Department's 99th Annual Report (1st April 2021 to 31st March 2022): Mathematics

Update

Name of the Department

Mathematics

Name of the Faculty

Mathematical Sciences

Brief History

The Department of Mathematics at the University of Delhi was established in 1947 and ever since its inception, department has always strived to be amongst the best mathematics departments in the country and has worked towards becoming a centre of excellence for advanced research in various areas of Mathematics including Algebra, Analysis, Topology, Differential Equations ,Mathematical Programming. A strong commitment of the department to excellence in teaching and research has attracted talented students from all over the country The department currently offers postgraduate M.Sc., M.Phil. and Ph.D. programs in Mathematics. It is dedicated to providing the students with the environment and the infrastructure that helps them develop the potential for scholarship, creative work, professional realization, and service. The department functions to create individuals with a strong foundation of the subjects and their practical attributes Department has been receiving various support and grants including UGC's SAP-DRS, SAP-DSA, DST-FIST and DST-PURSE

Major Activities and Achievements

The Department of Mathematics QS World ranking 2022 is 301–350 and the QS ranking within India is 9th which are improved from 2021. Faculty members of the department have Research Projects of approx. Rs. 94 Lacs and have published around 90 Research papers in journals of international repute. Two post doctoral fellows are working in the department availing prestigious NBHM and UGC Dr. D.S. Kothari fellowships. The Department of Mathematics has received best website award in 2021 in the University of Delhi. The infrastructure of the Department has improved as department Research Scholar Room, Seminar Room and Class Rooms are well equipped with laser projectors, PTZ video conferencing camera etc. Department placement cell organized many webinars and workshops for students to develop skills. Approximately 35 companies visited the campus and selected many students and the highest package offered in 2021-22 is 13.5 LPA.

Honours/Distinctions

- Ruchi Das addressed as Guest of honor in the inaugural session of two week interdisciplinary online Faculty Development Programme on “MOOC’s, E-Content Development, Research Methodology and Statistical Tools in Open Education World” at the Kalindi College University of Delhi held during August, 2021.
- Ruchi Das addressed as Guest of honor in the inaugural session of Faculty Development Programme on “Creation and Development of MOOCs while managing online classes” organized by the Keshav Mahavidyalaya, University of Delhi held during August, 2021.
- Ruchi Das appointed as subject expert, Board of studies of Mathematics, H.P.University Shimla for a period of two years from August, 2021.
- Ruchi Das was Key Note speaker in the inaugural session of an online workshop on "Net/JRF in Mathematics" organized by Himachal Ganit Parishad held during August, 2021.
- Ruchi Das was Key Note speaker and Chief guest in the inaugural function of one week interdisciplinary online Faculty Development Programme (FDP-56) on “Graph Theory and Its Applications” at the Deshbandhu college, University of Delhi held during September 15 - 21, 2021.
- Ruchi Das was Guest of Honor in the inaugural session of refresher courses on Mathematics/ Operational Research/ Statistics and Computer Science at the Centre for Professional Development in Higher Education held during October 4-18, 2021.
- Ruchi Das was Key Note Speaker and Chief Guest in the valedictory session of an International Conference on "Recent Trends in Mathematical Sciences" organized by HIMACHAL GANITA PARISHAD in December 2021 .
- Ruchi Das was Key Note Speaker and Chief guest in the inaugural session of two week refresher course in "Applicable Mathematics" organized by the Teaching Learning centre, Ramanujan College, University of Delhi held during December 15-29, 2021 .
- Ruchi Das chaired an invited talk by Prof. Arunima Ray in Indian Women in Mathematics Annual Conference January 28, 2022.
- Ruchi Das was Key Note speaker and Chief Guest in the valedictory session of National Seminar on "Applications of Mathematics in Social Sciences" sponsored by the University Grants Commission at the Shyama Prasad Mukherji College for Women, University of Delhi held during March 3-4, 2022.
- Ruchi Das is an editorial board member of Asian -European Journal of Mathematics published by World Scientific, Singapore.
- Tarun Das served as an expert in selection committees to appoint permanent faculties outside University of Delhi domain.
- Ajay Kumar joined the department as a Fellow of NASI The National Academy of Sciences.
- C.S. Lalitha is University Representative in the Governing Body of Shaheed Bhagat Singh college, University of Delhi.
- Lalit Kumar is a member of editorial board of Mathematical Journal of Interdisciplinary Sciences. Publisher: Chitkara University, Punjab.
- Lalit Kumar is a member of editorial board of International Journal of Wavelets Multiresolution and Information Processing, published by World Scientific, Singapore.
- Pratima Rai is a member of Advisory committee of the Vintage: Journal of Thematic Analysis.
- Tarun Das is University representative of Delhi College of Arts, University of Delhi.

Publications

(a.) Research Articles

1. Sharma, J. & Kumar, A , (2021) , Continuous abstract wavelet transform on homogeneous spaces , *Georgian Mathematical Journal* , 5 , 28 , 805-818 , 0

2. Kumari, P., Trisandhaya, P. & Kumar, A. , (2021) , Partial Optional Randomized Response Technique with Calibration Weighting to adjust Non-Response in Successive Sampling , *Communications for Statistical Applications and Methods* , 5 , 28 , 493-510 , 0

3. Beniwal, S., Kumar, A & Luthra, P. , (2021) , Local operator system structures and their tensor products , *Advances in Operator Theory* , 6 , 39 , - , 0

4. Madaan, V., Kumar, A. & Ravichandran, V. , (2021) , Estimates for initial coefficients of certain Bi-univalent functions , *Filomat* , 6 , 35 , 1993-2009 , 0

5. Antony, J. & Kumar, A. , (2021) , Spectra of elements in operator space tensor products of C*-algebras , *Positivity* , 5 , 25 , 1973-1987 , 0

6. Beniwal, S., Kumar, A. & Luthra, P. , (2022) , Quantized Hilbert modules over local operator algebras and Hyperrigidity of local operator systems , *Annals of Functional Analysis* , 1 , 13 , - , 0

7. Kumar, A. & Luthra, P. , (2022) , Operator System Theory: A Survey , *In Mathematics , its Applications and History (ed. S.G. Dani), Narosa, India.* , - , - , 8.1-8.20. , 0

8. Rimpi & Lalitha, C.S. , (2022) , Constraint qualifications in terms of convexificators for nonsmooth programming problems with mixed constraints , *Optimization* , - , Published online , - , 0

9. Rimpi & Lalitha, C.S. , (2022) , Constraint qualifications in nonsmooth optimization: classification and inter-relations , *Journal of Nonlinear and Variational Analysis* , 2 , 6 , 83-99 , 0

10. Vasisht , R. & Das, R. , (2022) , Generalizations of expansiveness in non-autonomous discrete systems. , *Bulletin of the Iranian Mathematical Society* , 2 , 48 , 417–433 , 0

11. Salman, M. & Das, R. , (2022) , Remarks on sensitivity and chaos in nonautonomous dynamical systems , *Journal of Difference Equations and Applications* , 2 , 28 , 289–294 , 0

12. Vasisht, R., Salman, M. & Das, R. , (2021) , Variants of shadowing properties for iterated function systems on uniform spaces , *Filomat* , 8 , 35 , 2565–2572 , 0

13. Garg, M. & Das, R. , (2021) , Chaotic behaviour of maps possessing the almost average shadowing property , *Hacettepe Journal of Mathematics and Statistics* , 5 , 50 , 1371–1383 , 0

14. Salman, M. & Das, R. , (2021) , Hypercyclic operators for iterated function systems , *Hacettepe Journal of Mathematics and Statistics* , 2 , 50 , 483–491 , 0

15. Thakur, R. & Das, R. , (2021) , Sensitivity and chaos on product and on hyperspatialsemiflows , *Journal of Difference Equations and Applications* , 1 , 27 , 1-15 , 0

16. Khan, A. G. & Das, T. , (2021) , Persistence and expansivity through pointwise dynamics , *Dynamical Systems: An International Journal* , - , 36 , 79-87 , 0

17. Khan , A. G. & Das, T. , (2021) , Average shadowing and persistence in pointwise dynamics , *Topology and its Applications* , - , 292 , 13 , 0

18. Khan, A. G., Das, P. & Das, T. , (2022) , Sequential shadowing implies spectral decomposition , *Topology Proceedings* , - , 60 , 169-179 , 0

19. Khan, A. G., Das, P. & Das, T. , (2022) , Topologically stable equicontinuous non-autonomous systems , *Filomat* , - , 35 , 3721-3731 , 0

20. Anand, J., Sahani, N. & Vastava, S. S. , (2021) , On extension of BeurlingHelsonLowdenslager theorem , *Advances in Operator Theory* , 4 , 6 , - , 1

21. Fagnola, F., Kumar, D. & Srivastava, S. , (2021) , A Quantum Laugerre Semigroup , *Indian Journal of Pure and Applied Mathematics* , - , 52 , 1201-1200 , 0

22. Malhotra, H.K. & Vashisht, L. K. , (2021) , On vector-valued nonuniform multiresolution analysis , *Applicable Analysis* , - , doi.org/10.1080/00036811.2021.1916479 , - , 0

23. Jyoti & Vashisht, L. K. , (2022) , On Hilbert-Schmidt frames for operators and Riesz bases , *Journal of Mathematical Physics, Analysis, Geometry, to appear* , - , Accepted for publication , - , 0

24. Vashisht, L. K. , (2022) , Frames with several generators associated with Weyl-Heisenberg group and extended af-fine group , *Bulletin of the Malaysian Mathematical Sciences Society* , - , doi.org/10.1007/s40840-022-01337-6 , - , 0

25. Jyoti & Vashisht, L. K. , (2022) , Duality for matrix-valued wave packet frames in L^2(R^n, C^sxr) , *International Journal of Wavelets Multiresolution and Information Process* , 4 , 20 , 20pp. , 0

26. Malhotra, H.K. & Vashisht, L. K. , (2022) , Discrete vector-valued nonuniform Gabor frames , *Bulletin des Sciences Mathematiques* , - , 178 , 34pp , 0

27. Vashisht, L. K. , (2021) , Construction of P^th-stage nonuniform discrete wavelet frames , *Results in Mathematics* , 3 , 76 , 30pp , 0

28. Patel, A., Kumar, M. & Bagai, S. , (2021) , Heat and mass transfer in a two-sided lid-driven squarecavity with non-uniform sinusoidal heating on horizontal walls , *The European Physical Journal Plus* , - , 136 , 1-32 , 1

29. Patel, A. & Kumar, V. , (2021) , Modulation instability analysis of a nonautonomous (3+1)-dimensionalcoupled nonlinear Schrodinger equation, , *Nonlinear dynamics* , - , 104 , 4355-4365 , 4

30. Kumar, V & Patel, A. , (2021) , Dispersion and phase managed optical soliton solutions of a nonautonomous(3+1)-dimensional coupled nonlinear Schrodinger equation, , *Optik* , - , 242 , - , 2

31. Bagai, S., Kumar, M. & Patel, A. , (2021) , Mixed convection in a two-sided and four-sided lid drivensquare porous cavity , *International Journal of Heat and Technology* , 3 , 39 , 711-726 , 1

32. Kumar, R. & Gaur, A. , (2022) , A note on pair of rings with the same prime ideals , *Hiroshima Mathematical Journal* , 1 , 52 , 103-112 , 0

33. Kumar, R. & Gaur, A. , (2022) , A note on residually small rings and modules , *Palestine Journal of Mathematics* , 1 , 11 , 149-151 , 0

34. Kumar, R. & Gaur, A. , (2021) , Pointwise maximal subrings , *Contri butions to Algebra and Geometry* , 4 , 62 , 843-856 , 0

35. Kumar, R. & Gaur, A. , (2021) , A note on imbedded prime divisors , *Contributions to Algebra and Geometry* , 3 , 62 , 595-597 , 0

36. Kumar, R. & Gaur, A. , (2021) , A note on ϕ-λ-rings and ϕ-Δ-rings , *Rendiconti del Circolo Matematico di Palermo Series II* , - , 70 , 1657- 1667 , 0

37. Dobbs, D.E., Gaur, A. & Kumar, R. , (2021) , On a field-theoretic invari- ant for extensions of commutative rings, II , *Palestine Journal of Mathematics* , 2 , 10 , 373-382 , 0

38. Kumari, A. & Singh, H. K. , (2022) , Fixed Point Free Actions of Spheres and Equivariant Maps , *Topology and It's Applications* , 107886 , 305 , - , 0

39. Singh, S. K. & Singh, H. K. , (2021) , Borsuk-Ulam type theorem for multivalued maps , *Hiroshima Mathematical Journal* , - , Accepted for publication , - , 0

40. Talwar, B. & Jain, R. , (2022) , Center of Banach Algebra valued Beurling Algebras , *Bulletin of the Australian Mathematical Society* , doi:10.1017/S0004972721000691 , 105 , 490-498 , 0

41. Gupta, V.P., Jain, R. & Talwar, B. , (2021) , On closed Lie ideals and center of generalized group algebras , *Journal of Mathematical Analysis and Applications* , 1 , 502 , 125228 , 0

42. Talwar, B. & Jain, R. , (2021) , Closed ideals and Lie ideals of minimal tensor product of C*-algebras , *Glasgow Mathematical Journal* , 2 , 63 , 414-425 , 0

43. Gupta, P., Goyal, A. & Jain, R. , (2021) , Independent point set domination in line graphs , *AKCE International Journal of Graphs and Combinatorics* , - , DOI: 10.1080/09728600.2021.1995307 , - , 0

44. Pal, S., Paland , S. K. & Panigrahi, A. , (2021) , Construction of S-Boxes with LBN and DBN >=4" , *Journal of Discrete Mathematical Sciences and Cryptography* , - , Accepted for publication , 2105102 , 0

45. Sharma, A. & Rai, P. , (2021) , A hybrid numerical scheme for singular perturbation delay problems with integral boundary condition , *Journal of Applied Mathematics and Computing* , - , 68 , 3445-3472 , 1

46. Yadav, S. & Rai, P. , (2021) , A parameter uniform scheme for delay parabolic singularly perturbed turning point problem , *Differential Equations and Dynamical Systems* , - , doi.org/10. 1007 /s 12591-021-00577-5, 2021. , - , 0

47. Yadav, S. & Rai, P. , (2021) , An almost second order hybrid scheme for the numerical solution of singularly perturbed parabolic turning point problems , *Mathematics and Computers in simulation* , - , 185 , 733-753 , 0

48. Rai, P. & Yadav, P. , (2021) , P., Robust numerical schemes for singularly perturbed delay parabolic convection diffusion problems with degenerate coefficient , *International Journal of Computer Mathematics* , 1 , 98 , 195-221 , 0

49. Kumar, S., Rai, P. & Cetinkaya, A. , (2021) , Radius Estimates of Certain Analytic Functions , *Honam Mathematical Journal* , 4 , 43 , 627–639 , 0

50. Kumar, S. & Rani, R. , (2022) , Symmetries of optimal system, various closed-form solutions, and propagation of different wave profiles for the Boussinesq–Burgers system in ocean waves , *Physics of Fluids* , 3 , 34 , 037109 , 5

51. Kumar, S., Mohan, B. & Kumar, A. , (2022) , Generalized fifth-order nonlinear evolution equation for the Sawada-Kotera, Lax, and Caudrey-Dodd-Gibbon equations in plasma physics: Painlevé analysis and multi-soliton solutions , *Physica Scripta* , 3 , 97 , 035201 , 6

52. Kumar, S., Dhiman, S. K. & Chauhan, A. , (2022) , Symmetry reductions, generalized solutions, and dynamics of wave profiles for the (2+1)-dimensional system of Broer–Kaup–Kupershmidt (BKK) equations , *Mathematics and Computers in Simulation* , - , 196 , 319-335 , 5

53. El-Ganaini, S. I., Kumar, S. & Niwas, M. , (2022) , Construction of multiple new analytical soliton solutions and various dynamical behaviors to the nonlinear convection-diffusion-reaction equation with power-law nonlinearity and density-dependent diffusion via Lie symmetry approach together with a couple of integration approaches , *Journal of Ocean Engineering and Science* , - , doi.org/10.1016/j.joes.2022.01.006 , - , 0

54. Kumar, A., Kumar, S. & Kharbanda, H. , (2022) , Closed-form invariant solutions from the Lie symmetry analysis and dynamics of solitonic profiles for (2+1)-dimensional modified Heisenberg ferromagnetic system , *Modern Physics Letters B* , 7 , 36 , 2150609 , 2

55. Kumar, S. & Dhiman, S. K. , (2022) , Lie symmetry analysis, optimal system, exact solutions and dynamics of solitons of a (3+1)-dimensional generalised BKP-Boussinesq equation , *Pramana-Journal of Physics* , 31 , 96 , - , 6

56. Kumar, S. & Mohan, B. , (2022) , A novel and efficient method for obtaining Hirota’s bilinear form for the nonlinear evolution equation in (n+1) dimensions , *Partial Differential Equations in Applied Mathematics* , doi.org/10.1016/j.padiff.2022.100274 , 5 , 100274 , 4

57. Ouahid, L., Abdou, M. A. & Kumar, S. , (2022) , Analytical soliton solutions for cold bosonic atoms (CBA) in a zigzag optical lattice model employing efficient methods , *Modern Physics Letters B* , 7 , 36 , 2150603 , 2

58. Kumar, S. & Rani, S. , (2021) , Invariance analysis, optimal system, closed-form solutions and dynamical wave structures of a (2+1)-dimensional dissipative long wave system , *Physica Scripta* , 12 , 96 , 125202 , 42

59. Rani, S., Kumar, S. & Kumar, R. , (2021) , Invariance analysis for determining the closed-form solutions, optimal system, and various wave profiles for a (2+1)-dimensional weakly coupled B-Type Kadomtsev-Petviashvili equations , *Journal of Ocean Engineering and Science,* , - , https://doi.org/10.1016/j.joes.2021.12.007 , - , 4

60. Kumar, S., Hamid, I. & Abdou, M.A. , (2021) , Specific wave profiles and closed-form soliton solutions for generalized nonlinear wave equation in (3+1)-dimensions with gas bubbles in hydrodynamics and fluids , *Journal of Ocean Engineering and Science* , - , https://doi.org/10.1016/j.joes.2021.12.003 , - , 2

61. Kumar, S. & Niwas, M. , (2021) , Exact closed-form solutions and dynamics of solitons for a -dimensional universal hierarchy equation via Lie approach , *Pramana-Journal of Physics* , 195 , 95 , - , 2

62. Kumar, S. & Mohan, B. , (2021) , A study of multi-soliton solutions, breather, lumps, and their interactions for Kadomtsev-Petviashvili equation with variable time coefficient using Hirota method , *Physica Scripta* , 12 , 96 , 125255 , 23

63. Kumar, S. , (2021) , Some new families of exact solitary wave solutions of the Klein–Gordon–Zakharov equations in plasma physics , *Pramana-Journal of Physics* , 161 , 95 , - , 21

64. Kumar, S. & Kumar, D. , (2021) , Generalised exponential rational function method for obtaining numerous exact soliton solutions to a (3+1)-dimensional Jimbo–Miwa equation , *Pramana-Journal of Physics* , 152 , 95 , - , 6

65. Kumar, S. & Kumar, A. , (2021) , Abundant closed-form wave solutions and dynamical structures of soliton solutions to the (3+1)-dimensional BLMP equation in mathematical physics , *Journal of Ocean Engineering and Science* , - , doi.org/10.1016/j.joes.2021.08.001 , - , 14

66. Kumar, S., Jadaun, V. & Ma, W-X. , (2021) , Application of the Lie symmetry approach to an extended Jimbo–Miwa equation in (3+1) dimensions. , *The European Physical Journal Plus* , 843 , 136 , - , 10

67. Niwas, M. , Kumar, S. & Kharbanda, H. , (2021) , Symmetry analysis, closed-form invariant solutions and dynamical wave structures of the generalized (3+1)-dimensional breaking soliton equation using optimal system of Lie subalgebra , *Journal of Ocean Engineering and Science* , - , doi.org/ 10.1016/j.joes.2021.08.002 , - , 12

68. Kumar, S., Niwas, M., Osman, M.S. & Abdou, M.A. , (2021) , Abundant different types of exact-soliton solutions to the (4+1)-dimensional Fokas and (2+1)-dimensional Breaking soliton equations , *Communications in Theoretical Physics* , 10 , 73 , 105007 , 26

69. Kumar, S. & Rani, S. , (2021) , Lie symmetry analysis, group-invariant solutions and dynamics of solitons to the (2+1)-dimensional Bogoyavlenskii–Schieff equation , *Pramana – Journal of Physics* , 51 , 95 , - , 0

70. Kumar, S., Kumar, A. & Kharbanda, H. , (2021) , Abundant exact closed-form solutions and solitonic structures for the double-chain deoxyribonucleic acid (DNA) model , *Brazilian Journal of Physics* , - , 51 , 1043–1068 , 26

71. Kumar,S., Kumar, D. & Wazwaz, M. A. , (2021) , Lie symmetries, optimal system, group-invariant solutions and dynamical behaviors of solitary wave solutions for a (3+1)-dimensional KdV-type equation, , *The European Physical Journal Plus* , 531 , 136 , - , 19

72. Ouahid, L., Abdou, A. M. Kumar, S. & Owyed, S. , (2021) , A plentiful supply of soliton solutions for DNA Peyrard–Bishop equation by means of a new auxiliary equation strategy, , *Internationl Journal Modern Physics B* , 26 , 35 , 2150265 , 9

73. Hendi, A. A., Ouahid, L., Kumar,S., Owyed, S. & Abdou, A. M. , (2021) , Dynamical behaviors of various optical soliton solutions for the Fokas-Lenells equation , *Modern Physics Letters B* , 34 , 35 , 2150529 , 5

74. Dhiman, S. K. , Kumar, S. & Kharbanda, H. , (2021) , An extended (3+1)-dimensional Jimbo-Miwa equation: Symmetry reductions, invariant solutions, and dynamics of different solitary waves , *Modern Physics Letters B* , 34 , 35 , 2150528 , 22

75. Jain, S. & Kumar, S. , (2021) , Dynamic analysis of the role of innate immunity in SEIS epidemic model , *The European Physical Journal Plus,* , 439 , 136 , - , 4

76. Kumar, S. & Kharbanda, H. , (2021) , Sensitivity and Chaotic Dynamics of an Eco-Epidemiological System with Vaccination and Migration in Prey , *Brazilian Journal of Physics* , - , 51 , 986-1006 , 0

77. Jain, S & Kumar, S , (2021) , Chaos detection in SIR model with modified Beddington-De Angelis type incidence rate and saturated treatment , *International Journal of Modeling Simulation and Scientific Computing* , 6 , 12 , 2150049 , 0

78. Shah, S. , Singh, R. & Jena, J. , (2022) , Steepened wave in two-phase Chaplygin flows comprising a source term , *Applied Mathematics and Computation* , - , 413 , 126656 , 1

79. Kipgen, L. & Singh, R. , (2022) , Riemann problem for van der Waals reacting gases with dust particles , *Ricerche di Matematica* , - , doi.org/10.1007/s11587-021-00654-5 , - , 1

80. Chaudhary, K. B. & Singh , R. , (2022) , Converging shocks in van der Waals stiffened relaxing gases , *The European Physical Journal Plus* , doi.org/10.1140/epjp/s13360-022-02499-9 , 137 , - , 0

81. Kipgen, L. & Singh, R. , (2022) , Collision of an acceleration wave with blast wave in van der Waals dusty reacting gases , *Physics of Fluids* , - , 34 , 056106 , 0

82. Kumar, S. & Sharma, P. , (2022) , Faedo–Galerkin method for impulsive second-order stochastic integro-differential systems , *Chaos, Solitons & Fractals* , - , 158 , 111946 , 1

83. Kumar, S.& Abdal, S. M. , (2022) , Approximate controllability of nonautonomous second-order nonlocal measure driven systems with state-dependent delay , *International Journal of Control* , - , doi.org/10.1080/00207179.2021.2023763 , 1-12 , 2

84. Upadhyay, A. & Kumar, S. , (2022) , Existence of solutions for non-autonomous second-order stochastic inclusions with Clarke's subdifferential and non instantaneous impulses, , *Filomat* , 4 , 36 , 1215–1230 , 0

85. Kumar, S. & Yadav, S. , (2021) , Infinite-delayed stochastic impulsive differential systems with Poisson jumps , *Indian Journal of Pure and Applied Mathematics* , - , 52 , 344-362. , 0

86. Kumar, S. & Abdal, S. M. , (2021) , Approximate controllability of non-instantaneous impulsive semilinear measure driven control system with infinite delay via fundamental solution , *IMA Journal of Mathematical Control and Information* , 2 , 38 , 552-575 , 9

87. Kumar, S. & Abdal, S. M. , (2021) , Approximate Controllability for a class of instantaneous and non-instantaneous impulsive semilinear systems , *Journal of Dynamical and Control Systems* , - , doi.org/10.1007/s10883-021-09540-7 , - , 3

88. Kumar, S. & Upadhyay, A. , (2021) , Optimal control problem for fractional stochastic delayed systems with noninstantaneous impulses , *IMA Journal of Mathematical Control and Information* , 3 , 38 , 855-880 , 3

(b.) Books/Chapter in Books

1. A. Jayswal and T. Antczak (Editors)/ S. Kapoor and Lalitha C.S.(Autors) , (2022) , Density aspects in semi-infinite vector optimization , *Boca Raton* , CRC Press (Taylors & Francis) , 9781003289883 , -

(c.) Journal(s) Published by the Department

1. NA,(NA) ,NA , *NA* , NA , NA , NA

Research Projects

1. DST-SERB Core Research Grant, 2020-23, “Asymptotics of Solutions of Linear and Non-Linear Delay Differential Equa tions”-Sachi Srivastava, 10.59

2. DST-SERB (MATRICS Scheme), 2020-23, “Quantum Dynamical Semigroups and Perturbations”- Sachi Srivastava, 6.6

3. DST-SERB (MATRICS Scheme), 2020-23 , “Lie Symmetry Analysis and Dynamics of Physical Phenomena for Nonlinear Evolution Equations”- Sachin Kumar, 6.6

4. DST-SERB (EEQ Scheme), 2020-23 , “Study of the dynamics of exact solu tions for the nonlinear evolution equa tions using Lie symmetry analysis”- Sachin Kumar, 20.74

5. DST-SERB (MATRICS Scheme), 2018-21, “Finite Group Actions on Product of Spaces of Type (0,0) and Borsuk-Ulam Type Theorem for Product of Projec tive Spaces”- H. K. Singh, 6.6

6. DST-SERB (EMR Scheme), 2018-21, “Index of Finitistic Spaces and Trans formation Groups on Projective Space”- H. K. Singh, 17.51

7. DST-SERB (MATRICS Scheme), 2018-21, “Scalarization Aspects in Vector and Set Optimization”- C. S. Lalitha, 6.6

8. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Semigroups of positive operators on C* algebras and derivations"- Sachi Srivastava, 1.75

9. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Schauder Frames in Banach Spaces and Their Applications "- Lalit Kumar, 1.6

10. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Structure of shock waves in polyatomic gases"-Arvind Patel, 1.75

11. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Free involutions on Grassmanian manifold G(n,k)"-Hemant Kumar Singh, 1.5

12. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Studies on Analytical Solutions and Solitonic Structures For Nonlinear Evolutionary Differential Equations"-Sachin Kumar, 1.75

13. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "Investigation of Shock Waves in Compressible flow"-Randheer Singh, 1.75

14. Faculty Research Programme Grant-IoE, University of Delhi, 2021-22, "The Solvability and Approximate Controllability for Stochastic Differential Equations with Impulse"- Surendra Kumar, 1.75

15. DST-SERB (MATRICS Scheme), 2019-22, “On Some Ring Extensions”- Atul Gaur, 6.6

Patents Filed/Granted

1. NA and NA

Seminars/Conferences organized by the Department

1. Mr Gaurav Srivastava, National Head, Power Sector Company, University of Delhi, "Let's take a pause to realign our lives and seek within. Is there peace ? Is there a joy? Satisfaction?" on the occasion of International Yoga Day, 21-06-2021

2. Professor Oscar Randal-Williams, Department of Pure Mathematics and Mathematical Statistics, Centre for Mathematical Sciences, University of Cambridge, Cambridge, UK, University of Delhi, "Tautological rings for smooth manifolds", 30-11-2021

3. Professor Killampalli Srinivasa Rao, Senior Professor (Retd.), The Institute of Mathematical Sciences, Chennai, University of Delhi, "Life and glimpses into the work of Srinivasa Ramanujan" on the occasion of National Mathematics Day, 22-12-2021

4. Professor S S Khare, Ex Pro Vice Chancellor, North-Eastern Hill University, Shillong, University of Delhi, "Academic Ethics and the Challenges" on the occasion of Vigilance Awareness Week-2021 on the theme Independent India @ 75: Self reliance with Integrity, 10-11-2021

5. Dr Shruti Dubey, Assistant Professor, Department of Political Science, Faculty of Social Sciences, Banaras Hindu University, Varanasi, University of Delhi, "Constitution of India: Rationale and Relevance" to celebrate 75th Years of India’s Independence-Azadi Ka Amrut Mahotsava on the occasion of Samvidhan Diwas (Constitution Day), 26-11-2021

6. Professor Isabelle Chalendar, University Paris Est Marne-la-Vallee, France, University of Delhi, "Spectral properties of weighted composition operators on spaces of analytic functions" organised by the seminar committee, South Campus, 29-04-2021

7. Professor Marc Rieffel, University of California, Berkeley , University of Delhi, Physicists say "Matrix algebras converge to the sphere.” How can that be? organised by the seminar committee, South Campus, 30-06-2021

8. Professor Vern Paulsen, University of Waterloo, University of Delhi, "Playing Games with Entanglement Assistance" organised by the seminar committee, South Campus, 30-09-2021

9. Professor Nikhil Srivastava, University of California, Berkeley, University of Delhi, "Nodal Domains in Sparse Random Graphs" organised by the seminar committee, South Campus, 28-02-2022

Seminar/Conference Presentations (National/International) by Faculty Members

1. Tarun Das delivered an invited talk entitled "Topological Dynamics- Some recent advances" in a National Conference at the Department of Mathematics, Manipur University during March 2022.

2. Tarun Das delivered a Key Note Address as a Chief Guest entitled "Srinivasa Ramanujan – at a glance" in a National Conference at the Department of Mathematics, Aggarwal College, Ballabgarh during December 2021.

3. Tarun Das delivered an invited talk entitled "Dynamical systems: a reflection on Chaos and entropy" in an International Conference at the Himachal Ganit Parishad during Shimla, December 2021.

4. Tarun Das delivered an invited talk entitled "Topological entropy in dynamical systems – Recent advances in an International Conference on Differential Geometry & Topology at the Department of Mathematics, Central University of Punjab during October 2021.

5. Tarun Das delivered an invited talk entitled "Recurrence in Dynamical Systems- at a glance" in a Annual Conference of Ramanujan Mathematical Society at the Amrita Vishwavidyalaya, Coimbatore during August, 2021.

6. Sachi Srivastava delivered an invited talk entitled “Stability of Delay Semigroups” in the 87th Annual Conference of the Indian Mathematical Society organized by the MGM University, Aurangabad held during December 4-7, 2021.

7. Sachi Srivastava delivered an invited talk entitled “Stability and Polynomial Stability of Delay Semigroups” in Symposium on Operator Semigroups and Evolution Equations of 8th European Conference of Mathematics, Portoroz, Slovenia, held during June 22-26, 2021.

8. Anupama Panigrahi presented a paper entitled "Construction of Compact Boolean S-Boxes for Some Lightweight Ciphers" in the International Conference on "Recent Trends in Mathematics" organized by the Department of Mathematics, Hansraj College, University of Delhi held during December 22-24, 2021.

9. Sachin Kumar delivered an invited talk entitled "Invariant closed-form solutions and various dynamical wave profiles for the higherdimensional nonlinear differential equation" the 6th International Virtual Workshop on Nonlinear and Modern Mathematical Physics (NMMP-2022) organized by Florida A&M University, Tallahassee, Florida held during June 17-19, 2022.

National/International MoUs Signed

a. NA

Other Inter-Institutional Collaborations

1. Ajay Kumar collaborated with V Ravichandran, Department of Mathematics National Institute of Technology, Tiruchirappalli, Tamil Nadu, India.
2. Sachi Srivastava collaborated with Prof. Ralph Chill, TU Dresden, Dresden, Germany.
3. Sachi Srivastava collaborated with Prof. Franco Fagnola, Politechnico di Milano, Milan, Italy.
4. Atul Gaur collaborated with David E. Dobbs, Department of Mathematics, University of Tennessee, Knoxville, Tennessee 37996-1320, U.S.A.
6. Sachin Kumar collaborated with Prof. Wen-Xiu Ma (University of South Florida), USA.
7. Sachin Kumar collaborated with Prof. Abdul-Majid Wazwaz (Saint Xavier University), USA.
8. Sachin Kumar collaborated with Prof. M.A. Abdou (University of Bisha), Saudi Arabia.
9. Sachin Kumar collaborated with Prof. Loubna Ouahid (University of Bisha), Saudi Arabia.
10. Sachin Kumar collaborated withProf. Shoukry El Ganaini (Damanhour University), Egypt.
11. Sachin Kumar collaborated with Prof. M.S. Osman (Cairo University), Egypt.

No. of Students under Exchange Programme

NA

Placement Details (Number and percentage of students placed)

Total Number of Students Placed- 64, Percentage of Students Placed- 60.377

Extension and Outreach Activities

1. Tarun Das delivered a lecture entitled "Toral Automorphisms" in a Faculty Development Programme at the Vivekananda College, University of Delhi in July, 2021.

2. Tarun Das delivered a lecture entitled "Research methodology and emphasis on quality publications" in a Faculty Development Programme at the Hansraj College, University of Delhi in October 2021.

3. Tarun Das delivered a lecture entitled "Enhancing Research Capacity and collaborations- challenges" in a Faculty Development Programme at the Kalindi College, University of Delhi in August, 2021.

4. Sachi Srivastava delivered a lecture entitled “Analysis – Measure Theory” in Advanced Foundation School II held at Shiv Nadar University, in December 2021.

5. Sachi Srivastava delivered a lecture entitled “Meet the Alumana” in Alumna Retreat of Lady Shri Ram College, University of Delhi held during November 2021.

6. Sachi Srivastava delivered a lecture entitled “An introduction to Hilbert Spaces” in Refresher Course in Mathematics organised by Teaching Learning Centre, Ramanujan College, University of Delhi held during September 2021.

7. Ranjana Jain delivered a lecture entitled "Creating e-content using open source tools" in Faculty Development Programme on “Introduction and Working with Open Source Software, Kalindi College, University of Delhi in August, 2021.

8. Ranjana Jain delivered a lecture entitled "Research methodology in mathematics and Plagiarism" in the Refresher Course in Mathematics organized by the Ramanujan College, University of Delhi in September, 2021.

9. Ranjana Jain delivered an invited talk entitled "Some applications of Perron Frobenious Theorem" at the Annual Fest "Tangentia'22" of Atma Ram Sanatan Dharam College, University of Delhi on February 19, 2022.

10. Ranjana Jain delivered an invited talk entitled "Some applications of non negative matrices” on the occasion of Pi Day at Hansraj College, University of Delhi, on March 14, 2022.

11. Sachin Kumar delivered an invited talk entitled "Application of the Lie Symmetry Method to Solve Higher-dimensional Nonlinear Evolution Equations in Mathematical Physics" in Faculty Development Programme on Recent Techniques for the solutions of Nonlinear Differential Equations held at JIIT Noida on October 23, 2021.

Faculty Strength

18 plus one NASI Fellow

Number of Ph.D. Degrees Awarded

29

Number of M.Phil. Degrees Awarded

9

Other Significant Information

1. Ruchi Das served as Dean, Faculty of Mathematical Sciences and Head, Department of Mathematics during April 2021 – March 2022. 2. Ralph Chill, TU Dresden, Germany joined as Adjunct Professor at the Department of Mathematics, University of Delhi under DST-SERB VAJRA Faculty Scheme from 30th August 2021. 4. Ruchi Das is a member of Standing Committee on academic matters to the Academic Council, 2021-22. 5. Ruchi Das is a member of Business Advisory Committee of the Academic council, 2021-22. 6. Ruchi Das is a subject Expert on Mathematical Sciences; Inspire Fellowship, DST, Ministry of Science and Technology, Government of India. 7. Ruchi Das is a member of Subject Expert Committee (SEC) on Physical & Mathematical Sciences under Women Scientists Scheme-A (WOS-A), a flagship program of Department of Science and Technology (DST) since November 2021. 8. Ruchi Das is a member of Formulation and related matters for Faculty of Technology, University of Delhi. 9. Tarun Das organized an international Conference of History of Mathematics as a Convener, Program Committee, Indian Society of History of Mathematics during December 16-18, 2021. 10. Hemant Kumar Singh organized an online Workshop on “MOOCs, E-content Development and Open Educational Resources” as a Convener at the Centre for Professional Development in Higher Education (CPDHE), UGC-HRDC, University of Delhi, Delhi during December 15-21, 2022. 11. Hemant Kumar Singh organized an online Refresher Course in Mathematics/ Operational Research/ Statistics and Computer Science as a Co-coordinator at the Centre for Professional Development in Higher Education (CPDHE), UGC-HRDC, University of Delhi, Delhi during October 4-18, 2021.