extended real number system, limsup and liminf of a sequence, the \( \epsilon - \delta \) definition of continuity and convergence, the algebra of continuous functions, monotonic functions, types of discontinuities, infinite limits and limits at infinity, functions of bounded variation, uniform continuity, differentiability, mean value theorem, sequence and series and their convergence, sequence and series of functions, uniform convergence, Riemann integrable functions, improper integrals, their convergence and uniform convergence.

Euclidean space \( \mathbb{R}^n \), Bolzano-Weierstrass theorem, compact subsets of \( \mathbb{R} \), Heine-Borel theorem, Fourier series, continuity and differentiability of functions from space \( \mathbb{R}^n \) to \( \mathbb{R} \), partial and directional derivatives, Taylor’s series, implicit function theorem, line and surface integrals, Green’s theorem, Stokes’s theorem. Elements of metric spaces, convergence, continuity, compactness, connectedness, Weierstrass’s approximation theorem, completeness, Baire’s category theorem, Lebesgue outer measure, Lebesgue measure and Lebesgue integration, Riemann and Lebesgue integrals.

Complex numbers, analytic functions, Cauchy-Riemann equations, Riemann sphere and stereographic projection, lines, circles, crossratio, Mobius transformtions, line integrals, Cauchy’s theorems, Cauchy’s theorem for convex regions, Morera’s theorem, Liouville’s theorem, Cauchy’s integral formula, zero-sets of analytic functions, exponential, sine and cosine functions, power series representation, classification of singularities, conformal mapping, contour integration, fundamental theorem of algebra, Riemann’s theorem on removable singularities, maximum modulus principle, Schwartz lemma, open mapping theorem, Casoratti-Weierstrass theorem.

**Algebra.** Space of $n$ vectors, linear dependence, basis, linear transformations, algebra of matrices, rank of a matrix, determinants, linear equations, characteristic roots and vectors.

Vector spaces, subspaces, quotient spaces, linear dependence, basis, dimension, the algebra of linear transformations, kernel, range, isomorphism, linear functional, dual space, matrix representation of a linear transformation, change of bases, reduction of matrices to canonical forms, inner product spaces, orthogonality, eigenvalues and eigenvectors, projections, triangular form, Jordan form, quadratic forms, reduction of quadratic forms.

Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, Symmetric groups, alternating groups, simple groups, conjugate elements and class equations of finite groups, Sylow's theorem, solvable groups, Jordan - Holder theorem, direct products, structure theorem for finite abelian groups.

Rings, Ideals, prime and maximal ideals, quotient ring, integral domains, Euclidean domains, principal ideal domains, unique factorization domains, polynomial rings, chain conditions on rings, fields, quotient fields, finite fields, characteristic of field, field extensions, elements of Galois theory, solvability by radicals, ruler and compass construction.

**Differential Equations and Mechanics.** First order ODE, singular solutions, initial value problems of first order ODE, general theory of homogeneous and non-homogeneous linear ODEs, variation of parameters, Lagrange's and Charpit's methods of solving first order PDEs, PDEs of higher order with constant coefficients.

Existence and uniqueness of solution $dy/dx = f(x, y)$, Green's function, Sturm - Liouville boundary value problems, Cauchy problems and characteristics, classification of second order PDE, separation of variables for heat equation, wave equation and Laplace equation.

Generalized coordinates, Lagrange's equation, Hamilton's canonical equations, Variational principle, Hamilton's principles and principles of least action, two dimensional motion of rigid bodies, Euler's dynamical equations for the motion of rigid body, motion of a rigid body about an axis, motion about revolving axis.

Equation of continuity in fluid motion, Euler's equations of motion for perfect fluids, two dimensional motion, complex potential, motion of sphere in perfect liquid and motion
of liquid past a sphere, vorticity, Navier-Stoke's equations of motion for viscous flows, some exact solutions.

3.3. Ph.D./M.Phil. Students List. List of Ph.D. Students currently on roll/ Supervisor(s)

- Preeti / Prof. Ajay Kumar
- Sachin Sharma / Prof. R.K. Mohanty & Dr. Swarn Singh
- Ankit Gupta / Dr. R.D. Sarma
- Neetu Aneja / Dr. S.P. Tripathi
- Kanika Sharma / Prof. V. Ravichandran
- Nitish Prajapati / Dr. Dinesh Khatkar & Dr. Ayub Khan
- Vishal Dhawan / Dr. Dinesh Khatkar & Dr. Ayub Khan
- Poonam Rani / Dr. Sanjay Kumar
- Rajesh Singh / Dr. Purnima Gupta
- Nidhi Malhotra / Dr. Bindu Bansal
- Deepti Kaur / Dr. Swarn Singh & Dr. Vivek K. Aggarwal
- Manish Chauhan / Dr. Raj Kumar
- Monika Singh / Prof. Ajay Kumar & Dr. Pankaj Jain
- Charanpreet Kaur / Dr. Binay K. Sharma
- Devendra Tiwari / Prof. Ajay Kumar & Dr. Krishnendu
- Shard Rastogi / Dr. Sachi Srivastava
- Anuj Kumar / Dr. S.K. Sahdev
- Riju Chaudhary / Dr. Pankaj
- Konthoujam Somorjit Singh / Prof. T.B. Singh & Dr. H.K. Singh
- Shah Jahan / Dr. Varinder Kumar
- Jyoti / Dr. Promila Kumar
- Neelima Ohri / Dr. Gopal Dutt
- Rajni Arora / Dr. Swarn Singh
- Anshika Mittal / Dr. Gopal Dutt
- Sushil Kumar / Dr. V. Ravichandran
- Niteesh Sahni / Dr. Dinesh Singh
- Meetu Bhatia / Dr. Surjeet Suneja
- Bhawna Kohli / Dr. Surjeet Suneja
- Anu Aggarwal / Prof. Ajay Kumar
- Seema Thakran nee Seema Rani / Dr. V.K. Tyagi Prof. B.K. Dass
- Pritha Dass Gupta (nee Rekhi) / Dr. Atul Razdan
- Pankaj Kumar Das / Dr. V.K. Tyagi Prof. B.K. Dass
- Amita Sethi nee Goel / Dr. V.K. Tyagi Prof. B.K. Dass
- Santosh Kumari / Dr. Pankaj Jain
- Vinod Chauhan / Prof. R.K. Mohanthy
- Ambika Tyagi / Dr. V.K. Tyagi
- Megha Sharma / Dr. Surjeet Suneja
- Jaspreet Kaur / Prof. T.B. Singh
- Venu Gopal / Dr. L.M. Saha Prof. R.K. Mohanthy
- Tarannum Kaur Anand / Dr. Promila Kumar
- Manju Kalra / Dr. Surjeet Suneja Dr. C.S. Lalitha
- Pakhi Aggarwal / Dr. Pratibha Kumar, / Dr. Manish Kant Dubey (DRDO)
• Balram Kindra / Dr. D.S. Jaggi
• Priyambada Tripathi / Dr. Ayub Khan
• Neeru Kashyap / Dr. Anuradha Gupta
• Praveen Kumar / Dr. Ayub Khan
• Pooja Lauhan / Dr. Surjeet Suneja Dr. C. S. Lalitha
• Naveen Kumar Jain / Dr. V. Ravichandran Prof. B.K. Dass
• Mohit Kumar Srivastava / Dr. V. Ambethkar
• Chandra Shekhar Nishad / Dr. Sobha Bagai
• Rajni Kapoor / Dr. V. Ravichandran
• Seema Bansal / Dr. Dinesh Khattar
• Iffat Jahan / Dr. Naseem Ajmal
• A. Zothan Sanga / Dr. S.K. Kaushik
• Ajeeet Singh / Dr. Ayub Khan
• Amit Kumar / Prof. Ajay Kumar
• Rashmi Gupta / Dr. Ratnesh R. Saxena
• Sandhya Jain / Dr. Pankaj Jain
• Prashanto Chatterjee / Dr. C.S. Lalitha
• Samridhi Mehta / Prof. B.K. Dass Prof. Sat Gupta
• Ram Parvesh Prasad / Dr. Ayub Khan Dr. V. Ambethkar
• Deepak Kumar Porwal / Dr. Gopal Datt
• Neha Bhatia / Dr. Anuradha Gupta
• Naresh Kumar Kodam / Dr. Vagisha Sharma
• Bikram Singh / Dr. Promila Kumar
• Kapil Kumar / Dr. Navin Chandra
• Mudita Upmanyu / Dr. Ratnesh R. Saxena
• Rekha Aggarwal / Dr. Manjari Srivastava
• Ritika Chopra / Dr. Ratnesh R. Saxena
• Garima Virmani / Dr. Manjari Srivastava
• Shailendra Kumar / Dr. B.K. Tyagi
• Rimpi Pal / Dr. Ayub Khan Dr. V. Ambethkar
• Bhavneet Kaur Bakshi / Dr. Rajiv Aggarwal
• Monika Arora / Dr. Rajiv Aggarwal
• Jyoti Talwar / Prof. R.K. Mohanthy Dr. Swarn Singh
• Vinay Kumar / Dr. Beena R. Gupta
• Khole Timothy Poumai / Dr. Manjari Srivastava
• Manoj Kumar Rana / Dr. Davinder Singh
• Shalu Sharma / Dr. S.K. Kaushik
• Ravindra Kumar / Prof. R.K. Mohanthy
• Sumit Nagpal / Prof. Ajay Kumar and / Dr. V. Ravichandran
• Rashmi Sehgal / Dr. Alka Marwaha
• Anu Chhabra / Prof. B.K. Dass Prof. Sat Gupta
• Mamta Choudhary / Dr. Sunila Sharma
• Rajesh Kumar / Dr. Sachin Vashistha
• Dinesh Kumar / Dr. Sanjay Kumar
• Gopal Datt / Dr. Sanjay Kumar
• Sudha Rani Dehri / Dr. S.P. Tripathi
• Saakshi Garg / Dr. Lalit Kumar
• Rachna Choudhary / Dr. B.K. Tyagi
• Rinku Sharma / Dr. Sachin Vashistha
• Jitender Kumar / Dr. Sachin Vashistha
• Meena Baweja / Dr. Ratnesh R. Saxena
• Geetika Khatkar / Dr. Lalit Kumar
• Arvind Kumar / Dr. Pankaj Kumar Garg
• Suman Panwar / Dr. S.K. Kaushik
• Arti Sharma / Dr. Atul Gaur Prof. Bhavanari
• Pooja Sharma / Dr. Anuradha Gupta
• Shivani Dubey / Prof. Ajay Kumar
• Nikita Setia / Prof. R.K. Mohanty
• Swati / Dr. Navin Chandra
• Sanjiv Kumar / Dr. Ratnesh R. Saxena
• Tarun Lata / Dr. Vinod Tyagi
• Vandana / Prof. Ajay Kumar
• Uday Sharma / Dr. Shashi Aggarwal
• Chavi Gupta / Dr. Shashi Aggarwal
• Laxmi / Dr. Rajiv Aggarwal
• Poonam Sarohe / Dr. Pratibha Kumar / Dr. Manish Kant Dubey (DRDO)
• Sushil Yadav / Dr. Rajiv Aggarwal
• Ashish Bansal / Prof. Ajay Kumar
• Mansi Dhiran / Dr. C.S. Lalitha
• Malti Chawla / Dr. Sunila Sharma
• Geeta Nagrath / Prof. B.K. Dass Prof. Sat Gupta
• Khushboo Bussi / Prof. B.K. Dass Dr. Dhananjoy Dey
• Shashi Kant Pandey / Prof. B.K. Dass Dr. Prasanna R. Mishra
• Neha Goel / Prof. B.K. Dass Dr. Indivar Gupta
• Pranjali / Dr. Purnima Gupta Dr. B.D. Acharya
• Subhash Chand / Dr. Vinod Tyagi
• Jayanta Biswas / Dr. A.R. Prasannan
• Rajeev Kumar / Dr. Arvind Dr. S.K. Pal
• Madhu Kumari / Dr. Anupama Panigrahi and / Dr. S.K. Pal
• Ajay Kumar / Prof. Dinesh Singh
• Manoj Kumar / Dr. Anupama Panigrahi and / Dr. S.K. Pal
• Harsh Vardhan / Dr. B.K. Tyagi
• Manoj Singh / Dr. Arvind Patel
• Bharti Sharma / Dr. Promila Kumar
• Karuna Mamtani / Dr. Anuradha Gupta
• Krishan Pal / Dr. Navin Chandra
• Nikhil Khanna / Dr. Varinder Kumar
• Chander Shekhar / Dr. S.K. Kaushik
• Ritu Aggawal / Dr. Gopal Datt
• Deepti Jain / Dr. Purnima Gupta Dr. B.D. Acharya
• Rakesh Batra / Dr. Sachin Vashistha
• Apeksha / Dr. V. Ambethkar
• Anshika Mittal / Dr. Gopal Dutt
• Rajni Arora / Dr. Swarn Singh
• Neelima Ohri / Dr. Gopal Dutt
• K. Somorjit Singh / Prof. T.B. Singh Dr. Hemant Kumar
• Jyoti / Dr. Promila Kumar
• Shahjahan / Dr. Varinder Kumar

M.Phil Students for the year 2013-14

Names of the students and their Supervisors

- Swati Anand
- Noopur Matta
- Shweta Gupta
- Vivek Kumar Sinha
- Soma Das
- Amit Sharma
- Swati Chhabra Sehgal
- Shiva Kapoor
- Neha Sharma
- Upendra Kumar Singh
- Harshita Shekhar
- Alka
- Rachna Shokhanda
- Mohd Sarik Idrisi
- Soni
- Mahendra Pratap Pal
- Reena
- Neha Talpa
- Nisha
- Lakshmi Rani Basumatary

M.Phil Students for the year 2012-13

- Shelly Verma
- Neha Ahuja
- Prakriti Saxena
- Vibha Anand
- Salaj
- Shweta Gandhi
- Naveen Gupta
- Namita
- Rachna Aggarwal
- Karuna
- Chhatra Pal
- Sweety Yadav
- Poonam Verma
- Abhay Kumar
- Manisha Saini
- Tarachand Prajapati
- Avinash Kumar
- Rohit Kumar
- Makhdoom Ahmed
- Pravati Jodia

M.Phil Students for the year 2011-12

- Preeti
- Mukta Garg
- Nisha Bohra
- Priyanka Sahni
- Neha Mongia
- Sulbha Kumar
- Ruchi Bajargaan
- Ankit Gupta
- Priyanka Yadav
- Venu Bagri
- Saloni Jindal
- Kushal Lalwani
- Himanshi Singh
- Ravi Kumar Sagar
- Shahjahan
- Sachin Sharma
- Ajay Kumar Verma
- Jay Kishore Sahni
- Raj Kumar
- Charan Singh

M.Phil Students for the year 2010-11

- Khushboo
- Poonam Rathi
- Vibhu Bansal
- Tahir Nadeem
- Japnit Kaur
- Neeraj Kumar
- Sonia
- Reema Agarwal
- Chappreet Kaur
- Meenal Sambhor
- Neelesh Kumar
- Chandra Prakash
- Konthoujam Sororjit Singh
- Ashok Kumar Sah
- Deepak Kumar
- Tamanna Yadav
- Brahm Prakash
- Pappu
- Manoj Kumar
- Rinkila Bhutia
List of UGC-Non-NET Fellowship holders for the year 2012-13:

- Shelly Verma
- Neha Ahuja
- Prakriti Saxena
- Vibha Anand
- Salaj
- Shweta Gandhi
- Rachna Aggarwal
- Sweeti Yadav
- Poonam Verma
- Manisha Saini
- Tarachand Prajapati
- Rohit Kumar
- Makhdoom Ahmed

List of UGC-Non-NET Fellowship holders for the year 2011-12:

- Mukta Garg
- Nisha Bohra
- Neha Mongia
- Kushal Lalwani
- Himanshi Singh
- Ravi Kumar Sagar
- Shahjahan
- Jay Kishore Sahni
- Charan Singh

3.4. List of PhD awarded.

2012
- Ranjana Jain under supervision of Ajay Kumar on Operator Space Tensor Products of $\mathbb{C}^*$-algebras and their Ideal Structure
- Sumit Kumar Sharma under the supervision of R.K. Panda and S.K. Kaushik on A Study of Atomic Decompositions in Banach Spaces
- Surbhi Madan under the supervision of B.K. Dass on Bounds for Codes Locating Blockwise Correcting Repeated Burst Errors
- Pramod Kumar under the supervision of Vishnu Gupta on On Armendariz Semirings
- Ritu Arora under the supervision of B.K. Dass on On Repeated Burst Error Location/Correction Capabilities of Linear Codes
- Satish Verma under the supervision of S.C. Arora on Weighted Composition Operators on Banach Function Spaces

2011
- Durgesh Kumar under the supervision of S.C. Arora and J.K. Kohli on Fixed Point Theorems in Symmetric Spaces and Uniform Spaces
- Raj Kumar under the supervision of S.K. Kaushik on On Frames in Banach Spaces And Their Conjugate Spaces
- Bharti under the supervision of L.M. Saha and R.K. Mohanty on Hyperbolicity, Energy Variability and Chaos in Nonlinear Dynamical Systems
- Neeti Goel under the supervision of R.K. Mohanty and Ayub Khan on Chaos Control in Various Problems of Dynamical Systems
- Jeetendra Kumar Aggarwal under the supervision of S.C. Arora and J.K. Kohli on Function Spaces and Variants of Continuity
- Varinder Kumar under the supervision of R.K. Panda and S.K. Kaushik on On Frames of Subspaces for Banach Spaces
- Anita Kumari under the supervision of S.K. Bambhri on On R-Strong Jordan Ideals in Rings and Ternary Rings

2010
- Hemant Kumar Singh under the supervision of T.B. Singh on On the Cohological Structure of Orbit Spaces of Certain Transformation Groups
• Rashmi Verma under the supervision of B.K. Dass on A Study of Repeated Burst Error Detecting and Correcting Codes
• Prem Pal Singh under the supervision of Ayub Khan and R.K. Mohanty
• Ruchi Arora under the supervision of C.S. Lalitha and B.K. Dass on On Constrained Set Valued Optimization: Proper Efficiency, Conjugate Duality and Epiderivatives
• S. Tahiliani under the supervision of S.C. Arora and S.P. Arya on ?-Open Sets in General Topology
• V. Shanta under the supervision of P.K. Jain on Some Aspects of Locally Convex Modules Over a Locally Convex Algebra
• Suket Kumar under the supervision of P.K. Jain on Boundedness of Generalized Hardy Operators on Weighted Lebesgue-Type Spaces
• Poonam Garg under the supervision of B.K. Dass on On the Error Detecting / Correcting Codes
• Roopesh Tehri under the supervision of R.K. Mohnaty and L.M. Saha on Studies on Chaos Control and Chaos Indicators in Dynamical Systems Chaos Control in Various Problems of Dynamical Systems
• Ritu Narang under the supervision of S.R. Arora and B.K. Dass on Various Aspects of Multi-Level Programming Problems
• 1 Mukund Madhav Mishra under the supervision of Ajay Kumar on Potential Theory on Stratified Lie Groups
• Guneet Bhatia under the supervision of C.S. Lalitha and B.K. Dass on Well-Posedness, Stability and Duality Aspects of Variational Inequality Problems 2009
• Noopur Khosla nee Arora under the supervision of R.K. Mohanty on Highly Accurate Variable Mesh Two Parameter Alternating Group Explicit Methods for the Solution of boundary Value Problems
• Aparna Jain under the supervision of Naseem Ajmal on A Study of Lattices and Categories in fuzzy Group Theory Daulti Verma nee Rani under the supervision of Pankaj Jain on Weighted Mean Inequalities in Certain Banach Function Spaces
• Monika Mehta nee Sethi under the supervision of C.S. Lalitha and B.K. Dass on On some Aspects of Variational Inequality Problems in Terms of Bifunctions
• Veena Sharma under the supervision of V. Shrikant and B.K. Dass on A Study of Ciphers Through Classification and Clustering Methods
• Gopal Datta under the supervision of S.C. Arora on Multiplication and composition Induced Operators on Lorentz Spaces
• Preeti Dharmaraha nee Dhingara under the supervision of S.C. Arora on A Study of Weighted Weyl Spectra of Operators
• Khundrakpam Binod Mangang under the supervision of P.P. Hallan and S.C. Arora on Linear and Non-Linear Stability of Equilibrium Points in Robes Restricted Three Body Problem
• Narender Kumar under the supervision of D. Bhatia and B.K. Dass on Vector Optimization Involving n-Set Functions
• Reena Kapoor under the supervision of S.R. Arora on Various Techniques for Linearizing Binary Non-linear Programming Problems
• Sudha Arora nee Jairath under the supervision of S.R. Arora on Some Aspects of Facility Location Problems
Nisha Gupta under the supervision of S.K. Kaushik and Ajay Kumar on A Study of Banach Frames and Related Concepts in Banach Spaces

Ritu Gupta under the supervision of S.R. Arora on On Multi-Level and Multi-Objective Programming Problems Using Goal and Fuzzy Programming

Arun Chaudhary under the supervision of Ajay Kumar on Complex Boundary Value Problems in Unbounded Regions

Anuradha Sharma née Gaur under the supervision of S.R. Arora on Some Aspects of Multi-level and Integer Programming Problems

Jyoti Bhola under the supervision of S.C. Arora on Generalized Slant Hankel Operators

2008

Lalit Kumar under the supervision of P.K. Jain on A Study of Frames in Banach Spaces

Vani under the supervision of S.K. Suneja on The Study of Optimality and Duality in Vector Optimization Problems

Sachin Vashshta under the supervision of J.K. Kohli on Fixed Point Theorems in Metric Spaces and Probabilistic Metric Spaces

Dhiraj Kumar Singh under the supervision of Prem Nath and B.K. Dass on On Some Functional Equations in Information Theory

Neenu Gupta under the supervision of B.B. Chakraborty and L.M. Saha on Regular and Chaotic Motions in Stellar Pulsations

2007

Ravi Shankar under the supervision of S.R. Arora on Various Techniques for Solving Non-Linear Set Covering Problem

Swarn Singh under the supervision of R.K. Mohanty on New Highly Accurate Discretization for the Solution and the Estimates of (du/dn) for singularly Perturbed Non-Linear Multi-Dimensional Elliptic and Parabolic Partial Differential Equations

3.5. M.A./M.Sc. in Mathematics. Students have been admitted to the M.A./M.Sc. program during 2013-14 either directly (Mode I) or through an entrance test (Mode II). Applicant graduated under 10+2+3 scheme or any equivalent scheme are eligible for admission. There are 308 seats in North Campus and 62 in South Campus for M.A./M.Sc. programme in Mathematics. Seats are also available in Non-Collegiate Women’s Education Board (NCWEB).

The distribution of seats under various categories of students in both North Delhi Campus (NDC) and South Delhi Campus (SDC) are given in table on the other side.

Mode I: Direct Admission. 50% seats shall be filled on the basis of merit list drawn in order of preference separately at North Delhi Campus, South Delhi Campus and Non Collegiate Women’s Education Board (for female candidates only) from the following categories of the candidates.

(1) B.A.(Hons)/B.Sc.(Hons) Examination in Mathematics of Delhi University with atleast 60% marks in Mathematics.

(2) B.A.(Hons)/B.Sc.(Hons) Examination in Mathematics of other Universities recognized by Delhi University with atleast 75% marks in Mathematics.
(3) B.A.(Hons)/B.Sc.(Hons) Examination in Mathematics of Delhi University with at least 50% marks in Mathematics

(4) B.A.(Hons)/B.Sc.(Hons) Examination in Mathematics of other Universities recognized by Delhi University with at least 65% marks in Mathematics.

Under Mode I, the minimum requirement for SC/ST candidates will be 40% marks in B.A.(Hons)/B.Sc.(Hons) Examination in Mathematics in each of above four categories.

Admission at all the campuses for Mode-I shall be made, independently, from amongst the candidates registered at the respective Registration Centres, in order of merit and upto the number of seats available in the Colleges falling within the jurisdiction.

Separate applications are to be filled for different campuses. Candidates desirous of seeking admission on the basis of merit (Mode I) in NDC, SDC and NCWEB shall be required to register their names with the following Registration Centre as per the schedule prescribed for the purpose:

(1) Room No. 01, New Academic Block, Department of Mathematics, Faculty of Mathematical Sciences, University of Delhi, North Delhi Campus (NDC), Delhi-110007.

(2) South Delhi Campus (SDC), Benito Juarez Road, New Delhi-110021

(3) Non-collegiate Women’s Education Board (NCWEB), University of Delhi - Delhi-110007.

Registration form for registration to M.A./M. Sc. will be available at the respective Registration Centres (NDC/SDC/NCWEB). These forms duly filled in accompanied with all the relevant certificates (original and self-attested copies thereof in person only) shall have to be submitted at the respective registration Centres. The original certificates will, however, be returned to the candidates immediately after verification but attested copies thereof will be retained along with the form. No registration form which is incomplete and not supported by all the required documents will be accepted. Consequent upon the acceptance of their registration forms the candidates will be issued registration slips as a token of their having been registered for provisional admission. These slips will have to be produced at the time of collection of Provisional Admission, Slip,
if selected for admission. The candidates are, therefore, advised to retain the registration slip carefully. However, the registration will be valid for the current academic session only.

**Mode II: Admission Through Entrance Test.** The remaining 50% seats be filled on the basis of merit in an entrance test. Any candidate who has obtained Bachelor degree in any subject and has studied qualified at least 3 courses each of one year duration or 6 courses each of one semester duration in Mathematics securing at least 45% marks in aggregate will be eligible to appear in the Entrance test.

Any candidate appearing in the final year examination of Bachelor’s degree of the same calendar year shall also be eligible to appear in the entrance test, however, he/she will be considered for admission if he/she fulfils the other requirements of admission.

The qualifying marks in the entrance test for a candidate belonging to General category shall be 40%. Any seat remaining vacant under this mode of admission will be filled in accordance with the mode 1. If a student qualifies for admission through both modes, he/she will be granted admission through Mode I.

The candidates belonging to other categories will be provided relaxations/reservations as per University rules in both the modes of admission.

The entrance examination shall be of three hours duration. The question paper shall be of 300 marks, comprising of three sections: Analysis, Algebra, Applied Mathematics with weightage of 100 marks each. The questions would be of short answer descriptive type testing the ability and understanding of the subject.

The fee for the entrance examination would be Rs. 800/- for students of general category and Rs. 400/- for students belonging to SC/ST/PH categories payable by a bank draft drawn in favour of the Registrar, University of Delhi, Delhi-110007 payable at Delhi.

The entrance examination would be held sometimes in June/July every year and would be duly notified on the University/Department website along with the syllabus and other details of the examination.

Registration form for registration under mode-2 in the NDC/SDC/NCWEB will be available in Room No. 0], Faculty of Mathematical Sciences, New Academic Block, University of Delhi, Delhi-110007. These forms duly filled in accompanied with all the relevant certificates (original and self-attested copies thereof in person only) shall have to be submitted at the Faculty office North Delhi Campus along with a Bank Draft for Rs. 800/- (General/OBC) and Rs. 400/- (SC/ST/PH) as per eligibility conditions. The bank-draft may be drawn in favour of Registrar, University of Delhi, De1h1-110007 payable at Delhi along with a self-addressed envelope of 9”x4” size affixing postage stamp of Rs. 12/-

The Office of the Faculty of Mathematical Sciences will prepare Admission Lists for students selected for admission separately. The first admission list will be notified at the New Academic Block, Registration Centre probably in the 4th week of June
2012. Second and subsequent lists, if necessary, will be notified as early as possible, thereafter.

A copy of each admission list will also be sent to the Principal of each College concerned and also to the other Registration Centre (SDC/ NCWEB) for display, etc. Candidates whose names appear on the admission list (NDWB) will be issued provisional admission slips from the office of the Faculty of Mathematical Sciences after notification of first admission list. A candidate after collecting the admission slip will seek admission to the allotted College offering the concerned subject and attached to the North Delhi Campus.

Candidates who will be issued provisional admission slips will be required to complete the admission formalities including payment of necessary fees, etc. in a College allotted within three days of the issue of admission slips. The admission slips will be retained by Colleges and the counterfoils returned to the Faculty office, duly signed and rubber stamped by the Principals of respective Colleges after a student has been duly admitted there. The names of those candidates who fail to complete the admission formalities or fail to surrender the admission slip in any College within the stipulated period shall be removed from the admission list without any further reference to them and seats thus vacated will be offered to other candidates in order of merit (Mode- I and Mode- II)

After the college have intimated the number of seats vacant, second and subsequent admission lists of candidates selected for their provisional admission equal to the number of seats vacant each time, will be notified by the Faculty from time to time. The students in their own interest are advised to look up at the Notice Board outside the Faculty Office or website: http://maths.du.ac.in for any notification issued from time to time relating to admissions.

There would be no minimum age bar for post-graduate course under the Faculty of Mathematical Sciences, [Ee. Res. No. 120 (7) dt 27.12.2007].

3.6. **Syllabus For M.A. / M.Sc. Entrance Examination. Analysis.** Elementary set theory, finite, countable and uncountable sets, real number system as a complete ordered field, Archimedean property, supremum, infimum.

Sequence and series, convergence, limsup, liminf, Bolzano Weierstrass theorem, Heine Borel theorem.

Continuity, uniform continuity, intermediate value theorem, differentiability, mean value theorem, Maclaurin’s theorem and series, Taylor’s series, Sequences and series of functions, uniform convergence.

Riemann sums and Riemann integral, improper integrals, monotonic functions, types of discontinuity, functions of several variables, directional derivative, partial derivative.

Metric spaces, completeness, total boundedness, separability, compactness, connectedness.
Algebra. Divisibility in \( \mathbb{Z} \), congruences, Chinese remainder theorem, Euler’s \( \phi \)-function.

Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley’s theorem, Class equations, Sylow theorems.

Rings, fields, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain, polynomial rings and irreducibility criteria.

Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations, matrix representation of linear transformations, change of basis, inner product spaces, orthonormal basis. eigenvalues and eigenvectors of matrices, Cayley-Hamilton theorem.


Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.


Velocity, acceleration, motion with constant and variable acceleration, Newton’s Laws of Motion, Simple Harmonic motion, motion of particle attached to elastic string, motion on inclined plane, motion of a projectile, angular velocity and acceleration, motion along a smooth vertical circle, work, energy and impulse, Collision of elastic bodies, Bodies falling in resisting medium, motion under action of central forces, central orbits, planetary motion, moment of inertia and couple, D’Alembart’s principle.

Equilibrium of particle and a system of particles, Mass centre and centres of gravity, Frictions, Equilibrium of rigid body, work and potential energy.